

European Society of
Anaesthesiology and
Intensive Care

Volume 38 | e-Supplement 59 | December 2021
www.ejanaesthesiology.com

EJA

European Journal
of
Anaesthesiology

Euroanaesthesia 2021
The European Anaesthesiology Congress

Abstracts Programme

Abstracts

EUROANAESTHESIA 2021

The European Anaesthesiology Congress

European Journal of Anaesthesiology

Editor-in-Chief

Charles Marc Samama, *Paris, France*

Deputy Editors-in-Chief

Nicolas Bruder, *Marseille, France*

Michelle Chew, *Linköping, Sweden*

Patrice Forget, *Aberdeen, UK*

Tom Hansen, *Odense, Denmark*

Dan Longrois, *Paris, France*

Anne-Claire Lukaszewicz, *Lyon, France*

Esther Pogatzki-Zahn, *Muenster, Germany*

Marc Van de Velde, *Leuven, Belgium*

Associate Editors

Fanny Bonhomme, *Geneva, Switzerland*

Matthias Desmet, *Kortrijk, Belgium*

Robert Greif, *Berne, Switzerland*

Maria Lema, *Madrid, Spain*

Annelies Moerman, *Ghent, Belgium*

Mona Momeni, *Bruxelles, Belgium*

Tino Münster, *Regensburg, Germany*

Ayten Saracoglu, *Istanbul, Turkey*

Patrick Schoettker, *Lausanne, Switzerland*

Methods, Statistics, Epidemiology

Malachy Columb, *Manchester, UK*

Nadia Elia, *Geneva, Switzerland*

Book and Media Reviews

Paola Aceto, *Rome, Italy*

Journal Manager

Lizzy Seal, *London, UK*

Language and Technical Editors

Ian Jenkins, *Bristol, UK*

Gordon Lyons, *Leeds, UK*

Ian F. Russel, *Hull, UK*

Andrew Wolf, *Bristol, UK*

European Journal of Anaesthesiology is the official publication of the European Society of Anaesthesiology. The Journal publishes original scientific work. Preference is given to experimental work or clinical observations in man, and to laboratory work of clinical relevance.

Information for contributors

Papers should be submitted online at: www.editorialmanager.com/eja.

European Journal of Anaesthesiology (ISSN: 0265-0215) is published monthly by Wolters Kluwer Health, Inc. and distributed in the US by Mercury Airfreight International, Inc., 365 Blair Road, Avenel, NJ 07001. Periodicals postage paid at Rahway, NJ. POSTMASTER: send address changes to *European Journal of Anaesthesiology*, PO Box 1610, Hagerstown, MD 21740, USA.

All correspondence should be addressed to the Editorial Office: *European Journal of Anaesthesiology*, Lippincott Williams & Wilkins, Citi Building, 41st Floor, 25 Canada Square, London E14 5LQ, UK
Publisher Daniel Hyde

Production Editor Duncan Martin-Holloway

Copyright © 2021 by European Society of Anaesthesiology and Intensive Care. All right reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise without either the prior written permission of the Publisher or a licence permitting restricted copying issued by the Copyright Licensing Authority and in the USA by the Copyright Clearance Center.

Printed on chlorine-free, recyclable paper from sustainable forests meeting the requirements of ISO 9706, ISO 14001 and ISO 9001 in Singapore by Markono Print Media Pte Ltd. Typeset by Thomson Digital Ltd., Noida Special Economic Zone, Noida, India.

Advertising: For journal specific contacts go to media kit site (<http://advertising.lww.com/media-kits.html>)

Reprints and Special Projects (U.S./Canada): For journal specific contacts go to media kit (<http://advertising.lww.com/media-kits.html>)

Reprints and Special Projects (non-U.S./Canada):

internationalreprints@wolterskluwer.com and for further journal specific contacts go to media kit (<http://advertising.lww.com/media-kits.html>)

Disclaimer

Although every effort is made by the publisher and editorial board to see that no inaccurate or misleading data, opinion or statement appear in this journal, they wish to make it clear that the data and opinions appearing in the articles and advertisements herein are the responsibility of the contributor or advertiser concerned. Accordingly, the publisher, the editorial board and their respective employees accept no liability for the consequences of any such inaccurate or misleading data, opinion or statement.

Drugs and drug dosages

Readers are advised that new methods and techniques described involving drug usage should be followed only in conjunction with drug manufacturers' own published literature.

2021 Subscription rates

Individual \$641 (USA); \$680 (Rest of the World). Institutional \$2,299 (USA); \$2,642 (Rest of the World). On-line only subscriptions for Institutions are available through Ovid (www.ovid.com). Prices include handling and shipping, but not sales tax, e.g. VAT, GST, MVG, MWS, AST and regional sales tax. Where applicable, please add sales tax to the listed prices at the appropriate rate. (The Canadian GST of 7% will be added to the subscription price of all orders shipped to Canada. Wolters Kluwer Health, Inc. GST Identification Number is 895524239.) Copies will be replaced without charge if the publisher receives a request within 90 days of the mailing date, both in the USA and worldwide.

Subscription information

European Journal of Anaesthesiology, Subscription Department, Wolters Kluwer Health, Inc., 1800 Dual Highway, Suite 201, Hagerstown, MD 21740-6636, USA; phone +1 800 638 3030; fax +1 301 223 2400.

The abstracts published in this Supplement have been typeset from electronic submissions and camera-ready copies prepared by the authors. Every effort has been made to reproduce faithfully the abstracts as submitted. These abstracts have been prepared in accordance with the requirements of the European Society of Anaesthesiology and have not been subjected to review nor editing by the European Journal of Anaesthesiology. However, no responsibility is assumed by the organisers or publisher for any injury and/or damage to persons or property as a matter of products liability, negligence or otherwise, or from any use or operation of methods, products, instructions or ideas contained in the material herein. Because of the rapid advances in medical sciences, we recommend that independent verification of diagnoses and drug doses should be made.

Call for abstracts

**The ESAIC solicits the submission of abstracts for
the Euroanaesthesia 2022 Congress
Milan, Italy
4-6 June 2022**

**All abstracts must be submitted online via the
Euroanaesthesia website**

**The submission module will be available to
submitters as from late December 2022**

Submission Conditions

When submitting your abstract, you will be prompted to accept the submission conditions that will be made available on the Euroanaesthesia website at least one month before the submissions starts.

Best Abstract Prize Competition (BPAC)

BAPC-1

Total intravenous anaesthesia with remimazolam/remifentanyl compared to propofol/remifentanyl significantly reduces the incidence of critical hypotension in ASA III to IV patients - First results of a European phase III multicenter trial (CNS7056-022)

Fechner J.¹, Barvais L.², Morley A.³, Motsch J.⁴, Spahn D. R.⁵, Struys M.R.F. M.⁶, SURE-TIVA trial study group©

¹FAU Erlangen-Nuremberg - Erlangen (Germany), ²Hopital Erasme, Clinique Universitaires de Bruxelles - Brussel (Belgium), ³PAION UK - Cambridge (United Kingdom), ⁴Universität Heidelberg, Universitätsklinikum Heidelberg - Heidelberg (Germany), ⁵Universität Zürich, Universitätsspital Zürich - Zurich (Switzerland), ⁶University of Groningen, University Medical Center Groningen - Groningen (Netherlands)

Background and Goal of Study: Remimazolam is a new benzodiazepine with a short-acting pharmacokinetic-dynamic time course (1) and a beneficial haemodynamic profile (2). In this European randomized prospective phase III multicenter trial we have compared remimazolam to propofol during TIVA for non-inferior anaesthetic efficacy in achieving adequate anaesthesia and for superior haemodynamic stability.

Materials and Methods: ASA class III or IV patients scheduled for elective surgery were randomized for total intravenous anaesthesia (TIVA) with remimazolam/remifentanyl (R) or propofol/remifentanyl (P) in a ratio of 3:1 for R:P. The Narcotrend® Index (NCI) was continuously measured. For haemodynamic comparison, the time interval of interest (TIOI) was defined as start of induction to 15 min after skin incision. Invasive arterial blood pressure measurements were started 5 min before induction and recorded every 20 s (FloTrac® system). The number of critical hypotensive events (CHE, composite endpoint) were calculated as the sum of mean arterial pressure (MAP) < 65 mm Hg for > 1 min duration, norepinephrine (NE) bolus doses of 10 µg iv. or a NE infusion (1 event per 2 min) and a decrease in MAP of 20% or 30% from baseline. Due to inter-component correlations the composite endpoint was analysed with a common factor analysis and tested with the Wilcoxon Rank Sum Test. Treatment arms were compared with a Mann-Whitney-u-test (MWU, p<0.05, mean±SD). Remifentanyl and NE doses were compared with a t-test (p<0.05; mean±SD).

Results and Discussion: 365 patients were randomized to group R (n:270) and group P (n:95). Age, sex, height, weight, BMI, duration of TIOI (R:66±19.2 min; P:67±18.7 min, p:0.565) and remifentanyl dose (R:6.2±4.1 µg/kg/h, P:6.3±4.2 µg/kg/h; p:0.788) during TIOI were not different between group R and P. Percentage of time of TIOI with a NCI value ≤ 60 was non-inferior in group R (92.8±20.66) compared to group P (99.1±4.7) (p<0.0027). In contrast for the TIOI the number of CHEs per patient were significantly lower in group R (R:61.9±38.1, P:71.0±41.1, p:0.015). The NE doses administered during the TIOI were also significantly lower in group R (R:2.2±2.1 µg/kg, P:3.4±3.5 µg/kg, p:0.0018).

Conclusion: TIVA with remimazolam compared to propofol significantly reduces the incidence of critical hypotension with a MAP < 65 mm Hg of more than 1 minute duration.

Reference:

1. J. Zhou et al. Clin Transl Sci 2020; 2) M. Doi et al. J Anesth 2020 Cardiac, Thoracic and Vascular Anaesthesiology

BAPC-2

Increased cerebral blood flow despite reduced oximetry during cardiopulmonary bypass suggests cerebral perfusion mismatches in patients developing postoperative delirium

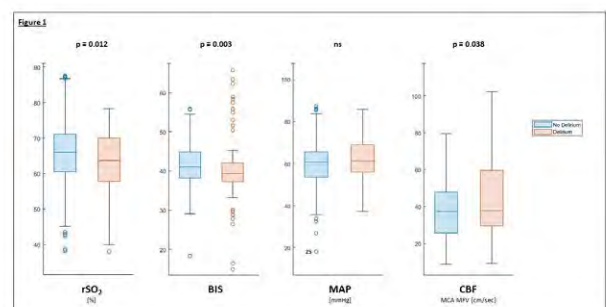
Braun L.¹, Thudium M.¹, Kornilov E.², Menzenbach J.¹, Coburn M.¹, Hilbert T. C.¹

¹University Hospital Bonn - Bonn (Germany), ²Rabin Medical Center - Petach Tikva (Israel)

Background: Decreased cerebral oximetry (rSO₂) in cardiac surgery is associated with postoperative delirium (POD) [1]. However, interventions optimizing intraoperative rSO₂ failed to demonstrate positive effects on neurological outcome [2]. We assessed the relation between rSO₂, cerebral blood flow (CBF), and processed EEG in cardiac surgery POD patients.

Methods: In adults undergoing elective cardiac surgery, CBF was continuously recorded by transcranial Doppler sonography (TCD), together with continuous rSO₂ and bispectral index (BIS) monitoring. Cardiopulmonary bypass (CPB) flow rate was adjusted according to body surface area. The cohort was divided into POD and control group, according to postoperative results of the CAM(-ICU), the 4A test, and the Delirium Observation Scale (DOS). In a subgroup, pre- and postoperative Syndecan-1 (SDC-1) serum levels were assessed using bead-based multiplex arraying.

Results: In 37 consecutive patients, incidence of POD was 38 % (14 patients). MAP showed no intergroup differences. rSO₂ values were significantly lower in POD group, compared to controls (median 64 [IQR 58 - 70] vs. 66 [61 - 71] %, Mann-Whitney p = 0.012). BIS values were likewise significantly decreased, while burst suppression ratio was increased in POD patients (1.13 [0.15 - 8.52] vs. 0.37 [0.05 - 1.39] %, p < 0.001). In spite of reduced rSO₂ and BIS, equal MAP, and even lower pump flow rate (4.4 [3.9 - 5.0] vs. 4.8 [4.3 - 5.2] l/min, p < 0.001) in POD group, TCD-derived CBF was significantly increased compared to controls (37.72 [29.35 - 59.42] vs. 37.34 [25.68 - 47.81] cm/sec, p = 0.038) (Fig. 1). Postoperative SDC-1 levels were significantly elevated in patients developing POD (4.0 [3.0 - 5.9] vs. 3.0 [2.5 - 4.0] ng/ml, p = 0.037).



Conclusion: Reduced rSO₂ and BIS values may reflect a vulnerable cerebral functional status, making the patient prone to developing POD. Interventions that increase rSO₂ to prevent POD may fail when they result in critical cerebral perfusion mismatches and increased vascular shear stress with glycocalyx damage.

References:

- Soh S et al., J Clin Monit Comput 2020 Aug
- Uysal S et al., J Thorac Cardiovasc Surg 2020 Mar

BAPC-3 Anaesthesiology and the patient's perception

Bezerra de Lima Novo J.¹, Ribeiro D.², Oliveira F.², Barbosa J.², Mourão J.³

¹Centro Hospitalar São João, EPE - Porto (Portugal), ²Faculdade Medicina Universidade do Porto - Porto (Portugal), ³Centro Hospitalar São João - Porto (Portugal)

Background and Goal of Study: The role of the Anaesthesiology remains uncertain. Many patients still do not recognize the functions of the anesthesiologist, and concerns about anaesthesia still subsist. Our goals were to evaluate the general knowledge of the Portuguese population about the clinical practice of the Anaesthesiologist and to understand their main concerns regarding the anaesthetic procedure. **Materials and Methods:** Prospective study performed at the Ambulatory Surgery Department with duration of 2 months. Patients older than 18 years old proposed for ambulatory surgery were included. Exclusion criteria were patient's refusal and non-autonomous or illiterate patients. Each filled a questionnaire before the assessment visit with the anesthesiologist, with 15 questions including demographics, previous anesthesia, role of the anesthesiologist, main concerns with anesthetic procedure and knowledge about general and regional anesthesia. The questions were assessed as correct (one point) or incorrect/do not know/do not answer (0 points).

Results and Discussion: A total of 259 patients were included. Median age was 47 years and the ratio female:male was 77:164 (no-respondents:18). 71.8% (n=186) considered the anesthesiologist to be a specialized physician and the tasks most recognized to these physicians were to "put patients to sleep" (67,6%,n=175) and the assessment of the patient before surgery (67,2%, n=174). Only 24.7% (n=65) considered the anesthesiologist as the most competent member to treat intra-operative complications such as severe allergic reactions or cardiac arrest. 59.8% (n=155) were not afraid of the anesthetic procedure and 80.6% (n=208) considered it to be safe. The main concern of this populations was "not waking up after surgery" (21,2%, n=55). A significant association with the number of correct answers was found only with general level of education (p<0.001). No association was found with any other variables, including previous anesthetic procedures.

Conclusion: The role of the anesthesiologist remains overly underestimated, and patients' knowledge has not improved significantly over the recent years¹. Patients with higher academic levels have a better knowledge about anesthetic procedures. Efforts should be made to educate patients in this regard, particularly during the pre-anesthesia consultation.

Reference:

1. Ribeiro C., Mourão J. O anestesiolista: a visão do doente. Rev. Bras. Anestesiol, Dec. 2015

BAPC-4 Myocardial infarction after non-cardiac surgery

Schmidt M. T.¹, Ruetzler K.¹, Department of OUTCOMES RESEARCH
¹Cleveland Clinic Foundation - Cleveland (United States)

Background and Goal of Study: Chest pain after non-cardiac surgery might be multifactorial, but is also the main symptom of myocardial infarction (MI). MI is associated with significant morbidity and mortality postoperatively. Therefore, patients having chest pain need to be promptly evaluated for potential MI. At Cleveland Clinic (CC) postoperative chest pain initiates an activation of the Adult Medical Emergency Team (AMET) consisting of an anesthesiologist, a registered nurse, and a respiratory therapist. The aim of this study was to investigate the rate of MI in patients having chest pain and their outcome.

Methods: This is a retrospective analysis of medical records of in-patients having AMET activations for chest pain after noncardiac surgery between 2011 and 2019 at CC. Patients were excluded if they had any disease of heart muscle, stroke or heart failure. The primary outcome was the rate of patients being diagnosed with MI during hospitalization, which was defined as patients having chest pain and a troponin elevation above 0.03ng/dl. Secondary outcomes are summarized in table 1. We did a Post-hoc analysis using a logistic regression model to assess the

association between postoperative MI and some risk factors including hemoglobin levels (Hb) adjusting for age, sex, and race.

Results: Among 5880 cases, 924 (16%; 95% CI: 15%-17%) patients had MI during hospitalization. Half of patients had ICU admission with a median [Q1, Q3] of 2.2 [1.3, 4.4] days. During the hospitalization, 17 (0.4%) patients had STEMI; 49 (0.8%) patients had cardiac surgery and 77 (1.3%) patients had cardiac catheterization. The median postoperative hospital stay was 8.5 [5, 16] days. 63% patients had ECG reading within one hour after AMET and 26% patients had troponin test within 30 minutes after AMET activation, Table 1. Hb of patients who had MI after AMET activation was lower than that of patients who did not. Hb was significantly associated with MI after AMET with an estimated odds ratio of 1.20 (95% CI: 1.12, 1.30; P<0.001).

Conclusion: AMET activation after non-cardiac surgery allows early detection of potential MI. Lowest Hb was associated with MI and could be a modifiable risk factor to improve outcomes.

BAPC-5 Effects of sodium glucose co-transporter 2 inhibitor empagliflozin on endothelial dysfunction induced by oscillatory shear stress

Li X.¹, Zuurbier C. J.¹, Hollmann M. W.¹, Hermanides J.¹, Preckel B.¹, Weber N. C.¹

¹Amsterdam UMC - Amsterdam (Netherlands)

Background and Goal of Study: Anaesthetists are facing an increasing challenge from high-risk patients with significant co-morbidities undergoing cardiac surgery. Empagliflozin (EMPA), a novel glucose-lowering agent, improves cardiovascular outcome in diabetic and non-diabetic patients, partly mediated by its direct anti-inflammatory and anti-oxidative effect on endothelial cells (ECs). In situ, ECs are constantly exposed to laminar shear stress (LSS) created by unidirectional blood flow. Perioperatively, blood loss and fluid management both disturb the flow pattern and create oscillatory shear stress (OSS), inducing endothelial dysfunction. We explored the effect of EMPA on OSS-induced endothelial dysfunction.

Materials and Methods: Human coronary artery endothelial cells (HCAECs) were pre-incubated for 2 h with vehicle or 1µM EMPA, followed by LSS or OSS for 6 to 48 h. After 6 h, reactive oxygen species (ROS) production and nitric oxide (NO) levels were measured with live cell imaging and quantified using mean fluorescence intensity (MFI). Expression of intercellular adhesion molecule-1 (ICAM-1) and vascular endothelial (VE)-cadherin were detected with immunofluorescence staining at 48 h.

Results and Discussion: Compared with LSS, OSS significantly increased ROS production and impaired NO bioavailability (MFI, ROS: 464.5±253.6 LSS vs 900.7±164.6 OSS; NO:586.2±355.6 LSS vs 273.4± 139.1 OSS, both P<0.01, Figure 1 a+b). EMPA inhibited OSS-induced ROS production (OSS+EMPA: 674.8±287.6, P<0.05 vs OSS). Immunofluorescence staining showed that OSS induced ICAM-1 overexpression and VE-cadherin disruption, which were attenuated by EMPA (Figure 1 c+d).

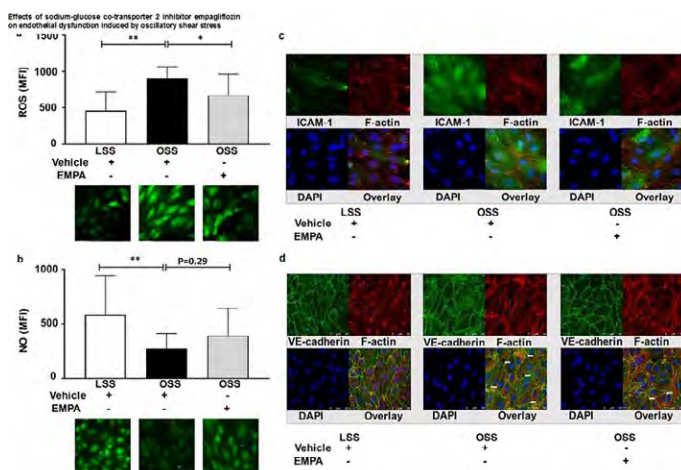


Figure 1 Effects of EMPA on OSS-related endothelial dysfunction. HCAECs were pre-incubated with either vehicle or 1 μ M EMPA for 2 h, followed by LSS or OSS for 6-48 h. ROS (a, n=2 of 3 independent experiments) and NO (b, n=3 independent experiments) were measured at 6 h with live cell imaging and quantified using MFI. Six pictures were taken from each individual experiment. ICAM-1, VE-cadherin and F-actin were detected by immunofluorescence staining at 48 h (c, d). Disruption of VE-cadherin was marked with arrow. Data are presented as means \pm SD. ** P<0.01 and *P<0.05 compared with OSS+Vehicle.

Conclusion: OSS increases oxidative stress, decreases NO production and increases ICAM-1. EMPA treatment was able to prevent OSS-induced ROS production and ICAM-1 expression, suggestive of a protective action of EMPA against OSS-induced endothelial dysfunction.

Acknowledgements: We acknowledge Olivia C. Klatt and Tehila Sigal for their help during the project.

BAPC-6

Co-administration of dexmedetomidine in carotid endarterectomy (CEA) with intraoperative SSEP and MEP monitoring: A single-centre prospective randomised controlled trial

Vetter C. T.¹, Meyer E.¹, Huber M.¹, Bervini D.¹, Krejci V.¹

¹Inselspital Bern - Bern (Switzerland)

Background and Goal of Study: All patients undergoing CEA at the department of neurosurgery, University Hospital of Berne, receive total intravenous anaesthesia (TIVA), electrophysiological monitoring, as well as adaptive hypertension and EEG-Burst Suppression (BS) during cross-clamp of the internal carotid artery. Effect site concentrations (Cet) of Propofol required for BS may result in delayed emergence and neurological assessability. Our hypothesis was that the centrally acting alpha-2 agonist Dexmedetomidine may result in lower requirements of Propofol to induce BS. Primary outcomes were Cet of Propofol required for BS and total amount of Propofol. One secondary outcome was the dose of Norepinephrine required to achieve hemodynamic goals.

Materials and Methods: This prospective controlled trial was approved by the local ethics committee. A total of 47 patients were randomised in two groups. The control group (n=25) received TIVA only. The study group (n=22) received Dexmedetomidine before induction of anaesthesia as a bolus of 0.4 μ g/kg BWT over 10 min, followed by an infusion of 0.4 μ g/kg/h. Cet of Propofol was titrated according to EEG-endpoints. Intravenous Norepinephrine was mainly used to achieve hemodynamic goals. Arterial Blood Pressure (ABP) was kept within 20% of preoperative measurements. Before cross clamping of the ICA, Cet of Propofol was increased until BS, and ABP was increased by 20 mmHg. Before reperfusion, Cet of Propofol was decreased, Dexmedetomidine was discontinued and ABP was decreased (<140 mmHg systolic).

Results and Discussion: There were no differences in demographics, duration of surgery and anaesthesia. The minimum Cet of Propofol required for BS was 4.12 μ g/ml \pm 1.16 μ g/ml and the total amount of Propofol was 1185 [1016;1500] in the study group compared to 6.59 μ g/ml \pm 2.66 μ g/ml (p < 0.001) and 1438 mg [1232;1733] (p=0.035) in the control group. We found no differences in Arterial Blood pressure between groups. The study group received a total of 482 μ g [246; 899] Norepinephrine vs. 949 μ g [530;1309] in the control group (p=0.023). Bradycardia was observed in 3 patients in the study group vs. 1 patient (p=ns).

Conclusion: Co-administration of Dexmedetomidine resulted in lower Cet of Propofol required to reach Burst Suppression, a well defined EEG-Endpoint. In addition to the peripheral alpha agonism of Dexmedetomidine, this may explain the decreased amounts of norepinephrine used to achieve hemodynamic goals.

BAPC-7

Virtual reality and 3D printing in clinical anesthesia; 18 months experience in a large, single medical center

Shaylor R.¹, Golden E.¹, Verenkin V.¹, Koldi M.¹, Peer M.¹, Cohen B.¹

¹Tel Aviv medical center, Israel - Tel Aviv (Israel)

Background: Anatomically correct patient-specific models made from medical imaging can be printed on a 3D printer or turned into a VR program. In 2019 the anesthesia department at Tel Aviv Medical Center started using 3D modeling for preoperative assessment in all patients presenting with suspected difficult airway due to abnormal sub-glottic anatomy, large mediastinal masses (MM), or any pediatric patient requiring one-lung ventilation (OLV). We present the results of our first 18 months of routine use of 3D modeling; the modalities used and perceived benefits to anesthetic management.

Methods: We conducted a retrospective review of all patients referred for 3D modeling as part of their anesthesia plan between 07/2019-01/2021. The following were recorded: type of modeling used; underlying pathology; airway plan suggested by the model; age at surgery; height; weight; operation; actual airway plan; induction technique. For MM, the relationship to cardiovascular structures as well as any airway compression was noted.

Results: 12 patients were referred for 3D modeling including 4 children requiring OLV, 1 fetus, 1 severe subglottic stenosis, and 3 MMs. The age of patients ranged from in-utero to 83. In general 3D printing was used for airway cases with VR used for MM. Where 3D models were printed the plan devised on the model was also the final airway plan. After reviewing VR images none of the MM patients had pre-induction ECMO cannulas or wires inserted. There were no reports of anesthetic complications in any of the patients referred for 3D modeling.

Discussion: A 3D model can be made in 30 minutes. Printing takes 3-4 hours on entry-level 3D printers. Our patients are often referred via the surgeons and the VR model is reviewed with them, resulting in improved communication and a greater understanding of the challenges involved for both specialties. With a specific plan in place, trial and error are reduced, there is less wastage of equipment and trauma to the patient and the anesthesiologists involved in these cases report reduced stress. This is especially true where ECMO was avoided.

Conclusions: 3D modeling and subsequent printing or VR reconstruction are feasible and beneficial in clinical anesthesia. Its routine use for patients with difficult airway anatomy correlates well with the final clinical outcome, reduces anesthesiologist stress, and increases interdisciplinary understanding of patient-specific anesthesia challenges.

BAPC-8

Anaesthesia as a risk factor for cognitive decline: the effects of anaesthesia on long term cognitive functioning. A prospective cohort study

Pennings C.¹, De Korte D.¹, Van Boxtel M.², Buhre W.¹, Vossen C.¹

¹Maastricht University Medical Center - Maastricht (Netherlands),

²Maastricht University - Maastricht (Netherlands)

Background:

The surgical population of most western countries is ageing rapidly. The incidence of postoperative neurocognitive disorders (PND) after surgery is increased in these elderly patients. The long-term effects of surgery under general anaesthesia on the decline of cognitive function have been a topic of discussion. This study investigates if repeated exposure to surgery under general anaesthesia during an individual's lifetime negatively affects their cognitive ageing.

Methods: A prospective cohort of adults aged 25 to 84 years (n=1823) with normal cognitive functioning was serially assessed at baseline, 6 and 12-years with documentation of demographics, medical history, a medical exam, and neurocognitive function tests. We tested the following cognitive domains; learning and memory, selective attention and mental speed, executive function, and information processing speed. An operation under general anaesthesia was defined as any operation that involved a general anaesthetic. We used a mixed linear model to assess

the effect of the total number of operations under general anaesthesia at baseline on the development of cognitive functioning during the 12-year follow-up period. Random intercepts and slopes were incorporated. The multilevel model was corrected for age, sex, educational level, smoking status, alcohol abuse, and individual comorbidities.

Results: Patients with more than two general anaesthetics at baseline were older ($p < 0.005$) and had more comorbidities such as hypertension ($p < 0.005$), coronary artery disease ($p < 0.005$) and hypercholesterolemia ($P < 0.05$) compared to individuals without any operations under general anaesthesia. Analysis showed a significant, negative effect of the number of general anaesthetics at baseline on the Stroop interference score (selective attention and mental speed, $p = 0.013$). Hypertension, coronary artery disease, hypercholesterolemia and diabetes mellitus had a greater impact on the long-term cognitive decline than an operation under general anaesthesia. The number of general anaesthetics at baseline did not negatively affect the development of the other cognitive domains.

Conclusion: Our study indicates that repeated exposure to surgery under general anaesthesia has little effect on long-term cognitive decline. Instead, patient factors such as a history of cardiovascular disease, diabetes mellitus, and educational level are more important for the speed of cognitive decline during an individual's lifetime.

General Anaesthesiology

6492

Anesthetic implications of laparoscopy surgery in a patient with ventriculoperitoneal shunt

Vieira L. D. G. D. S.¹, Alves B.¹, Silva C.¹, Pereira C.¹, Assunção J.¹, Francisco E.¹

¹Centro Hospitalar Tondela Viseu - Viseu (Portugal)

Background: Hydrocephalus patients have now a longer survival due to advances in surgery and in ventriculoperitoneal (VP) shunt's technology. Thereby, the likelihood that a VP shunt patient presents for emergent or elective surgery has become greater. Although there is no absolute contraindication for laparoscopy in VP shunt patients, the risk of raised intracranial pressure (ICP) shouldn't be neglected. We report the anesthetic management of a VP shunt patient submitted to laparoscopic appendectomy and discuss the anesthetic considerations of this condition.

Case Report: 58-yo man, ASA III, presented for urgent appendectomy (acute appendicitis). His medical history included a secondary hydrocephalus (subarachnoid spontaneous hemorrhage) with VP shunt insertion 10 years ago. The patient did not present any neurologic deficits or signs of raised ICP since then. Before surgery the abdominal localization and functionality of the shunt were confirmed by echography. The best surgical approach and potential complications were discussed between anesthesiologists and surgeons, who decided to proceed to a laparoscopic appendectomy. Standard ASA monitoring plus bispectral index and neuromuscular monitoring were instituted and rapid sequence induction with rocuronium was performed. Normocapnia was maintained under pressure controlled ventilation. CO₂ was inflated slowly and the achieved intra-abdominal pressure was lower than 10mmHg. Trocars were inserted carefully and the distal extremity of the VP shunt was maintained far from the operating area. Operating table was maintained with low degree Trendelenburg position. The patient remained haemodynamic stable and the VP shunt was functional after 50 min of surgery. The time the patient remained in PACU was uneventful, no neurologic complications occurred and the patient was discharged home seven days after surgery.

Discussion: The presence of a VP shunt is associated with complications, namely raising ICP and pneumocephalus. Some measures can avoid complications such as an imaging exam to localize the catheter, maintaining pneumoperitoneum pressures under 15 mmHg for no longer than 3 hours and ICP monitoring. Although there are no guidelines for perioperative management of patients with VP shunts presenting for abdominal and laparoscopic surgery, the majority of cases described in literature claim that this kind of procedure is safe, like the case we present.

6502

Release of serum Neurofilament Light (NFL), a specific and sensitive biomarker of neuronal injury, in surgery under general anaesthesia (GA) compared to surgery with Hypno-analgesia (Hyp): A prospective, non-inferiority study.

Abene S.¹, Mestdagh F.¹, Robu B.¹, Berlière M.¹, Mourad M.¹, Momeni M.¹
¹Cliniques universitaires Saint Luc; Université Catholique de Louvain - Brussels (Belgium)

Background and Goal of Study: Whether general anaesthetics induce neurotoxicity is not fully elucidated. We hypothesized that postoperative serum NFL is not significantly higher after surgery under GA compared to Hyp. Materials and Methods: Breast cancer or thyroid surgery patients (NCT04500236) were included. Patients chose the anesthetic technique.

Timepoint	Preop	Intraoperative	Recovery room	Day 1 (H18-24)	Day 8-10
Hypnosis group (Hyp)		<ul style="list-style-type: none"> Hypnosis session (with frontal EEG) Infiltration surgical site with local anaesthetics Remifentanyl 0.02 - 0.06 µg.kg⁻¹.min⁻¹ Mg sulfate 2 g IV Ketorolac IV paracetamol 	IV Piritramide and IV Tramadol if required		
General Anaesthesia group (GA)		<ul style="list-style-type: none"> Remifentanyl 0.125 to 0.5 µg.kg⁻¹.min⁻¹ TIVA propofol based on frontal EEG Rocuronium in case of an endotracheal tube insertion Infiltration surgical site with local anaesthetics Mg sulfate 2 g IV Ketorolac IV paracetamol 	IV Piritramide and IV Tramadol if required		
Serum Neurofilament Light analysis	x			x	x
Quality of Recovery-15 questionnaire	x			x	
Montreal Cognitive Assessment	x				x
Premedication	Alprazolam				

Fig 1 illustrates study flowchart. The primary endpoint is the difference in NFL at 18-24h postop between both groups. A minimum of 44 patients in each group are required. Data are expressed as mean±SD, P50(P25-P75) and N(%) and compared using Student t, Mann-Whitney and Chi square test. Results and Discussion: 50 patients were analyzed.

Table 1: Patients' characteristics of both study groups.

	GA (N = 34)	Hyp (N = 16)	P
Age (y)	52 ± 18	56 ± 14	0.390
Baseline NFL (pg/mL)	8.55 (6.70 - 18.73)	12.74 (6.53 - 21.93)	0.456
NFL Day 1	8.88 (5.31 - 17.96)	13.54 (9.27 - 20.92)	0.110
NFL Day 10	13.11 (7.12 - 31.95)	15.48 (10.74 - 33.31)	0.522

Table 2: Patients' characteristics in function of type of surgery.

	Thyroid (N = 30)	Breast cancer (N = 20)	P
Age (y)	48 ± 17	61 ± 13	0.005
Baseline NFL (pg/mL)	6.99 (5.27 - 14.30)	14.37 (10.61 - 29.92)	0.001
NFL Day 1	7.51 (5.01 - 15.49)	14.05 (10.66-25.21)	0.011
NFL Day 10	10.20 (6.88-15.60)	34.40 (15.80-47.51)	<0.001

Linear mixed model showed that NFL levels were significantly higher in breast surgery ($P = 0.004$) and in older patients ($P = 0.001$) but were not influenced by type of anaesthesia ($P = 0.445$) or by time ($P = 0.374$).

Conclusion: These preliminary data show that other factors than anaesthesia induce increased NFL levels. NFL kinetics need to be investigated in other types of surgery.

6507 Distribution of intraoperative QTc interval values during general anaesthesia

Krönauer T.¹, Friederich P.²
¹University Hospital of Augsburg - Augsburg (Germany), ²München Klinik Bogenhausen - München (Germany)

Background and Goal of Study: General anaesthetic agents interact with cardiac ion channels and prolong the QT interval [1,2]. This is accompanied by an increased perioperative incidence of pathologically extended QTc intervals without a defined increase in cardiac risk. This observation may indicate a need for the definition of specific limits of QTc values valid during general anaesthesia.

Materials and Methods: In 100 patients, the QT / QTc interval was continuously measured intraoperatively using a 12-lead electrocardiogram (ECG). A mean intraoperative reference duration of the QTc interval was determined and compared to the mean duration of the QTc interval in the resting ECG of a similar population [3].

Results and Discussion: The average duration of the QTc time (Bazett's correction) in n = 100 patients in a total of 900 measurements was 439 ± 30 ms in the 12 lead ECG (357-535 ms) and is thus clearly above the mean values of the QTc interval in the resting ECG determined in large patient collectives. 43% of the measured values were above the limit of 440 ms known for the resting ECG. In 2.7% of the measurements, the QTc interval was ≥ 500 ms intraoperatively. The measured values of the QTc interval are normally distributed. Cardiac arrhythmias did not occur.

Conclusions: Compared to the normal population with identical regional and genetic background [3], patients under general anaesthesia have a longer average duration of the QTc time. According to current limits of normal QTc values [3] the incidence of QTc prolongation is increased in our study. These results suggest that intraoperative limits may be higher than previously assumed [1,2,3]. Our data proposes that an intraoperative threshold value for pathologically prolonged QTc times of 500 ms ($\mu + 2\sigma$) would be more appropriate.

References:

1. Nagele P et. al. Postoperative QT interval prolongation in patients undergoing noncardiac surgery under general anaesthesia. *Anesthesiology* 2012;117: 321-328
2. Duma A et. al. High-fidelity analysis of perioperative QTc prolongation. *Anesth Analg* 2016; 122: 439-448
3. Pfeufer A. et. al. Common variants in myocardial ion channel genes modify the QT interval in the general population: results from the KORA study. *Circ Res* 2005; 96: 693-701

6508 Early quality of recovery and postoperative outcome after surgery under general anaesthesia (GA) compared to surgery with Hypno-anaesthesia (Hyp): Subanalysis of a prospective study.

Lecompte A.¹, Watremez C.¹, Roelants F.¹, Docquier M. A.¹, Touil N.¹, Momeni M.¹
¹Cliniques universitaires Saint Luc; Université Catholique de Louvain - Brussels (Belgium)

Background and Goal of Study: The 15-item Quality of Recovery (QoR-15) scale measures postoperative quality of recovery. It consists of 15 questions quoted from 0 to 10 with 3 questions related to pain and nausea/vomiting. We compared early postoperative outcomes in patients undergoing surgery under GA compared to surgery with Hyp.

Materials and Methods: This is a subanalysis of a prospective study (NCT04500236). Breast cancer or thyroid surgery patients were included. Patients chose the anaesthetic technique. Fig 1 illustrates study flowchart. Data are expressed as mean±SD, P50(P25-P75) and N(%) and compared using Student-t, Mann Whitney and Chi squared test. **Results and Discussion:** 80 patients were analyzed. Table 1 illustrates patients' characteristics of both study groups. One patient in the GA group required Tradonal.

Timepoint	Preop	Intraoperative	Recovery room	Day 1 (H18-24)	Day 8-10
Hypnosis group (Hyp)		<ul style="list-style-type: none"> • Hypnosis session (with frontal EEG) • Infiltration surgical site with local anaesthetics • Remifentanyl 0.02 - 0.06 µg.kg⁻¹.min⁻¹ • Mg sulfate 2 g • IV Ketorolac • IV paracetamol 	IV Piritramide and IV Tramadol if required		
General Anaesthesia group (GA)		<ul style="list-style-type: none"> • Remifentanyl 0.125 to 0.5 µg.kg⁻¹.min⁻¹ • TIVA propofol based on frontal EEG • Rocuronium in case of an endotracheal tube insertion • Infiltration surgical site with local anaesthetics • Mg sulfate 2 g • IV Ketorolac • IV paracetamol 	IV Piritramide and IV Tramadol if required		
Serum Neurofilament Light analysis	x			x	x
Quality of Recovery 15 questionnaire	x			x	
Montreal Cognitive Assessment	x				x
Premedication	Alprazolam				

	Hyp (N = 30)	GA (N = 50)	P
Age(y)	58 ± 14	51 ± 17	0.048
Preop QoR-15 (Max 150=best)	131 (124-142)	127 (112-136)	0.109
Postop QoR-15	126 (115-138)	107 (82-124)	< 0.001
Postop moderate pain (0=worse; Max = 10)	6.9 ± 2.8	6.0 ± 3.1	0.128
Postop severe pain (0=worse)	10 (10 - 10)	10 (8 - 10)	0.041
Nausea/Vomiting (0=worse)	10 (7 - 10)	10 (8 - 10)	0.648
Postop IV Piritramide (mg)	0 (0 - 0)	6 (2 - 8)	< 0.001
Patients requiring paracetamol at ward	15 (50%)	33 (66%)	0.157
Patients requiring NSAID at ward	6 (20%)	12 (24%)	0.678

Conclusion: These preliminary data indicate that patients undergoing surgery with Hyp have a better quality of recovery and significantly reduced immediate analgesic consumption. Whether the use of higher doses remifentanyl in the GA group induces this latter effect, needs to be investigated.

References:

1. Demumieux F. *BJA* 2020;124:761-67

6509 Desflurane in Huntington Disease: a case report

Lopes C.¹, Portela F.¹, Lopes-Pimentel P.¹
¹Centro Hospitalar de Lisboa Ocidental EP - Lisboa (Portugal)

Background: Huntington disease (HD) is a rare autosomal dominant disorder that causes chorea, dystonia and incoordination. Prior reports have suggested increased risk of shivering, spasms and pulmonary aspiration after anesthesia. Apart from a case report in 1999(1), we found no specific data on the use of desflurane in HD.

Case Report: A 55-year-old man with HD was submitted to an urgent laparotomy and bowel resection due to intestinal obstruction and days later to abdominal wall closure due to wound dehiscence. Both cases were carried out under general anesthesia following rapid sequence induction with propofol. A propofol target controlled infusion was chosen for maintenance in the first case and desflurane in the second one. In both procedures remifentanyl, rocuronium and sugammadex were used. Increased dystonia and incoordination occurred similarly after both surgeries. Other than this, both techniques were uneventful and desflurane maintenance allowed for a more rapid recovery and return of airway reflexes in comparison to total intravenous anesthesia. No shivering or spasms were observed.

Discussion: This is the first case report since 1999 describing in detail the use of desflurane for anesthetic maintenance in a patient with HD.

We found no absolute contraindications to any particular anesthetic technique regarding this disease. There are multiple case reports describing the safety of propofol, opioids, benzodiazepines and non-depolarizing muscle relaxants. Caution is recommended with succinylcholine due to some association with atypical pseudocholinesterase. Regarding volatile agents in HD, there is the theoretical risk of muscle spasm, shivering and prolonged recovery. Sevoflurane has nonetheless been considered safe(2). Isoflurane has been reported to alter calcium homeostasis and there is no data on desflurane.

References:

1.Cangemi et al. Huntington's disease: review and anesthetic case management. *Anesth Prog*.1999

2.Kivela et al. Anesthetic management of patients with Huntington disease. *Anesth Analg*.2010

Learning points: The primary goal in general anesthesia for patients with HD is to provide airway protection and rapid and safe recovery. In this regard, sevoflurane has been used uneventfully but desflurane remains an infrequent choice. After this case report, we can conclude that desflurane seems to be a good option for these patients and may even be advantageous due to faster return of airway reflexes, minimizing the risk of aspiration.

6512

Impact of opioid-free anaesthesia on postoperative nausea, vomiting and pain after gynaecological laparoscopy - a randomised controlled trial

Massoth C.¹, Schwellenbach J.², Küllmar M.³, Wenk M.²

¹University Hospital Münster - Münster (Germany), ²Florence-Nightingale-Hospital - Düsseldorf (Germany), ³University Hospital Münster - Münster (Germany)

Background and Goal of Study: Opioid-free anaesthesia may enhance postoperative recovery by reducing opioid-related side effects such as nausea, hyperalgesia or tolerance. The objective was to investigate the effects of multimodal opioid-free general anaesthesia on postoperative nausea, vomiting, pain and morphine consumption as compared to the traditional opioid-inclusive approach.

Materials and Methods: This study was conducted as a prospective parallel-group randomised controlled trial. 152 patients undergoing gynaecological laparoscopy were randomly assigned for opioid-free anaesthesia (Group OF) with dexmedetomidine, esketamine and sevoflurane or to have opioid-inclusive anaesthesia (Group C) with sufentanil and sevoflurane. Primary outcome was the occurrence of nausea within 24 hours after surgery. Patients were assessed for the incidence and severity of PONV, postoperative pain and morphine consumption and characteristics of recovery.

Results and Discussion: Patients in both groups had comparable clinical and surgical data. 69.7 % of patients in the control group and 68.4% of patients in the opioid-free group met the primary endpoint (OR 1.06, 95% Confidence Interval (CI) (0.53; 2.12) p=0.86). The incidence of clinical important PONV defined by the PONV impact scale was 8.1% (Group C) vs. 10.5% (OF); p=0.57). Antiemetic requirements, pain scores and morphine consumption were equivalent in both groups. Postoperative sedation was significantly increased in Group OF (p<0.001), and the median length of stay at the post-anaesthesia care unit was 69.0 minutes (46.5-113.0) vs. 50.0 (35.3-77.0) minutes in the control group (p<0.001). Although the overall incidence of nausea was high, most patients reported only mild and transient symptoms that were classified as clinically insignificant according to the validated simplified PONV impact scale.1.

Conclusion: Opioid-free multimodal general anaesthesia has no beneficial effect on PONV, pain scores or morphine consumption in patients undergoing gynaecological laparoscopy but is associated with delayed recovery.

References:

1. Myles, P.S., and R. Wengritzky. 2012. Simplified postoperative nausea and vomiting impact scale for audit and post-discharge review. *British Journal of Anaesthesia* 108: 423–429. doi:10.1093/bja/aer505.

6514

Carotid Body Paraganglioma – an anesthetic challenge

Tinoco J.¹, Guimarães J.², Eloy A.², Regufe R.²

¹Hospital São Bernardo - Setúbal (Portugal), ²Hospital São Bernardo - Setúbal (Portugal)

Background: Paraganglioma is an uncommon neuroendocrine tumor originating from the autonomic nervous system. Most are nonfunctional and manifest as mass lesions, however catecholamine secretion can occur, leading to hypertension or dysrhythmias. Several perioperative challenges can arise from surgical resection, either due to tumor location or neuroendocrine response to manipulation. We describe a successful anesthetic management case of carotid body paraganglioma.

Case Report: 58-year-old woman, ASA II, with history of medicated hypothyroidism. She was diagnosed with carotid body paraganglioma and presented tachycardia, normotension, tremors and anxiety. Biochemical tests detected norepinephrine secretion by the tumor and SPET revealed bone metastasis. The patient was initiated on α and β blockers two weeks before surgery. Surgery was performed under total intravenous anesthesia with invasive blood pressure monitoring before induction. Anesthetic and surgical triggers for norepinephrine release or massive hemorrhage were anticipated. Liberal Fluid therapy was carried out before tumor resection, followed by a guided strategy afterwards. The patient maintained hemodynamic stability throughout the procedure, allowing extubation after the procedure and transfer to PACU.

Discussion: This case highlights the importance of good perioperative management of a rare but potentially catastrophic tumor.

A multidisciplinary approach of anesthesiologists, endocrinologists and surgeons is needed for optimized perioperative care.

Preoperative evaluation is essential for patient optimization, with institution of timely α and β blockade. During the intraoperative period, drugs that release catecholamines should be avoided and hemodynamic responses to anesthetic triggers and tumor manipulation should be minimized in order to avoid a catecholamine storm with severe consequences, such as hypertension, arrhythmias and other cardiac complications. The postoperative care, given the high-risk of complications, should be carried out in a continuous monitored ward.

Learning points: Careful preoperative evaluation and management is imperative for secretive paragangliomas. A meticulous anesthetic plan, predicting possible complications during surgery, is also crucial for an uneventful procedure.

References:

1. *Anesth Pain Med* 2017; 12: 281-285

2. *Int J Res Med Sci.* 2015 Dec;3(12):3897-3900

6528

Goal-directed vasopressor and fluid management decreased fluid requirements during DIEP flap surgery

Maes J. W.¹, Verriest R.¹, Allaert S.¹, Heerman J.¹, Scheeren T.², Kalmar A. F.³

¹AZ Maria Middelaers - Gent (Belgium), ²UMC - Groningen (Netherlands), ³AZ Maria Middelaers - Gent (Belgium)

Background and Goal of Study: Fear for vasopressor induced flap hypoperfusion often leads to liberal fluid administration during DIEP Flap surgery to maintain adequate perfusion pressure. Conversely, excessive fluid administration can result in interstitial fluid accumulation with reduced flap oxygenation and may also negatively impact multiple other aspects of recovery. A goal-directed vasopressor and fluid management (GDVFM) has recently been implemented in MM hospital for DIEP flap surgery. The protocol entails titration of a vasopressor (phenylephrine or norepinephrine) targeting a systolic blood pressure of 100mmHg, and crystalloid (Plasmalyte®) targeting a PPV<12%. The aim of this study was to assess the impact of GDVFM on fluid requirement during DIEP flap surgery, and in the first 12 hours postoperatively.

Materials and Methods: In this before-after study, 40 patients before implementation of the protocol(group 1) were compared with 20 patients after implementation (group 2). In group 1, hemodynamics were managed at the discretion of the anesthetist, generally without continuous

vasopressor and with liberal fluid management. In group 2, GDVFM mandates meticulous titration of vasopressors and fluids. At the end of operation, patients from both groups were extubated and transferred to the ICU, where fluids were titrated towards a MAP>90mmHg. The intraoperative and first 12 postoperative hours fluid administration was compared between the two groups using an unpaired T-test. The incidence of flap failure was recorded.

Results and Discussion: Table 1 shows the average(SD) total intraoperative and postoperative fluid administration, and the Intraoperative rate of fluid administration. GDVFM resulted in a 35% lower rate of intraoperative fluid administration than conventional management. The lower intraoperative fluid loading in the GDVFM group did not result in significantly increased compensatory postoperative fluid or vasopressor requirements.

Conclusion: Goal-directed vasopressor and fluid management decreased perioperative fluid requirement during DIEP-flap surgery with 35% compared to conventional management without inducing any signs of flap failure.

6547 Effect of tidal volume challenge on reliability of plethysmography variability index in hepatobiliary and pancreatic surgeries

Salem Y. S.¹, Botros J. M.¹, Algyar M. F. M.¹, Khalil M.², Yassin H. M.¹
¹Fayoum University Hospital - Fayoum (Egypt), ²National Liver Institute - Menofia (Egypt)

Background and Goal of Study: Plethysmography variability index (PVI) which is a safe and non-invasive parameter for evaluating fluid responsiveness does not reliably predict fluid responsiveness during low tidal volume ventilation. This study aimed to investigate whether a temporary increase in tidal volume from 6 to 8 ml/kg can predict fluid responsiveness through the use of PVI (tidal volume challenge).

Materials and Methods: This prospective interventional diagnostic accuracy study was performed on 48 adult patients undergoing hepatobiliary pancreatic tumor resections (NCT03546179). The cardiac output was continuously monitored by electrical cardiometry (thoracic bioimpedance). PVI and electrical cardiometry measured parameters: corrected flow time (FTc), stroke volume variation (SVV), stroke volume index (SVI), and cardiac index (CI) were recorded. All patients were initially ventilated with a low tidal volume of 6 ml/kg and later subjected to a tidal volume of 8 ml/kg. The tidal volume was reduced back to 6 ml/kg, and a fluid bolus (6 ml/kg) of crystalloid was given over 10 minutes to identify fluid responders (increase in SVI ≥ 10%).

Results and Discussion: 20/48 patients were responders. After the tidal volume challenge, the change in PVI value predicted fluid responsiveness. The area under receiver operating characteristics curves (with 95% confidence interval) was 0.86 (0.76-0.96). The best cut-off value of PVI change after "tidal volume challenge" was 2.5% with 95% sensitivity, 68% specificity and p-value <0.001. PVI, FTc, SVV, SVI and CI obtained during tidal volume 6 ml/kg did not predict fluid responsiveness with p-values >0.05. However, both PVI and FTc were able to predict fluid responsiveness during tidal volume challenge with p-values 0.001 and 0.01 and cut-off values 11.5% and 332ms respectively.

Conclusion: PVI changes obtained by tidal volume challenge are superior in predicting fluid responsiveness compared to values during low tidal volume ventilation.

6550 Remimazolam dose based on ideal body weight can be reduced in patients over 76 years old

SAKAMOTO H.¹
¹Shin-Sapporo Orthopaedic Hospital - Sapporo (Japan)

Background and Goal of Study: A new ultra-short acting benzodiazepine, Remimazolam (RZ), has been marketed in Japan. Its recommended maintenance dose is 1.0 mg/kg/h and reduced to 0.6 mg/kg/h in senile patients. But that age to reduce infusion and what body weight to be applied is not clear. We started to administer RZ at 1 mg/IBW/h in patients under 75 years old and 0.6 mg/IBW/h in patients over 75 y.o.. IBW (ideal body weight) = 45.4+0.98x(height(cm)-152.4) and if male add 4.5. We compared the effect of RZ in both groups to determine the age to reduce RZ dose.

Materials and Methods: After obtaining IRB and patients' informed consent, 113 patients undergoing scheduled orthopedic surgery were enrolled in this study. Eighty five patients were less than 75 y.o. (U75I) and 28 patients were 75 years of age or older (O75I). RZ maintenance dose was 1.0 mg/IBW/h in group U75I and 0.6 mg/IBW/h in group O75I. General anesthesia was maintained with RZ and 0.1 µg/IBW/min of remifentanyl and peripheral nerve blocks were performed. We employed Root® and SedLine® (Masimo, Irvine, CA, USA). Patient state index (PSI) was recorded every 2 seconds during RZ infusion. Patients' demographic data were compared using unpaired t-test and regression line between age and PSI was calculated. A p-value < 0.05 was considered statistically significant.

Results and Discussion: Results are shown in tables and graph. Patients' age showed significant difference. Regression lines between age and PSI and correlation coefficients in group U75I and O75I were shown in table and graph. PSI between 25 and 50 means adequate anesthesia and PSI in both groups showed adequate anesthesia. Regression lines and upper and lower 95% prediction lines of group U75I and O75I cross at 76, 78 and 73 y.o.. This suggests RZ infusion rate can be reduced at 73 – 78 y.o.. And RZ infusion at 1 mg/IBW/h is still safe in senile patients because lower and upper 75% prediction lines of group U75I are between 20.4 and 47.0 from 75 to 100 y.o., mathematically.

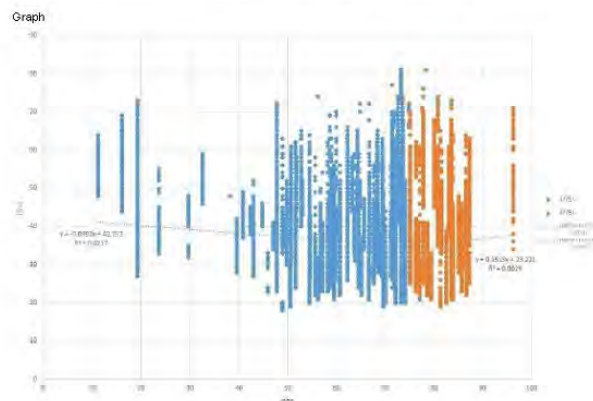
Conclusions: Remimazolam infusion at 0.6 mg/IBW/h is adequate in patients over 76 y.o.. But 1.0 mg/IBW/h is still safe in senile patients.

Table 1. Demographic data (mean ± S.D. [range])

group	M/F	age (y.o.)	Height (cm)	TBW (kg)	BMI (kg/m ²)	Duration of Anesthesia (minute)	Duration of Surgery (minute)
U75I	37 / 48	58.8 ± 14.4 [11 – 75]	161.5 ± 9.3 [135 – 183]	63.4 ± 15.3 [32 – 126]	24.1 ± 4.4 [16.0 – 36.2]	106 ± 49 [39 – 276]	63 ± 43 [5 – 217]
O75I	12 / 16	81.2 ± 4.7 [75 – 96]	159.4 ± 8.6 [146 – 180]	59.3 ± 11.6 [40 – 81]	23.2 ± 3.4 [16.0 – 29.2]	124 ± 48 [48 – 239]	77 ± 46 [12 – 186]
p		0.000	0.291	0.138	0.260	0.084	0.151

Table 2. Results (mean ± S.D. [range])

Group	PSI during Remimazolam Infusion	Regression line	Correlation coefficient
U75I	36.5 ± 9.5 [18 – 81]	y = -0.0992x + 42.252	-0.147
O75I	36.6 ± 9.9 [18 – 85]	y = 0.1513x + 23.221	0.054



6562

Combined Spinal Epidural (CSE) for abdominoplasty in a patient with mesial temporal lobe epilepsy (MTLE) with uncontrolled seizures and psychiatric symptoms

Varghese Mathew G.¹, Korichi N.¹

¹Hamad Medical Corporation - Doha, Qatar - Doha (Qatar)

Background: Mesial temporal lobe epilepsy is a form of focal epilepsy, often due to sclerosis in the median temporal lobe. There is a concern whether patients with seizures are at increased risk of CNS toxicity [seizures] after Local Anesthetic (LA) administration, especially in epidurals where large LA doses are required.

Case Report: A 44 yr old lady with long-term seizures and frequent recurrence despite multiple antiepileptic drugs (AED), memory loss, and depression, presented for abdominoplasty. MRI reported bilateral mesial temporal sclerosis. Her history includes ICU admission for viral encephalitis and sleeve gastrectomy. An MDT meeting decided for surgery under CSE and continuation of AEDs till surgery. She received CSE with 3ml of bupivacaine heavy with 25 mcg Fentanyl given intrathecally. 5 mg midazolam was given for its sedative and anticonvulsant effects. The procedure took four hours, and the epidural was activated with 10 ml levobupivacaine and 75 mcg fentanyl. She received PCEA infusion for postop pain relief. The postop period was uneventful, and AED resumed.

Discussion: Seizures in MTLE are multidrug-resistant, with psychiatric symptoms. Perioperative management of seizures is the challenge here. Regional Anaesthesia (RA) helps minimize the disruption of the regular AEDs and avoid drug interactions between AED and GA agents. Drug induced enzyme induction in GA causes resistance to muscle relaxants. CSE has the advantage of giving titrated doses and continuing analgesia in the postop period, which prevents the perioperative seizures arising from the pain. Most of the seizures during the perioperative period in epileptics are related to the underlying condition, and RA is not a contraindication (1). The incidence of postoperative epilepsy is more for patients with GA than neuraxial anaesthesia (2).

References:

1. Kopp SL, Wynd KP, Horlocker TT, Hebl JR, Wilson JL. Regional blockade in patients with a history of a seizure disorder. *Anesth Analg*. 2009;109(1):272-278. doi:10.1213/ane.0b013e3181a832da
2. Chang HC, Liao CC, Chang CC, et al. risk of epilepsy in surgical patients undergoing general or neuraxial anaesthesia. *Anaesthesia*. 2018;73(3):323-331. doi:10.1111/anae.14099

Learning points:

The stress and the pain with surgery, a potential trigger for seizure activity, is better controlled with RA. CSE under close monitoring is safe in epileptic patients. Regardless of the anesthetic technique, preparation for seizure management is vital.

6565

Morgagni hernia: anesthetic considerations and a opioid-sparing approach

Maia J.¹, Guimarães D.², Tena J.², Amaral J.²

¹Hospital Espírito Santo Evora EPE - Evora (Portugal), ²Hospital do Espírito Santo - EPE Evora - Evora (Portugal)

Background: Morgagni diaphragmatic hernia (MDH) is a rare congenital condition, usually detected in childhood. Diagnosis in adulthood is unusual and usually accidental. 1/3 of patients have non-specific respiratory or gastrointestinal symptoms, what difficult diagnosis (1). It can cause severe restrictive respiratory conditions or intestinal occlusion requiring urgent surgery (2). Cardiopulmonary impairment due to the mass effect of the herniated content in the lungs, heart and large vessels potentially leads to high perioperative morbidity and mortality (3).

Case Report: 79 years old, male, ASA III, comes to the ER with periumbilical pain with 5h of evolution. Refers postprandial fullness and easy fatigue. X-ray shows hydro-air levels in the mediastinum and small intestine. CT shows a right anterior diaphragmatic hernia containing an incarcerated, possibly strangled, small bowel loop and atelectasis of the right lung. Urgent abdominal laparoscopy was performed under BGA with opioid-sparing technique. A protective mechanical ventilation strategy was followed including alveolar recruitment maneuvers. An episode of

atrial fibrillation with rapid ventricular response occurred resolved with amiodarone. After extubation, transferred to PACU under spontaneous ventilation. Postoperative period was uneventful.

Discussion: Anesthetic approach of MDH in an emergency context should follow precautions: due to delay in gastric emptying, prophylaxis of pulmonary aspiration and gastric deflation are indicated. Fibroscopy under spontaneous ventilation is the gold standard in airway management. If unavailable, RSI should be performed. Depending on the hemodynamic commitment, invasive monitoring should be considered and cardiodepressive agents should be avoided. Laparoscopy allows for faster recovery, but increases airway pressures, not being recommended if there is hemodynamic or respiratory impairment. In these situations, protective ventilation with low pressures and low tidal volumes or pulmonary exclusion techniques are the best options.

References:

1. World J Emerg Surg. 2017; 12, 23
2. Ann R Coll Surg Engl. 2008; 90(8): 694–695
3. Anesthesia, essays and researches. 2015; 9(3), 413–416

Learning points: MDH is a rare but potentially fatal entity when it involves strangulation of herniated viscera, challenging anesthesiologists. This case suggests that opioid-sparing anesthesia may be advantageous in preventing postoperative pulmonary and intestinal complications.

6573

Optimal end expiratory pressure (PEEP) in prone position during spinal surgery. A prospective observational study

Rodríguez Rivas U.¹, Vilà Barriuso E.¹, Colom A.², Garcia Orellana M.³, López Arguella E. X.¹, Carpintero Cruz A. C.¹

¹Department of Anaesthesia and Intensive Care Medicine, Parc de Salut Mar - Barcelona (Spain), ²Universitat Autònoma de Barcelona/Universitat Pompeu Fabra - Barcelona (Spain), ³Anesthesiology Department, Hospital Clinic, Barcelona - Barcelona (Spain)

During general anesthesia, exists a risk of ventilation-induced lung injury. To reduce this risk, the "open lung" strategy is used. A correct prone position (PP) reduces pressure on the lungs. Therefore, the required optimal PEEP levels (PEEPo) might be reduced in PP. The aim of this study is to compare the PEEPo required in the supine (SP) versus PP and to evaluate the PEEPo in the PP during intraoperative spinal surgery. Observational, descriptive, single-center study. Fifteen patients were consecutively recruited.

Inclusion criteria:

- Spine surgery in the PP for minimum 2hours
- Use of intraoperative neuromuscular blocking agents.

Exclusion criteria:

- Pregnancy
- Diseases that not allow alveolar recruitment maneuvers (RM): severe aortic stenosis, heart failure, severe emphysematous COPD or intracranial hypertension. Patients underwent general balanced anesthesia. All patients were ventilated with a volume-controlled strategy with a Vt of 6ml/kg according to ideal weight. After anesthetic induction, RM was performed and PEEPo was calculated. Then, the patients were disconnected and turned to PP. PEEPo was recalculated every hour. Arterial blood gas analysis was determined after every PEEPo measurement. Protocolized RM: pressure-controlled ventilation mode, FiO2 of 0.8, increasing values of PEEP up to 20cmH2O and maintaining a transpulmonary pressure of 40cmH2O for 160sec. The PEEPo calculation was performed immediately after RM, in pressure-controlled ventilation mode, decreasing PEEP by 2cmH2O every 30s until the best level of dynamic compliance was obtained. PEEP was lower (p<0.01), compliance was higher (p<0.01) and Pplat was lower (p<0.02) in comparison to SP (Figure1). PEEPo were not modified after 2h in PP (p>0,05) (Figure2). PEEPo in PP are significantly lower than those in the SP. Decrease in PEEPo requirements remains constant in PP. Individualized PEEPo in the PP might maintain homogeneous alveolar ventilation and lower intrathoracic pressure. Controlling intrathoracic pressure may lead to better hemodynamic stability, improving venous return and left ventricular compliance. Patients in the PP require lower PEEPo compared to SP. PEEPo is remains without significant differences during 2h of surgery in PP.

6579

Effect of cafedrine/theodrenaline (Akrinor™) on the time course of extended haemodynamic variables in anaesthesia-induced hypotension

Weyland J.¹, Weyland A.², Günther U.³

¹Pius Hospital Oldenburg - Oldenburg (Germany), ²Carl von Ossietzky Universität Oldenburg - Oldenburg (Germany), ³Klinikum Oldenburg - Oldenburg (Germany)

Background: Akrinor™, a cafedrine/theodrenaline mixture (Caf/Theo), is widely used in Germany to treat perioperative hypotension. However, knowledge of its pharmacodynamics and time course of haemodynamic effects is scarce.

Methods: This prospective observational study investigates the influence of Caf/Theo bolus application on haemodynamic variables during total intravenous anaesthesia (TIVA). With approval of the institutional ethics committee 61 patients undergoing moderate risk surgery were included in the study. The effects on mean arterial blood pressure (MAP), systemic vascular resistance index (SVRI), cardiac index (CI), pulse rate (PR) and stroke volume variation (SVV) were determined non-invasively and near-continuously over 30 min after Caf/Theo application by use of the ClearSight™ system (Edwards Lifesciences). Fifty patients received 0.8-1 mg/kg body weight Caf when MAP fell below 65 mmHg. Subgroup analyses were performed to investigate the potential influence of gender and β -blocker premedication.

Results: The mean applied Caf bolus dose was 69 mg (0.86 mg/kg), which corresponds to about 1/3 ampoule; 50% of the patients were female. After Caf/Theo application, MAP increased above the critical limit of 65mmHg within 52±43 s (mean±SD). Maximum MAP (+52%) was reached after 4.2±3.5 min. The SVRI showed its maximum (+51%) after 2.9±2.7 min. Mean CI reached a plateau with an increase of 18% after 8.4±7.2 min, SVV decreased to a minimum of 70% of baseline in 9.2±10.4 min. In contrast, PR remained virtually unchanged. There was a significant gender difference in MAP ($p=0.045$), CI ($p=0.004$) and PR ($p=0.006$). There was no significant difference in haemodynamic effects with respect to β -blocking premedication.

Conclusions: Caf/Theo effectively and rapidly increases blood pressure in hypotension during TIVA. The increase in MAP to restore organ perfusion is reached after about 1 min, resulting from a combined effect of Caf/Theo on SVRI and CI, but with markedly different dynamics. Despite the partly β -adrenergic mechanism of action, premedication with β -blockers does not weaken the effect of Caf/Theo in the context of TIVA. The comparatively longer lasting effect on MAP in female patients seems to be primarily due to gender-specific differences in the course of CI and PR. The effect on SVRI and SVV suggests a simultaneous stimulation of α_1 -receptors. Caf/Theo thus counteracts the sympatholytic effects of TIVA on various levels.

6580

Factors associated with delayed onset time of rocuronium in elderly patients

Pape P.¹, Vested M.¹, Rasmussen L. S.¹

¹Rigshospitalet, University of Copenhagen, Denmark - Koebenhavn OE (Denmark)

Background: In elderly patients there may be substantial differences in pharmacodynamics and pharmacokinetics of drugs administered during anaesthesia, such as rocuronium. The aim of this study was to identify factors of importance in relation to onset time of rocuronium 0.6 mg kg⁻¹ in patients > 80 years.

Methods: Neuromuscular data from a total of 49 patients from two clinical trials were analysed (1). All patients received standardised intravenous anaesthesia and neuromuscular monitoring was performed with TOF Watch SX. Onset time of rocuronium was defined as time from start of administration of rocuronium until no response to TOF stimulation. We compared onset time for rocuronium according to patient demographics, comorbidities, and intake of medications.

Results and Discussion: Median onset time was 135 sec. (120-165) in our sample of patients with a median age of 83 years (81-84). Hypertension was associated with shorter onset time of rocuronium 135

sec. (104-150) versus 163 sec. (135-225) with a mean difference of 65 sec. (CI 25-106) $P=0.013$. No significant difference in onset time was found according to sex, ASA class, medication or other comorbidities. No correlation between onset time and age, weight, BMI or eGFR was found ($P>0.27$). The study findings did not allow identification of significant predictors of delayed onset of rocuronium, but type-II errors must be considered as a limitation.

Conclusion: Elderly patients with hypertension had a shorter onset time of rocuronium. None of the other factors could explain differences in onset time.

Reference:

1. Bjerring C, Vested M, Arleth T, Eriksen K, Albrechtsen C, Rasmussen LS. Onset time and duration of action of rocuronium 0.6 mg/kg in patients above 80 years of age: A comparison with young adults. *Acta Anaesthesiologica Scand.* 2020;64:1082–1088. <https://doi.org/10.1111/aas.13645>

Table 1. Results: Onset time according to patient characteristics

			Difference (95% CI)	P-value	
Sex	Female	Male			
	135 (120-180)	135 (105-150)	26 (-14 to 66)	0.62	
ASA	I and II	III			
	135 (105-165)	135 (120-180)	3 (-41 to 48)	0.89	
Comorbidities	Yes	No			
	Heart disease	135 (120-150)	135 (113-173)	7 (-34 to 48)	0.73
	Hypertension	135 (104-150)	163 (135-225)	65 (25 to 106)	0.013
	Diabetes	120 (98-140)	135 (120-180)	37 (-17 to 90)	0.19
Medication	Yes	No			
	Diuretics	135 (113-145)	135 (120-180)	24 (-16 to 65)	0.23
	Use of Ephedrine	135 (105-150)	135 (120-180)	19 (-21 to 59)	0.34
Onset time in seconds represented as median (Interquartile range) and mean difference (95% CI).					

6624

Medium-chain acyl-CoA dehydrogenase deficiency (MCADD): The importance of anesthetic approach

Eloy A.¹, Tinoco J.², Teixeira J.², Cordeiro L.², Ferreira I.²

¹Centro Hospitalar Setúbal - Setubal (Portugal), ²Centro Hospitalar Setúbal - Setubal (Portugal)

Background: Although quite rare (incidence 1:50,000), MCADD is the most frequent inherited pathology of the fatty acid oxidation chain in the mitochondria¹. This disease confers inability to metabolize medium chain fatty acids during periods of fasting or in other situations of increased energy needs such as surgical aggression².

Case Report: 10-year-old female patient (28kg) with MCADD was proposed for adenotonsillectomy. She was admitted the day before and had a G22 IV with D10 running at 68mL/h plus 10mmol KCl every 12h prior to fasting period which should be as short as possible with the maintenance of carbohydrate fluids up to 2 hours before surgery. Her usual medication with L-carnitine was also maintained in the morning of surgery. Induction of anaesthesia was completed with fentanyl 75mcg and ketamine 55mg. She was intubated with a 5.0 endotracheal tube after rocuronium 15mg and close monitoring of neuromuscular block. Sevoflurane was used for maintenance and sugammadex 50mg was administered for complete reversal of the block. D10 fluid was continued intra-operatively, in the PACU and in the floor until she was able to tolerate the diet.

Discussion: With situations of hypoglycemia with hyperammonemia and coma already described MCADD constitutes a delicate clinical situation for the anesthesiologist, requiring a strict preoperative evaluation and preparation of an individualized anesthetic approach. These patients should be first case in the room to minimize fasting period (and to avoid depleting glucose stores) and adequate dextrose IV fluid selection should be started before fasting time to avoid metabolic decompensation and continued until patient resumes adequate per os intake. Although not contraindicated, anesthesiologist should consider risk:benefit of agents such as volatile anesthetics, propofol and neuromuscular blocking agents, because these patients may present hypotonia and impaired hepatic metabolism with prolonged effect of many drugs and increased risk of

propofol infusion syndrome. In case of use, adequate neuromuscular blocking monitorization should also be applied.

References:

1. Paediatr Anaesth 2017 Jan;27(1):60-65.
2. J of Cellular & Molecular Anesthesia, Vol.2 No.2, 12May 2017, Page 69-76

Learning points: Careful and individualized multidisciplinary preoperative planning is of major importance for MCADD patients requiring anesthesia to avoid metabolic decompensation and adverse outcomes.

6631

Converting a 350.000 patients ICU and perioperative database into the OHDSI Common Data Model – The Vienna Experience

Laxar D.¹, Maleczek M.¹, Kimberger O.¹. LBI Digital Health and Patient Safety

¹Medical University of Vienna - Vienna (Austria)

Introduction: Each day thousands of patients are treated in hospitals around Europe and globally. Each one of these patients generates vast amounts of data during their stay – for diagnostic purposes, treatment decisions, insurance billing, hospital staffing strategies and much more. But because most of this data is stored in a fragmented way on proprietary systems, secondary usage is often difficult – if not impossible.

There are, however, solutions to this problem. The OHDSI – Observational Health Data Science and Informatics – group (Columbia University) has created a common data model (CDM) that is being increasingly adopted by the scientific community. In Europe, the EHDS consortium, funded by the Innovative Medicines Initiative (IMI) as part of the Horizon 2020 project of the European Union, aims to harmonise health records throughout the EU using precisely this common data model.

Methods: At the General Hospital of Vienna, Austria's largest tertiary-care provider and university hospital for the Medical University of Vienna, we are currently in the process of converting the proprietary ICU and perioperative database with more than 350.000 patients into the Common Data Model. We created a two-step process in which we first replicate the data and then transform it. Various software components aid the clinicians in creating a precise mapping while enabling them to specify complex transformations for more advanced concepts.

Results: Proprietary, site-specific concept codes and different representation paradigms in the data source compared to CDM pose a big challenge in the process. Our extensible approach, however, has shown to be of advantage in these situations. As a renowned center for organ transplants as well as rare diseases, over 120 ICU beds, 45 operating theaters and 69 post-anaesthesia care unit beds, our database contains valuable data which we look forward to sharing with the scientific community.

Discussion: As the CDM technology will be here to stay, nurses, physicians and decision makers are encouraged to determine whether CDM may be a vital scientific foundation to facilitate multicenter trials and international benchmarking. While the data format itself is easy to understand, the conversion process comes with a large variety of caveats and pitfalls, a challenge that can only be successfully tackled with a combination of flexible and user-extensible software, experienced software engineers and data science savvy clinicians.

6634

Postoperative shivering following sevoflurane and desflurane anesthesia

Keiko N.¹, Kazuhiro S.¹, Kaoru U.¹, Midoriko H.¹, Ken Y.¹

¹Kyushu University Hospital - Fukuoka (Japan)

Background: Anesthetic agents used for general anesthesia can change the threshold of shivering, but which depends on the drug. It is controversial which is higher risk of postoperative shivering (POS) following TIVA or inhalational anesthesia. Currently, sevoflurane and desflurane are the most commonly used inhalational anesthetics in Japan; they have been also reported to lower the threshold of shivering in a dose-dependent manner. It is expected that POS could be appeared more frequently after the anesthesia with desflurane compared to sevoflurane because the lowered threshold of shivering will return quickly in desflurane compared to sevoflurane. However, there have been no reports examining a direct comparison between sevoflurane and desflurane on the occurrence of POS. In this study, we retrospectively examined the comparison between these inhalational anesthetics for the occurrence of POS.

Method: After obtaining by the Ethical Review Committee (2020-261), 683 adults patients who underwent open radical surgery for uterine, cervical, or pancreatic cancer under general anesthesia using inhalational anesthetics at our hospital between December 2012 and March 2020 were included in the study. The odds ratio for the occurrence of postoperative shivering between the two groups (sevoflurane and desflurane) was calculated. Multivariable adjustment was performed using age, gender, BMI, surgical technique, volume of blood loss, operative time, whether flurbiprofen or acetaminophen were administered or not, and peripheral and central temperature at the end of surgery. Furthermore, propensity score matching was conducted using these factors.

Results: The multivariable-adjusted odds ratio for the occurrence of shivering in the desflurane group (62 occurrence/356 subjects) was 1.06 (95% confidence interval: 0.69-1.62, p = 0.79) compared with the sevoflurane group (77/327, reference). Similarly, after propensity score matching, the crude odds ratio for the occurrence of shivering in the desflurane group (47/210) was 1.09 (95% confidence interval: 0.68-1.75, p = 0.72) compared with the sevoflurane group (44/210, reference).

Conclusion: The occurrence of postoperative shivering was not difference between after sevoflurane and desflurane inhalation anesthetics.

6636

An unusual presentation of Malignant Hyperthermia (MH)

Warwick E.¹, Wadhvani R.¹, Rigby A.¹

¹Kings College Hospital London - LONDON (United Kingdom)

Background: The Association of Anaesthetists 2020 guidance describes MH as: "A progressive life-threatening hyperthermic reaction occurring during general anaesthesia" [1]. The incidence is quoted at 1 in 10,000 to 1 in 150,000 anaesthetics and numbers are falling with increasing use of TIVA and decreasing use of suxamethonium. Mortality from MH is quoted at 4%, and early recognition is key to survival. Due to the rarity of MH, many anaesthetists may never see a case, yet have to remain vigilant to the potential of MH occurring, especially as previous uneventful surgery does not rule out the possibility.

Case Report: A fit 24-year-old male presented for a bimaxillary osteotomy. He had never had surgery before, did not have any relevant family history and had no allergies. The patient underwent a routine intravenous anaesthetic induction (using rocuronium). Maintenance of anaesthesia was with sevoflurane/oxygen/air, combined with a remifentanyl infusion. Surgery was conducted uneventfully until three hours post induction.

The ETCO₂ began to rise despite two changes of the soda lime and changes in ventilatory parameters. Thirty minutes later, the temperature began to rise, peaking at 38.5 degrees. The patient remained haemodynamically stable, likely due to the remifentanyl infusion and ongoing fluid intravenously. MH was declared and the patient treated in accordance with Association guidance, requiring the use of charcoal filters, dantrolene and onward ICU care for 24 hours. Prompt management avoided DIC, myoglobinuria and arrhythmias, but potassium rose to 6.4. The patient was discharged 4 days after surgery with no residual

sequelae. A referral was made by the anaesthetic team to the national MH centre.

Discussion and Learning points: Signs of MH can be both subtle and delayed and do not all occur at once in a textbook fashion. Vigilance and an anaesthetist's "gut feeling" are key in prompt recognition and early management. Asking for help early from the theatre multidisciplinary team is crucial in being able to coordinate all aspects of management. As MH is rare, it is important to share experience of cases to help recognition and management. Ensuring patients receive appropriate follow up is crucial and is the responsibility of the anaesthetist.

References:

- Hopkins PM, Girard T, Dalay S et al. Malignant hyperthermia 2020 Guideline from the Association of Anaesthetists. *Anaesthesia* 2021; 76(5): 655-664

6637

Influence of propofol versus sevoflurane on surgical conditions during functional endoscopic sinus surgery (FESS)

Kerremans O.¹, Declercq G.², Vanmaele H.², Sys L.², De Coster L.², Kalmar A. F.³

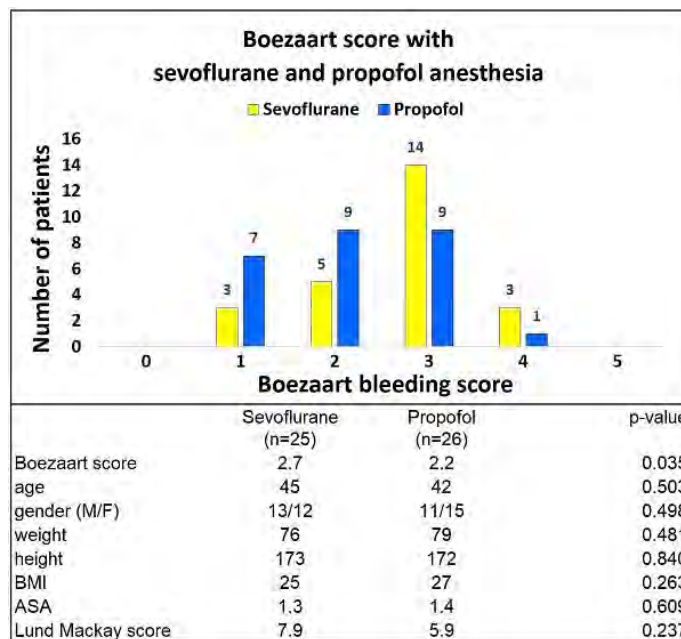
¹Department of Anaesthesiology and Perioperative Medicine, Ghent University Hospital - Ghent (Belgium), ²Department of Otorhinolaryngology, Maria Middelaes Hospital - Ghent (Belgium), ³Department of Anaesthesia and Critical Care Medicine, Maria Middelaes Hospital - Ghent (Belgium)

Background and Goal of Study: Optimal surgical conditions and quality of the surgical field during Functional Endoscopic Sinus Surgery (FESS), increase efficiency and minimize the risk of serious complications. The aim of this study was to evaluate, when in both groups remifentanyl is used as analgetic, whether propofol or sevoflurane for maintenance of anesthesia provides better surgical conditions, reflected in the Boezaart surgical field grading scale¹.

Materials and Methods: In this double blinded RCT in adult patients undergoing FESS, 51 patients were randomly allocated to either receive sevoflurane or propofol for maintenance of anesthesia. Patients with elevated bleeding risk were excluded. General anesthesia was induced with propofol TCI 4µg/ml and remifentanyl TCI 4ng/ml. After intubation, in the sevoflurane group propofol TCI was stopped and anesthesia was maintained using sevoflurane. In both groups, the hypnotic was titrated to maintain a BIS-value of 50. At the end of surgery the surgeon, blinded for group allocation, was asked to rate the Boezaart score (score 0-5 with 0= no bleeding; 5= uncontrollable bleeding).

Results and Discussion: Student T-test showed a significant better (p=0.035) Boezaart score in the propofol (Average 2.2) versus sevoflurane (2.7) group, reflecting better surgical conditions with propofol anesthesia. Patient characteristics and disease severity, as reflected by the LM-score, were not significantly different between groups.

A physiological explanation of our observation may be selective vasodilatation², where propofol induces greater venous postcapillary sphincter dilatation, while sevoflurane gives comparatively more dilatation of the arterial precapillary sphincter, thus increasing capillary pressure and vascular congestion.



Conclusion: Propofol for maintenance of anesthesia during FESS provides significantly better surgical conditions compared to sevoflurane.

References:

- Boezaart AP et al. *Can j Anaesth.* 1995; 42: 373-376
- Albertin A et al. *Spine*, 2008; 33: 2017-2022

6642

Opioid-free anesthesia guided by NOL® monitor in bariatric surgery. Reduction of postoperative pain and PONV

Toral Toral U.¹, Salas Rezola E.¹, Galiana Ivars M.¹, Navarro Martinez J.¹, Ferrero Coloma C.¹

¹Hospital General Universitario de Alicante (HGUA) - Alicante (Spain)

Background: The prevalence of obesity has increased exponentially, considered the pandemic of the 21st century. The high incidence of PONV and the severe hypoxemia present in this group of patients make it necessary to search for new multimodal approaches in order to avoid or minimize the use of opioids.

Case Report: A 46-year-old woman (BMI 53kg/m²) with fibromyalgia, anxiety-depressive disorder, asthma and OSAHS, presented for Gastric Bypass. Twenty minutes before surgery, 16µg bolus of dexmedetomidine is administered. Induction was performed with propofol 150mg, rocuronium 70mg and 7ml of the prepared mixture (dexmedetomidine 2µg/ml + ketamine 1mg/ml + lidocaine 10mg/ml). Pre incision, ketamine 40mg, dexketoprofen 50mg were administered and infiltration of laparoscopy ports with lidocaine 1%. Maintenance was performed with mixture infusion at 1 - 1,5ml/10kg/h and propofol at 3mg/kg/h. During operation: NOL 10, BIS 40-45, TOF 0. At the end of surgery Paracetamol 1g, metamizole 2g and infiltration of laparoscopy ports with ropivacaine 2% and 400mg sugammadex were administered. Extubation after TOF > 0.9 and adequate level of consciousness and ventilatory mechanics which was 8min after drug discontinuation. Surgery lasted 2 hours and 10 minutes. Hemodynamic stability was maintained all time. NOL values were 45 during intubation and <20 afterwards. During the procedure and postoperative no complications appeared and no rescue of morphine required. EVA's scale was 0/10 and no nausea or vomiting appeared.

Discussion: We have implemented an anesthetic protocol based on opioid-free anesthesia guided by the NOL nociception monitor. Our results are a lower incidence of postoperative pain (with less need for postoperative opioid rescue and lower EVA scores) as well as less nausea and vomiting, and a high perceived quality of care by patients compared to standard practice using fentanyl and remifentanyl. OFA protocols require management of multiple drugs and the use and validation of nociception monitors is necessary to anesthesiologists to optimal management.

References:

Thorell A, et al. Guidelines for perioperative care in bariatric surgery: Enhanced Recovery After Surgery (ERAS) society recommendations. *World J Surg.* 2016;40:2065–83

J Mulier, et. al. Standardization of the anesthesia for laparoscopic bariatric-metabolic surg

Learning point: Opioid-free anesthesia guide by NOL monitor is a safe technique that reduces the postoperative pain and PONV

6656

Sevoflurane consumption by individual anaesthetists varies widely during identical procedures despite using the same high-end workstation

De Bel N. R.¹, Hendrickx J. F.², Vanoverschelde H.³, Allaert S.³, Nieuwenhuizen R.³, Kalmar A. F.⁴

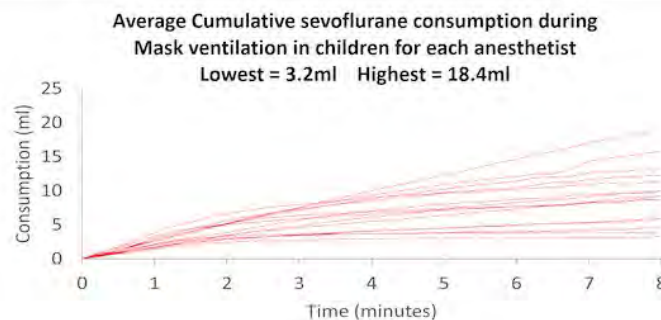
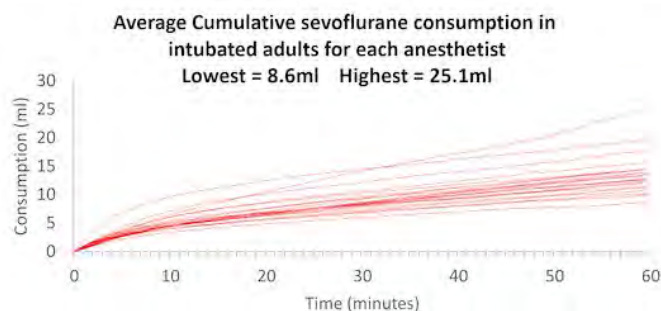
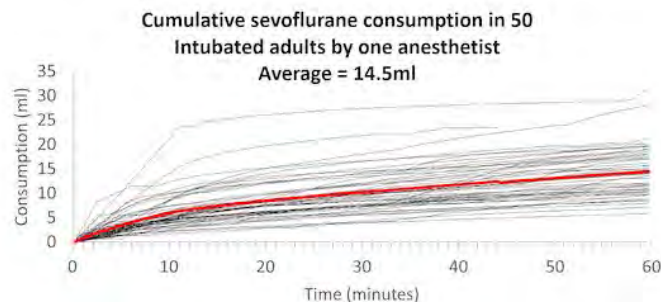
¹Dept. of Anaesthesiology, University Hospitals Leuven - Leuven (Belgium), ²Dept. of Anaesthesiology and Intensive Care Medicine, OLV Clinic - Aalst (Belgium), ³Dept. of Anesthesia and Critical Care Medicine, Maria Middelaers (MM) Hospital - Ghent (Belgium), ⁴Dept. of Basic and Applied Medical sciences, Ghent University - Ghent (Belgium)

Background: Waste of volatile anaesthetics ought to be kept to a minimum for financial and environmental reasons. Although contemporary, automated anaesthesia workstations easily and safely enable major waste reductions, individual anaesthetist's routines may prevent them from using this technology to its fullest potential. We therefore measured the variability in sevoflurane consumption (Vsevo) among anaesthetists during general endotracheal anaesthesia in adults or during mask ventilation in children while using the same type of workstation, the Flow-i with automatic gas control software (AGC) (Getinge, Solna, Sweden). At the MM hospital, all operating theatres are equipped with the Flow-i including AGC. AGC automatically minimizes agent waste while reliably maintaining the requested end-tidal concentration.

Methods: Consumption data of 22 anaesthetists were analysed. Sevoflurane was delivered via the Flow-i; the actual workstation settings were left at the discretion of the anaesthetist. Vsevo data for each anaesthetist (as reported by the Flow-i) were collected for two scenarios: (1) Vsevo during the first 60 min in intubated adult patients undergoing a variety of procedures in dorsal decubitus; and (2) Vsevo during the first 8 min in children undergoing myringotomy (face-mask). Each anaesthetist performed each scenario 50 times, and the average Vsevo of these 50 procedures was calculated for each scenario.

Results: In scenario 1, the lowest and highest average Vsevo after 1h were 8.6 and 25.1 mL, respectively. In scenario 2, the lowest and highest average Vsevo after 8 min were 3.2 and 18.4 mL, respectively.

Conclusion: Despite using the same workstation in the same hospital, average Vsevo by 22 anaesthetists differed by 290% in intubated adults, and by 575% during face-mask anaesthesia in children. This substantial variability in waste among anaesthetists who have access to the same technology indicates that appropriate training and education is required to reap the full ecological and economic benefits of these technologies. Further analysis is required to better understand the contributing factors, including differences in routine.

**6677**

Anesthetic Management in Scoliosis Surgery in a Patient with Fontan Circulation

Oliveira F.¹, Dias A. L.¹, Dias J.²

¹Centro Hospitalar Universitário de São João - Porto (Portugal), ²Centro Hospitalar Universitário de São João - Porto (Portugal)

Background: The anesthetic management of patients with Fontan physiology can become complex, particularly in invasive non-cardiac surgeries such as scoliosis surgery. This case pretends revisiting Fontan physiology and relevant anesthetic management considerations.

Case Report: A 20-year-old male, Jehovah's Witness, with a history of Fontan's procedure in childhood was admitted for correction of severe lumbar kyphoscoliosis. He also had mixed ventilatory syndrome with severe obstructive component and was currently on Enalapril 5mg and Aspirin 100mg once a day. 2-D echo showed mild to moderate impairment of global systolic function (LVEF 43%) and stress test limited effort capacity. Optimization of Hb and Ht values was performed in preoperative period. Anesthesia was induced with 4mg midazolam iv, 0.05µg/kg/min remifentanyl infusion and 1.5mg/kg propofol bolus, with laryngoscopy facilitated with 0.5mg/kg of rocuronium iv, and maintained with infusion of propofol and remifentanyl. CVP, invasive blood pressure, somatosensory and motor evoked potentials were monitored in addition to standard monitoring. Volume controlled mechanical ventilation was maintained with 5-6mL/kg of tidal volume, short inspiratory times, low media airway pressure, without PEEP. The patient was placed in prone position. It was given 1500mL NaCl 0.9%, 500mL HAES-steril6% and 450mL of red cells from cell-saver. Stimulated blood loss was 900mL. Hypotensive were corrected with ephedrine. After 5h of surgery, the patient was transferred to ICU and was discharged home on day 8 post-surgery.

Discussion: Fontan circulation consists of direct communication of

venous blood from the upper and lower vena cava with the pulmonary artery, with passive pulmonary blood flow. Intravascular volume is the main determinant of CVP, that reflects the mean pulmonary arterial pressure, with hypovolemia being poorly tolerated. The patients usually have basal venoconstriction to maximize the preload, being more susceptible to hemodynamic instability due to general anesthesia induced hypotension. In this case, there is the overlap of another hemodynamic challenge: prone position, in which intra-abdominal pressure causes a decrease in venous return.

References: Nayak S, Booker PD. The Fontan circulation. *Contin Educ Anaesth Crit Care Pain*. 2008;8:26-302

Learning points: Anything that increases intrathoracic pressure and, therefore, pulmonary vascular resistance, should be avoided. A high CVP is necessary to maintain pulmonary perfusion.

6679

Cushing syndrome: a challenge to the anaesthesiologist - A case report

Elvas-Leitão I.¹, Petiz C.¹, Marques Da Costa F.¹, Neves I.¹, Ormonde L.¹
¹Centro Hospitalar Universitário Lisboa Norte - Lisboa (Portugal)

Background: Cushing syndrome is a rare disease with multiple pathologic features concerning almost all organ systems. Thus, these patients constitute a true challenge to the anaesthesiologist. **Case Report:** A 30-year-old male was hospitalized due to multiple vertebral fractures, diabetes mellitus, hypertension, and persistent hypokalaemia. He reported abnormal weight gain over 100 kg in the last year with no apparent explanation. An intercurrent diagnosis of SARS-CoV2 with respiratory failure and pulmonary atelectasis worsened by an obesity hypoventilation syndrome and bacterial superinfection postponed the diagnosis. These features together with liver failure and psychosis during hospital stay prompted diagnosis of Cushing syndrome. Further investigation showed increased ACTH production without pituitary disease. The assumption of an ectopic source led to bilateral open adrenalectomy planning. The patient's condition was optimized preoperatively, and arrangements were made for fiberscope availability, packed red blood cells as needed and an ICU bed. A balanced general anaesthesia was conducted with few complications; two peripheral large bore catheters, a central venous access and an arterial line were placed. Surgery was a success and accomplished expected goals with minimal blood loss. The patient was transferred to the ICU under ventilatory support.

Discussion: Cushing Syndrome requires individualized anaesthetic management during pre, intra and postoperative periods. Airway, breathing and hemodynamic stability demand thorough attention from the beginning. The anaesthesiologist must be prepared to bring together and lead a team that can best manage perioperative features as diverse as these. In this case, a multidisciplinary approach conjoining Anaesthesiology, Blood Transfusion, Endocrinology, General Surgery, Infectious Diseases, Intensive Care, Neurosurgery, Pneumology, Psychiatry and Rehabilitation Medicine was crucial to optimize the conditions for major surgery so as to promote the best care for this patient and improve the outcomes.

Learning points: Planning ahead and predicting of anaesthetic complications are good habits that reduce unexpected risks in all surgeries. Early diagnosis in Cushing syndrome is essential to prevent complications and increase the likelihood of anaesthetic and surgical success. Anaesthesiologists can profit from multidisciplinary approaches particularly in complex patients with truly systemic diseases

6690

General Anesthesia for Myotonic Dystrophy Type 1: Setting The Record Straight

Neri M. L.¹, Oliveira I.¹, Freire P.¹
¹Centro Hospitalar de Lisboa Ocidental - Lisboa (Portugal)

Background: Myotonic dystrophy type 1 (DM1) renders a complex neuromuscular disease spectrum¹. The literature has much evolved in recent years, so that facts held before as best practice should now be clarified as nothing more than clinical myths².

Case Report: An ASA III 16-year-old boy with DM1 was diagnosed with rhinosinusitis and proposed for CENS. He presented with weakness of facial muscles, distal myotonia and spine deformities. The complementary tests were normal. Aspiration prophylaxis was performed. We performed a TIVA, with infusion of Propofol and Remifentanyl, under standard ASA, bispectral index and TOF monitoring. Rocuronium was used for optimizing intubation conditions, obtained with videolaryngoscopy. With the conclusion of an uneventful procedure, Sugammadex was administered for reversal of the neuromuscular block, followed by extubation. After vigilance in the postanesthesia care unit for six hours, the patient was transferred to the surgical ward and discharged from hospital on the day after surgery.

Discussion: The assessment of neuromuscular, pulmonary and cardiac manifestations is of paramount importance. As the extent of peripheral muscle weakness correlates poorly with pulmonary muscle function, signs of respiratory and swallowing compromise should dictate complementary testing and postoperative outcome. Additionally, risk evaluation for arrhythmias and sudden cardiac death is to be taken annually. Since DM1 is linked with anaesthesia-induced rhabdomyolysis, it's not only crucial that these patients undergo a free from triggers technique, such as TIVA, but also that targeted treatment is delivered, if needed. Identification of difficult airway predictors must be sought, as head and neck muscle impairment and dysmorphic features are characteristic. Opting for short acting agents and attaining a minimal anesthetic interference could enable a reduced hospital stay.

References: Schieren M, et al. Anaesthetic management of patients with myopathies. *European Journal of Anaesthesiology*, 2017; 34:641–649. Gray R. Anesthesia-induced rhabdomyolysis or malignant hyperthermia: is defining the crisis important? *Pediatric Anesthesia*, 2017; 27:490-493.

Learning points: A thoughtful perioperative approach will positively impact postoperative complications and hospital stay. Although DM1 isn't a malignant hyperthermia-linked myopathy, there is still risk of anaesthesia-induced rhabdomyolysis, in which there is no role for Dantrolene.

6697

Evaluation of a modified TOF-ratio (T4/Tref) to assess recovery from rocuronium-induced neuromuscular block: A simultaneous comparison with the classical TOF-ratio

Schmartz D.¹, Bernard P.², Sghaier R.², Fils J. F.³, Fuchs-Buder T.²
¹CHU Brugmann - Huderf - Brussels (Belgium), ²CHRU de Nancy - Vandoeuvre-lès-Nancy (France), ³Ars Statistica - Nivelles (Belgium)

Background and Goal of Study: The TOFScan is a new acceleromyographic neuromuscular (NM) monitor which proposes in addition to the usual train-of-four (TOF)-ratio a modified TOF-ratio (1). This new parameter does not refer fade of the 4th twitch response to the height of the 1st twitch in a TOF series (T4/T1), but it refers fade of the 4th response to a reference value taken before relaxation (T4/Tref). It has recently been shown that this T4/Tref allows monitoring of depolarizing NM blockade (2). However, until now its significance to assess recovery from non-depolarizing block has not been evaluated so far. The aim of this prospective, controlled observational study was to compare NM recovery assessed with a modified TOF-ratio (T4/Tref) with the corresponding parameters simultaneously obtained with the classical TOF-ratio.

Materials and Methods: After IRB approval, ClinicalTrials.gov registration (NCT04287426) and written informed consent, 35 patients were included in this study. Under TIVA anesthesia, patients received a single bolus of 0.6 mg/kg of rocuronium. NM block was continuously monitored at the adductor pollicis. Stat.: Power analysis shows that 25 patients are needed

to compare both TOF-ratios using t-test(1). Values are mean ± SD.

Results:

Time (min) to reach T4/T1≥90%	Time (min) to reach T4/Tref≥90%	P value
56.2 ± 17.2	65.3 ± 19.3	<0.001
1st value of T4/T1 ≥ 90% (%)	Concomitant T4/Tref value (%)	
90.9 ± 1.1	69.6 ± 9.4	<0.001
1st value of T4/T1 ≥ 100% (%)	Concomitant T4/Tref value (%)	
100.3 ± 0.47	91.6 ± 6.7	<0.0001

Discussion and conclusions: T4/T1 and T4/Tref cannot be used interchangeably. Using T4/Tref the threshold of 0.9 is achieved later and the simultaneously measured T4/T1 ratio was already more advanced. It has recently been shown that postoperative pulmonary complications are reduced for T4/T1 ratio > 0.95 before tracheal extubation compared with AMG T4/T1 > 0.9 (3). Using the modified TOF ratio of 0.9 as threshold for acceptable neuromuscular recovery could improve patient's safety in the immediate postoperative period.

References:

1. Anesthesiology. 2018,129(5):880-888
2. J Monit Comput 2020 doi: 10.1007/s10877-020-00560-5
3. Br J Anaesth 2020,124(1):63-72

6699

A novel awake mouse urodynamic model including external urethral sphincter electromyography reveals effects of anaesthetics on bladder function

Von Siebenthal M.¹, Schneider M. P.¹, Zheng S.², Wuethrich P. Y.³, Burkhard F. C.⁴, Monastyrskaya K.⁴

¹Urology Research Laboratory, Department for BioMedical Research, University of Bern, Switzerland - Bern (Switzerland), ²Urogenital Engineering Group, ARTORG Center, Faculty of Medicine, University of Bern, Bern, Switzerland - Bern (Switzerland), ³Inselspital, University Hospital Bern - Bern (Switzerland), ⁴Department of Urology, Inselspital, Bern University Hospital, University of Bern, Bern, Switzerland; Urology Research Laboratory, Department for BioMedical Research, University of Bern, Switzerland - Bern (Switzerland)

Background and Goal of Study: Anaesthetics affect bladder function often leading to urinary retention. Bladder catheterization intra- and postoperatively employing anaesthetics acting on μ-receptor is of importance to prevent bladder over-distention and urinary retention. The mechanism behind this observation is not well understood. We aimed to develop an urodynamic investigation (UDI) model allowing repeated measurements in awake mobile mice and study the effects of midazolam, fentanyl and hydromorphone on bladder function.

Materials and Methods: Female mice underwent either bladder catheter (n=6) or bladder catheter plus electrodes (n=11) implantation next to the external urethral sphincter. Following awake baseline UDI (including storage phase and voiding phase), the effects of midazolam (5 mg/kg (i.p.)) and opioids (fentanyl (50 μg/kg (s.c.)) and hydromorphone (250 μg/kg (s.c.)) on bladder function were studied. Only one drug was applied at a time and the mice were allowed to recover for at least one day before being subjected to the next drug and UDI.

Results and Discussion: Baseline traces showed a slow increase in intravesical pressure during the storage phase followed by a sharp pressure increase (voiding phase). Under midazolam, intravesical pressure rose constantly during the storage phase at a higher rate compared to baseline followed by a sudden pressure decrease with bladder emptying followed by sphincter relaxation alone. With fentanyl, maximal detrusor pressure (Pmax) reached higher levels than baseline and remained at that level resulting in urinary retention. Under hydromorphone, intravesical pressure increased at a rate comparable to baseline, however Pmax reached a higher level, before a rapid decrease occurred. Such high pressures were observed in 100% under fentanyl, in 60% under hydromorphone and in 20% under midazolam. Pmax were significantly increased in midazolam and opioids compared to baseline. The opioids lead to either a significantly increased bladder capacity and micturition cycle duration (hydromorphone) or a complete loss of the

voiding phase leading to overflow incontinence (fentanyl).

Conclusion: Anaesthetics severely interfere with physiological bladder function: Fentanyl and hydromorphone disrupted the voiding phase evidenced by the reduced coordination of sphincter activity with detrusor contraction, while voiding under midazolam was achieved by sphincter relaxation only.

6701

Bilateral bispectral index and asymmetries in patients with high risk of postoperative delirium: An observational, prospective, exploratory study

Lauretta M. P.¹, Querci L.¹, Marra E.¹, Busignani S.¹, Melotti R. M.¹
¹Policlinico S. Orsola-Malpighi of Bologna - Bologna (Italy)

Background and Goal of Study: Postoperative delirium (PD) and postoperative cognitive dysfunction (POCD) are significant complications after general anesthesia (GA). Bispectral Index (BIS) is a non-invasive monitor to access electroencephalographic informations during GA and their asymmetry in right and left cerebral hemispheres (ASYM). This study has the task to evaluate ASYM in a cohort of surgical patients with high risk of PD.

Materials and Methods: Patients undergoing head&neck surgery, having 3 of the following criteria ("a priori" high risk), were enrolled: Age>70, male sex, ASA III, status of smoker, arterial hypertension. In theatre, a bilateral BIS probe was applied on their forehead. BIS Vista® monitor recorded left and right total power (0-30 Hz) and ASYM at these timepoints: (t1) BIS probe application (t2) 60" before GA administration (t3) 60" after myoresolution (t4) intubation (t5) surgical incision (t6) end of ipnosis (t7) 10 minutes after extubation. Daily follow-up was performed with CAM scale over 5 post-op days for PD diagnosis and a telephone follow-up with CIT-6 scale at 30 and 90 days for POCD.

Results and Discussion: ASYM of 50% indicates the same inter-hemispheric power; while ASYM<50% indicates a lower power in the left cerebral hemisphere. In our study, patients developing PD had higher power in the right hemisphere at t1, t2, t3 (ASYM<50%), while presented higher power in the left hemisphere at t6, t7 (ASYM>50%). Conversely, patients who developed POCD at 30 days presented prevalence in the left hemisphere (ASYM>50%) at t2,t3,t4.

Conclusion: Despite our results are preliminary, they highlight the association between intraoperative inter-hemispheric EEG differences and onset of PD and POCD. BIS monitor appears a valid intraoperative tool for a prompt diagnosis made by anesthetists.

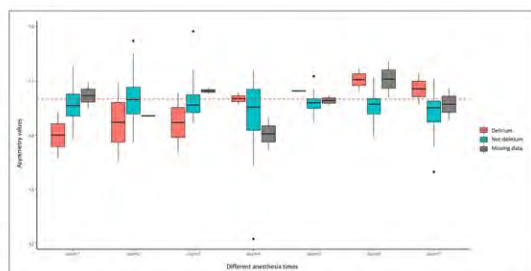


Fig.1 - ASYM at different anesthetic timepoints in patients who develop PD at 5 post-op days. Asymmetry values less than 50 indicate a prevalence of total power of the right hemisphere.

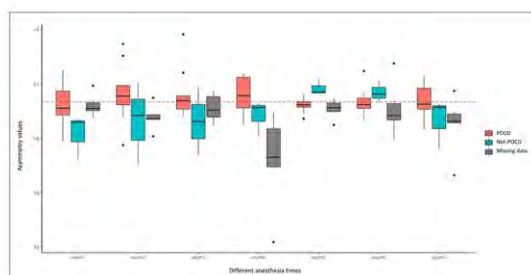


Fig.2 - ASYM at different anesthetic timepoints in patient who develop POCD at 30 post-op days.

6705

Loss of lung volume during high-flow nasal oxygenation in apneic patients estimated by electrical impedance tomography: a single-center randomized controlled trial

Riedel T.¹, Greif R.¹, Kaiser H.¹, Theiler L.², Nabecker S.¹, [Riva T.¹](#)
¹*Inselspital, University Hospital Bern - Bern (Switzerland)*, ²*Kantonsspital Aarau - Aarau (Switzerland)*

Background and Goal of Study: Studies investigating high-flow nasal oxygen (HFNO) at flow rates of >50 L.min⁻¹ postulated an increase in end-expiratory lung volume in apneic patients. This secondary analysis of a RCT investigates the evolution of lung volume over time comparing different flow rates of 100% oxygen in apneic, anesthetized and paralyzed adults.

Materials and Methods: This single-center trial assessed lung volume changes by chest electrical impedance tomography (EIT) in a subgroup of patients enrolled in a non-inferiority RCT investigating the increase of arterial CO₂ in apnea. Patients were randomized to 5 groups:

minimal-flow: 0.25 L.min⁻¹ via tube;
 low-flow: 2 L.min⁻¹+jaw thrust;
 medium-flow: 10 L.min⁻¹+jaw thrust;
 high-flow: 70 L.min⁻¹+jaw thrust;
 control: 70 L.min⁻¹+laryngoscopy.

After standardized anesthesia induction, all patients received 100% HFNO or O₂ via the anesthesia machine. Continuous jaw thrust or laryngoscopy ensuring airway patency was applied from the induction of anesthesia throughout the entire study period. The study intervention ended when either SpO₂<92 %, PtCO₂>100 mmHg, or at 15 min of apnea. Then patients were intubated and after a recruitment maneuver mechanical ventilation was started at a tv of 6 mL/kg lbw. EIT were performed during the entire study procedure. Changes in lung impedance during apnea were normalized for the impedance change during mechanical ventilation at 6mL/kg lbw and expressed in arbitrary units. Time to 25%, 50% and 75% of total reduction was calculated to describe the shape of the decay curve.

Results and Discussion: EIT-measurements were obtained in 48 subjects (minimal-flow 11 patients; low-flow 7 pat.; medium-flow 7 pat.; high-flow 14 pat.; control 9 pat.). Median [Q1-Q3] normalized reduction in lung impedance (LI) in the 5 groups was: minimal-flow 1.5 [1.5-2.2]; low-flow 1.0 [0.8-1.3]; medium-flow 1.7 [1.5-2.4]; high-flow 1.2 [0.8-1.4] and high-flow (control) 1.5 [1.1-2.0]. Time to 25%, 50% and 75% of total reduction in LI for all subjects was 1.3 [0.9-2.1] sec; 5 [2-13] sec and 52 [15-249] sec with no differences between groups. Analyses of the different regions of interest revealed no differences between groups.

Conclusion: Different flow rates of humidified 100% oxygen during apnea result in comparable decrease in estimated lung volume, which does not support a lung recruitment effect of HFNO.

6712

A comparison of methods for artefact detection in vital signs: A retrospective analysis

[Maleczek M.¹](#), Laxar D.¹, Dibiasi C.¹, Kimberger O.¹
¹*Medical University of Vienna - Vienna (Austria)*

Background: Continuous recording of vital signs is very common in anaesthesia and intensive care and the resulting databases are frequently used for research purposes. Any collection of vital signs inevitably includes errors and artefacts which may occur due to a wide variety of causes (electrosurgery, probe/transducer displacement,...) and lead to distorted recordings. To distinguish between artefacts and actual values, often simple algorithms like Cut-off filter or moving mean are used. In data science literature, more sophisticated filters like Multiples of Inter Quartile Range (IQR) or Multiples of Standard Deviation (z-value) are used. Data on which artefact detection methods is the most appropriate for which vital sign is missing. The objective of this trial is to compare artefact detection methods for vital signs collected during anaesthesia and intensive care stays in actual patient data.

Methods: From the department's perioperative database, 10 patients admitted to the OR or ICU (5/5) were randomly selected with recordings

longer than 180 min. and all vital parameters available (blood pressure, heart rate, puls-oxymetry, capnometry, temperature) were extracted.

All artefacts in the dataset were annotated by human experts and their manual artefact detections were compared with five commonly used artefact detection methods (IQR, z-value, cut-off, moving mean, moving median). Datasets were analyzed descriptively. Sensitivity and specificity of the applied algorithms were calculated.

Results and Discussion: In total, 110,904 datapoints were analyzed. Human experts classified 3,201 (3%) of those as artefacts. Z-value performed best (sens/spec) for heart rate (21%/100%), SpO₂ (55%/99%) and MAP (9%/100%). For temperature (60%/100%) and etCO₂ (83%/100%) IQR performed best. MAP was the vital parameter with the worst overall sensitivity. SpO₂ was the vital sign varying most between algorithms (z-value: 55%/99% vs cut-off: 0%/100%). Moving mean/median algorithms created completely different datasets as it modifies every datapoint putting its use in question when exact data is needed.

Conclusion: This comparison of algorithms demonstrates that choice of optimal algorithm for artefact detection has to be tailored to the vital sign of interest and that a "one size fits all" approach towards artefact detection is not recommended.

Acknowledgement: Ludwig Boltzmann Institute for Digital Health and Patient Safety

6724

The incidence of inadvertent intraoperative hypothermia and its association with blood loss

[Zeiner S.¹](#), Wallisch C.¹, Dibiasi C.¹, Kimberger O.¹
¹*Medical University of Vienna/General Hospital of Vienna - Vienna (Austria)*

Background and Goal of Study: Intraoperative hypothermia is associated with significant morbidity rates and its effect on coagulation, blood loss and prolonged recovery are recognized (Karalapillai et al., 2013; Rajagopalan et al., 2008). The goal of this study was to audit the occurrence of inadvertent intraoperative hypothermia and possible correlations with blood loss.

Materials and Methods: This retrospective, single-centre, descriptive study was conducted with the approval of the ethics committee of the Medical University of Vienna. Intraoperative temperature data as well as baseline characteristics of surgery cases at the Vienna General Hospital between 09/2013 and 05/2019 were extracted from our databases. Cases with invalid temperature measurements, patients undergoing therapeutic hypo- or hyperthermia, as well as minors were excluded. Continuous variables are summarized as means with standard deviations (SD), and categorical variables are presented as percentages. Student's t-test was performed, and results were evaluated at 95% confidence interval (CI). P<0.05 was considered statistically significant.

Results and Discussion: The final dataset included 44,643 cases. The minimum temperature was approximately normally distributed with a mean of 35.9°C. Hypothermia (below 36°C) was observed in 49.8% of cases. 17.9% and 4.4% of patients reached core temperatures below 35.5°C and 35°C, respectively. The use of forced-air warming devices (FAWs) was documented in 81.3% of cases. Furthermore, we compared patients with intraoperative temperature below 35°C at any point to patients with minimal intraoperative temperature above 35°C. Blood loss (in ml) and blood transfusions (in ml) differed significantly between the two groups with mean blood loss of 132.46 compared to 91.98 (95% CI, 18.05-62.91, p<0.001) and mean blood transfusion of 15.89 compared to 8.13 (95% CI, 2.89-12.63, p=0.002).

Conclusion: The results indicate that inadvertent intraoperative hypothermia occurs frequently despite the use of FAWs and is associated with higher blood loss as well as greater amount of blood transfused. Timely and more aggressive hypothermia prophylactic measures, such as extended prewarming, use of conductive warming devices, the combination of conductive heating and forced-air warming devices or even the use of invasive warming devices may be options to consider.

6734

Does somatostatin influence hepatic blood flow (HBF) during noradrenaline (NOR) infusion

Iturriagagoitia Bassas X.¹, Van Limmen J.¹, Wyffels P.¹, Berrevoet F.¹, De Hert S.¹

¹University Hospital Ghent - Gent (Belgium)

Background and Goal of Study: Somatostatin (SOMATO) is used as a portal inflow modulator during complex hepatic surgery¹, as SOMATO reduces portal vein flow (PVF). NOR is used to modulate mean arterial blood pressure (MAP) and may affect hepatic arterial flow (HAF) by adrenergic stimulation². The aim of this study was to evaluate the effect of NOR on HBF in patients receiving SOMATO.

Materials and Methods: Data from the NorWhipple trial were used to perform a sub-analysis to study the potential interaction of SOMATO and NOR on HBF. NorWhipple trial investigated the effect noradrenaline on HBF. Patients scheduled for a Whipple's procedure, were included. Anaesthesia was provided using target-controlled infusion of propofol (Schnider) and remifentanyl (Minto). Haemodynamic variables were measured using PulsioflexTM and HBF was measured using ultrasound transit time (Medi-Stim ASTM). HBF, PVF and HAF were indexed on body surface area. NOR was used to increase mean arterial blood pressure (MAP) from baseline (T1), to 10 – 20% (T2) and 20 – 30% (T3) of T1. On surgical indication, patients received SOMATO. To compare the effects of SOMATO and NOR on HBF, a linear mixed model was used to analyse the effects.

Results and Discussion: 28 patients were analysed of whom 20 patients received SOMATO (group S) and 8 patients did not receive SOMATO (group N). During NOR infusion MAP was increased, but cardiac index remained similar. At baseline T1, group S had lower total HBF compared with group N ($p < 0.01$) due to a lower PVF ($p < 0.01$). In group N, NOR resulted in a reduction of total HBF which was mediated by a reduction of both PVF and HAF. In contrast, in group S, NOR infusion resulted in a reduction of total HBF by reducing HAF. PVF was not altered by NOR infusion.

Conclusion: SOMATO resulted in a lower total HBF at baseline. NOR reduced total HBF in both groups but in patients receiving SOMATO, this effect was solely related to a reduction of HAF while in other patients, NOR reduced both HAF as PVF. The mechanisms responsible for this discrepancy are unknown.

References:

1. Troisi RI et al. *Ann Surg* 2019; 269: 1025–33
2. Gelman S, Mushlin PS. *Anesthesiology* 2004; 100: 434–9

6737

Audit of the compliance and accuracy of the documentation of disposal of unused controlled drugs in the operating theatre at a major tertiary referral teaching hospital in Melbourne, Australia

Talman A.¹, Trajceska L.¹, Desmond F.¹

¹Austin Hospital - Heidelberg (Australia)

Background and Goal of Study: Appropriate management and documentation of controlled drugs in the operating theatre is the responsibility of all anaesthetic practitioners. There are well defined legal requirements outlining the disposal of controlled drugs in most countries. In Australia, it's a mandatory legal requirement to document the disposal of residual amounts of all discarded controlled drugs. Compliance with these regulations reduces the risk of theft or abuse. The aim of this study was to retrospectively audit current compliance of the accurate recording of all used controlled drugs and the discard of residual unused controlled drugs in operating theatres at Austin Health, a tertiary referral teaching hospital in Melbourne, Australia.

Materials and Methods: After ethics permission was granted, we conducted a retrospective observational study between the 23rd of September 2019 and the 5th of June 2020. Data was collected from the Drugs of Addiction register of two major operating theatres and analysed for the accurate recording of used controlled drugs, including accuracy of recording of discarded residual drugs not used during the case. All data was retrospectively verified against the anaesthetic charts of those

cases.

Results and Discussion: 100 individual patient entries from two major operating theatres were analysed. There was a total of 247 controlled drugs signed out of the "Drugs of Addiction Register". 147/247 (57.49%) of controlled drugs were accounted for. Accounted for drugs included residual discarded drugs recorded in the drug registry 43/247 (17.41%), drugs entirely used during the case and recorded on the anaesthetic chart 90/247 (36.43%), as well as drug infusions in patients transferred directly from the operating theatre to the Intensive Care Department 9/247 (3.64%). A total of 105/247 (42.51%) of controlled drugs signed out of the "Drugs of Addiction Register" had residual unused drug not accounted for on the anaesthetic chart or drug discard documentation.

Conclusion: There was a significant quantity of controlled drugs that were dispensed, not entirely used, and not accounted for in record keeping, with no record of discard (42.51%). While this is likely due to poor compliance of essential record keeping, rather than drug divergence, the latter is possible and concerning. Disposal of controlled drugs is important because of the potential for abuse and all controlled drugs given and wasted should be accounted for.

6752

Anterolateral thigh flap for total esophageal reconstruction: anesthetic approach case report

Cruz G.¹, Nunes J. M. C. R.², Rodrigues I.¹

¹Centro Hospitalar Universitário Lisboa Norte - Lisboa (Portugal),

²Instituto Português de Oncologia de Lisb - Lisboa (Portugal)

Background: Reconstruction of gastrointestinal continuity is crucial for maintaining quality of life after esophagectomy. Options include gastric, jejunal, or colonic interposition but in 2 -13% of cases ischemic complications occur¹. Secondary reconstruction options are limited and myocutaneous tubularized skin flaps are an alternative. Scientific literature regarding the anaesthetic approach in these rare cases is scarce. We present a case of prestenal reconstruction of the oesophagus using a skin tube from myocutaneous free anterolateral thigh flap (ALT).

Case Report: A 69-year-old female with a medical history of COPD and depression underwent a gastroesophagectomy and colonic interposition for stage IV.A adenocarcinoma of the esophagogastric junction after chemoradiation therapy. The postoperative period was complicated by necrosis of the colonic conduit with subsequent need for surgical resection. 1 year after, the patient was offered reconstruction with myocutaneous free ALT flap. Preoperative malnutrition status was evidenced and nutritional and physical rehabilitation program was ensued. Total intravenous general anaesthesia (TIVA) with target-controlled infusion was induced and maintained with remifentanyl and propofol. FloTrac[®] cardiac monitoring system was used for goal-directed fluid therapy (GDFT) for the 12h of procedure duration. Haematocrit was maintained at 30%-35%. Systemic postoperative multimodal analgesia (MA) was adopted. The patient was transferred to an intensive care unit under mechanical ventilation. Extubation occurred on postoperative day 2 and transfer to the ward on postoperative day 4. No complications were registered.

Discussion: Anaesthetic management influences free flap survival. Evidence for standard of care is still limited. TIVA and GDFT may result in better hemodynamic stability, improved oxygen delivery and better outcomes. MA and early extubation can also contribute to improved results².

References:

1. Hamai Y, et al. Skin Tube Reconstruction for Esophageal Defect Due to Postoperative Complication. *Ann Thorac Surg*. 2009.
2. MP L, et al. Anaesthetic Challenging in Microsurgical Flap Reconstruction: A Systematic Review. *J Anesth Clin Res*. 2018.

Learning points: Perioperative management influences the microcirculation of myocutaneous tubularized skin flaps, being crucial to surgical outcome. There is a need to gather standard multidisciplinary enhanced recovery pathways and develop standard intraoperative management.

6754

The effect of premedication on hypnosis management of total intravenous anaesthesia. A randomized controlled trial

Seror Cuiabano I.¹, Rodrigues Belai B.², Soares De Siqueira R. E.², Do Nascimento Junior P.³

¹Hospital Santa Helena - Cuiaba (Brazil), ²Hospital de Cancer de Mato Grosso - Cuiaba (Brazil), ³Sao Paulo State University - UNESP - Botucatu (Brazil)

Background and Goal of Study: Many studies have demonstrated the effect of premedication on propofol requirement for loss of consciousness. However, few relate this effect to maintaining total intravenous anaesthesia (TIVA) when other adjuvants are added. This study aimed to evaluate the effect of premedication with dexmedetomidine or midazolam on hypnosis management on induction and maintenance of TIVA.

Materials and Methods: Twenty-seven adults undergoing videolaparoscopy were randomly assigned into one of three groups in a 1:1:1 ratio: Dexmedetomidine 0.5 µg.kg⁻¹ IV; Midazolam 0.05 mg.kg⁻¹ IV and Placebo (saline 0.9% IV). After premedication, propofol infusion was started with an effect-site target of 1.0 µg.ml⁻¹ and titrate with increments of 0.5 µg.ml⁻¹ towards unconsciousness and bispectral index (BIS) < 60. Remifentanyl infusion was then started at a constant rate of 0.2 µg.kg.min⁻¹, and atracurium was administered. After tracheal intubation, the propofol was titrated by control of the BIS with a target value of 40-60. The remifentanyl infusion was adjusted to maintain intraoperative hemodynamic control. ANOVA and Kruskal Wallis tests were performed as appropriate. If there was a statistical difference between groups, then multiple comparisons tests were used. Values are presented as medians (IQR) or mean (±SD), and p<0.05 was considered statically significant.

Results and Discussion: The predicted effect-site (Ce) of propofol on induction was lower in the groups Dexmedetomidine (2.8 µg.ml⁻¹ [± 0.9]) and Midazolam (2.3 µg.ml⁻¹ [± 0.4]) than in group Placebo (4.5 µg.ml⁻¹ [±1.0]) (p<0.01). However, there was no significant difference between Dexmedetomidine and Midazolam (p=0.3). During the maintenance there were no significant differences among the three groups in Ce of Propofol (p=0.165): Dexmedetomidine (2.2 µg.ml⁻¹ [± 0.35]); Midazolam (2.1 µg.ml⁻¹ [± 0.3]); Placebo (2.6 µg.ml⁻¹ [±0.9]). The infusion dose of remifentanyl (µg.kg.min⁻¹) was lower with Dexmedetomidine (0.12 [0.1-0.15]) than with Midazolam (0.17 [0.16-0.27]) and Placebo (0.14 [0.12-0.2]) (p=0.002). The time to awake was similar between groups (p=0.3).

Conclusion: Dexmedetomidine or midazolam similarly reduce the Ce of propofol on induction of anaesthesia, smoothing the transition to maintenance. However, dexmedetomidine reduces the dose of remifentanyl compared to midazolam without delaying the time to awake.

6759

Mortality and cardiovascular complications after laparoscopic versus open abdominal surgery. Preliminary results

Beltrán de Heredia S.¹, Mases A.¹, Román L.¹, Vallès A.¹, Bosch L.¹, Sabaté S.²

¹Parc de Salut Mar - Barcelona (Spain), ²Fundació Puigvert - Barcelona (Spain)

Background and Goal of Study: Laparoscopic abdominal surgery reduces pulmonary complications, postoperative incisional pain and surgical complications compared to open abdominal surgery, but few studies compare postoperative cardiovascular complications.¹

The aim of the study was to evaluate mortality, major adverse cardiovascular and cerebrovascular events (MACCE), myocardial injury after noncardiac surgery (MINS) and global complications after laparoscopic abdominal surgery (LAS) compared with open abdominal surgery (OAS).

Materials and Methods: Prospective single centre cohort study (MINSMAR study), that included all patients over 45 years undergoing elective high cardiac risk abdominal surgery or intermediate cardiac risk abdominal surgery with cardiovascular risk factors from May 2017 to May 2019. Mortality, MACCE not including MINS (postoperative non-fatal cardiac arrest, postoperative acute myocardial infarction (PMI),

congestive heart failure (CHF), new cardiac arrhythmias, angina, stroke, cardiovascular death or cerebrovascular death), MINS and global postoperative complications were compared (LAS versus OAS) at 30 days and 1 year by phone call and electronic medical records. Dependent variables were mortality, MACCE and MINS at 30 days and 1 year after surgery. Mann-Whitney U test and Fisher exact test were used to compare quantitative and qualitative variables respectively.

Results and Discussion: A total of 349 patients were included, being 221 (63,3%) LAS and 128 (36,7%) OAS. No differences in demographic data were observed except for coronary artery disease (57 (26%) LAS vs 13 (10.2%) OAS, p<0.0001).

Table 1. Mortality, MACCE, MINS and global postoperative complications in laparoscopic versus open abdominal surgery.

Conclusion: In our study, LAS had better outcomes than OAS (mortality, MACCE, MINS and global complications). Further studies are needed to confirm our results.

References:

1. Kristensen SD et al. 2014 ESC/ESA guidelines on non-cardiac surgery : cardiovascular assessment and management. European Heart Journal (2014) 35, 2383-2431.

6782

Anaesthesia Management of a Patient with Pneumonectomy Undergoing Robotic Bilateral Adrenalectomy: A Case Report

Izgi M.¹, Tümer M.¹, Bal E. O.¹, Uzun Ş.¹

¹Hacettepe University School of Medicine - Ankara (Turkey)

Baseline: Robotic surgeries which are minimally invasive techniques have some features in terms of both anaesthesia management and surgical advantages. We aimed to present our anaesthesia management in a patient with pneumonectomy who underwent robotic bilateral adrenalectomy.

Case Report: Robotic bilateral adrenalectomy was scheduled due to metastases of a 56-year-old, 99 kg male patient who underwent right pneumonectomy with the diagnosis of squamous cell lung cancer. SpO₂ value was 95% in room air. After anaesthesia induction and endotracheal intubation, 8 mg dexamethasone was administered. Left adrenalectomy and lymph node dissection was performed with right lateral 20-30 degrees Trendelenburg position. Ventilator settings were set as tidal volume 475 mL, respiratory rate 18/min, PEEP 5 cmH₂O. PaCO₂ was around 40 mmHg, P peak was up to 27 cmH₂O. Then, he was positioned for right adrenalectomy. Ventilator settings were adjusted as tidal volume 400 mL and respiratory rate 20 /min. P Peak was the highest 27 cmH₂O. The operation was completed in 5 hours and 15 minutes. There was 100 mL of bleeding. To prevent brain and lung edema, fluid restriction (5 ml/kg/hour balanced crystalloid solution) and 20 mg furosemide were performed. The patient's anaesthesia was terminated in 6 hours. . Patient was transferred to the supine position. After muscle relaxation reversed with sugammadex, he was extubated. After followed up in the ICU for one day, he was discharged from service in three days.

Discussion: Robotic bilateral adrenalectomy operation can be performed smoothly in a patient with pneumonectomy, with lung-protective ventilation strategies, neuroprotective steroid administration, and fluid restriction. We recommend that bilateral adrenalectomy surgeries be performed by starting the operation with the surgery on the same side by positioning the intact

6792

The impact of low-opioid anaesthesia on post-operative pain after laparoscopic cholecystectomy

Komorowska-Wojtunik E.¹, Kosciuczuk U.², Hady R. H.²

¹Hospital of The Ministry of Internal Affairs and Administration - Bialystok (Poland), ²Medical University of Bialystok - Bialystok (Poland)

Background and Goal of Study: Post-operative pain is common symptom of the perioperative care. The aim was to describe the impact of low-opioid anaesthesia protocol on the occurrence and intensity of the post-operative pain after laparoscopic cholecystectomy within 24 hours after surgery (1, 2).

Materials and Methods: The study was approved by Ethical Committee in Medical University of Bialystok (Poland). The study group - 39 patients were anaesthetized with general anaesthesia with the low-opioid protocol (single intravenous dose of 0.1 mg fentanyl, only during the induction phase of anaesthesia, with co-analgesics: ketamine, lidocaine and magnesium sulfate), while 37 patients were control group (general anaesthesia using fentanyl as a main analgesic). The occurrence and intensity of pain was evaluated by questionnaire based on ten-point Numerical Rating Scale (NRS) in periods: 0-2, 2-6, 6-12, 12-24 hours after anaesthesia.

Results and Discussion: The incidence of the post-operative pain was 90% in general group, while it was 82% in study group, and 100% in control group. The highest median NRS was 3 in study group, and it was noticed in period 0-2, where the lowest median NRS was 1 in period 12-24 hours after anaesthesia. In the control group-the similar median NRS was 4 and it was noticed in periods: 0-2, 2-6, 6-12 hours, while the lowest median NRS was 3 in the period 12-24 hours after anaesthesia. The significant differences in the intensity of pain in periods 2-6 ($p = 0.001$), 6-12 ($p = 0.001$), and 12-24 ($p = 0.0001$) hours after anaesthesia were recorded. The correlations of the total dose of fentanyl and the NRS value, implementation of additional pain medicaments in the post-operative period in the control group were not demonstrated.

Conclusion: The application of the proposed low-opioid anaesthesia protocol was safe and resulted in a reduction in the intensity of post-operative pain within 24 hours after laparoscopic cholecystectomy.

References:

- Shanthanna H, Ladha KS, Kehlet H, Joshi GP. Perioperative Opioid Administration. *Anesthesiology*. 2021 Apr 1;134(4):645-659. doi: 10.1097/ALN.0000000000003572
- Bugada D, Lorini LF, Lavand'homme P., Opioid free anaesthesia: evidence for short and long-term outcome. *Anesthesiol*. 2021 Feb;87(2):230-237. doi: 10.23736/S0375-9393.20.14515-2. Epub 2020 Aug 4

6807

Postoperative intracranial haematoma secondary to an intracranial hypotensive syndrome after lumbar spinal surgery: about one case

Brogly N.¹, Romero K.¹, Lopez Vizcaino M.¹, Martins K.¹, Villar T.¹, Puertas J.¹

¹Hospital Universitario La Zarzuela - Madrid (Spain)

Background: Spinal surgery's complications are mostly related to direct nervous lesions or haemorrhage. In this case report, we describe the history of a severe intra-cranial haemorrhage after a lumbar spinal fusion.

Case Report: 74-year-old patient with lumbar spinal stenosis scheduled for a lumbar arthrodesis under general anaesthesia. After induction of general anaesthesia, the patient was placed in the prone position without any complications. Depth of anaesthesia was monitored with Bispectral index. Intraoperatively, the patient remained stable haemodynamically and respiratory, and no anaesthetic incident was observed. During the resection of L4 posterior arch, a punctual dural defect was detected, immediately sutured and sealed using Tissucol®, and checked with a leak trial (Valsalva maneuver). Implants were inserted under radioscopy control uneventfully and the rest of surgery ended without complications. At the end of surgery, patient was extubated and transferred to the recovery room, conscious, oriented and with a pain score <3/10. One hour after

admission to the recovery room, she presented a headache. Tramadol 100mg IV were administrated. Thirty minutes later the patient presented a general tonic-clonic seizure, which ceased with 5mg IV midazolam. In absence of recovery of a normal level of consciousness, the patient was intubated. A cerebellar CT scan was immediately performed before admission to the ICU and showed signs of acute subdural haematoma. In the ICU, the haematoma was complicated with apparition of hydrocephalia on day 2, and an external ventricular derivation was inserted. The persistence of Status Epilepticus with intermittent tonic-clonic crisis despite antiepileptic treatment with 4 drugs (levetiracetam, lacosamid, valproate and propofol) difficulted weaning and recovery. A tracheostomy was performed on day 8. Patient was transferred to a chronic neurological ICU on day 13 after surgery.

Discussion and Conclusion: Cerebral hemorrhage due to intracranial hypotensive syndrome is a very well-known and rare complication of neuraxial anaesthesia (1). Few cases were described in the literature after spinal surgery (2). An early diagnosis and treatment will improve prognosis of this very severe complication.

References:

q. RAPM 2021;46:337-343 (2); Eur Spine J (2012) 21:2091-2096

Learning points: Intracranial subarachnoid haemorrhage can occur after accidental dural tap during spinal surgery.

6817

Cardiorespiratory arrest secondary to anaphylactic shock by sugammadex. Can we prevent it?

Meschini N.¹, Monge E.², Corbella C.², Vicente J. M.², García M.², Zaballos M.²

¹Hospital General Universitario Gregorio Marañón - Madrid (Spain),

²Hospital General Universitario Gregorio Marañón - Madrid (Spain)

Background: Sugammadex is a synthetic γ -dextrin widely used for selective reversal of steroidal neuromuscular blocking agents, mainly rocuronium. Incidence of anaphylaxis has been estimated in 1/10.0001.

Case report: A 77 years old male patient, without history of allergies, ASA III (LVEF 35% with ICD pacemaker, atrial fibrillation, COPD, obesity) had a scheduled ureterorenoscopy and bladder transurethral resection, under general anaesthesia. Rocuronium was used in the procedure and sugammadex administered for neuromuscular reversion prior to extubation (2mg/kg). Three minutes later, the patient experienced cardiovascular collapse without pulmonary involvement, so advanced CPR was required for 20 minutes. Just when eyelids angioedema and upper body erythema were evidenced, anaphylactic reaction was suspected as the primary cause. He was transferred to the intensive care unit, and experienced fully recovery. Tryptase determination at 60 min was 189 μ L, (baseline 3,76 μ L), IgE 838 KU/L. Later on, intradermal tests were positive to sugammadex.

Discussion: Sugammadex anaphylaxis is rare but life threatening. It is suggested to be more frequent with higher doses but not with repeated sugammadex administration or prior non-medical exposure to cyclodextrins. Hence, neuromuscular monitoring must guide sugammadex use. Rocuronium-sugammadex complex antigenicity has also been reported. Hypersensitivity reactions (HR) are usually diagnosed according to the Sampson criteria developed by the National Institute of Allergy and Infectious Diseases. Sugammadex is considered a safe drug, even used as a treatment of rocuronium HR. Still, we must be vigilant for development of anaphylaxis, as is not always easy to diagnose within the first minutes. Early clinical suspicion and supportive treatment must be provided for good outcomes. Tryptase levels may not be above normal range. Skin tests should be performed 4-6 weeks after the sugammadex HR; basophil activation tests are reported to be useful even later.

References:

1.Burbridge MA. Incidence of Anaphylaxis to Sugammadex in a Single-Center Cohort of 19,821 Patients. *Anesth Analg*. 2021 Jan;132(1):93-97

Learning points: Anaphylaxis to sugammadex, although rare, must always be considered and its administration titrated by use of quantitative monitoring of neuromuscular blockade. Sugammadex dose must be the lowest required for neuromuscular reversal, since anaphylaxis seems to be more likely with higher doses.

6821

Co-analgesics and opioid-sparing effect in parathyroid surgery

Tarasenko S.¹, Suslov G.¹, Dubrov S.¹, Yefimova O.², Rudenko V.²
¹Bogomolets National Medical University - Kyiv (Ukraine), ²Ukrainian Scientific and Practical Center of Endocrine Surgery, Transplantation of Endocrine Organs and Tissues of Public of the Ministry of Health of Ukraine - Kyiv (Ukraine)

Background and Goal of Study: The majority of primary hyperparathyroidism (PHPT) are due to solitary adenoma and require the target surgery. Research of new anaesthesia/analgesia methods, which afford to have an opioid-sparing effect, is going. The Goal: Assessment of using combined method anaesthesia with co-analgesics on the intra- and post-op opioid requirement in parathyroidectomy patients.

Materials and Methods: 124 patients with PHPT were divided into 3 groups: STI-BCSPB (n=26) was used combined general anaesthesia (GA) with sevoflurane (SEV), the tracheal intubation (TI) with the myorelaxant introduction and bilateral cervical superficial plexus blockade (BCSPB); STI (n=82) was used SEV anaesthesia with IT and no BCSPB; PLM-BCSPB (n=16) was provided propofol (P) GA with protection airways by laryngeal mask (LM) and BCSPB. In both groups (STI-BCSPB and PLM-BCSPB) were used co-analgesics, such as dexamethasone (DXM) 8 mg IV, 2% lidocaine (L) 1.0-1.5 mg/kg IV, metamizole (M) or paracetamol (P) 1 g IV, dexketoprofen (DKTP) 50 mg IV as pre-emptive analgesia 30 min before surgery. Ketamine 25 mg IV was used for induction anaesthesia in these groups. In STI group only opioid with P were used for induction of GA. Duration of surgery (DoS), anaesthesia (DoA), opioid consumption, time from the operation ending until the eyes opening (EyOp), desaturation were measured. All data M±σ

Results and Discussion: DoS for STI, STI-BCSPB and PLM-BCSPB was respectively 37.8±13.9, 38.2±14.4 and 35.6±12.6 min (NS), DoA was respectively 59.4±17.9, 63.8±18.5 m and 48.1±16.5 min (p=0.028 STI vs PLM-BCSPB, p=0.024 STI-BCSPB vs PLM-BCSPB, the difference is significant (DS)). EyOp was 15.4±3.6, 15.6±4.0 and 11.2±2.6 min respectively for STI, STI-BCSPB and PLM-BCSPB (p=0.022 STI vs PLM-BCSPB (DS) and p=0.025 STI-BCSPB vs PLM-BCSPB (DS)) . Desaturation (SpO₂ below 92%) due to residual sedation and the effect of myorelaxants was observed in 39 (47.5%) and 12 (46.1%) patients in STI and STI-BCSPB during the first 30 min post-op compared to 2 cases (12.5%) in PLM-BCSPB (both STI groups were DS vs PLM-BCSPB, chi-square test). The dose of intra-op fentanyl was 334.3±56.8, 261.5±86.9 209.3±46.1 mcg in STI, STI-BCSPB and PLM-BCSPB respectively, (DS for PLM-BCSPB vs other groups, DS between STI groups)

Conclusion: Combine methods GA with BCSPB have some benefits vs mono GA. Co-analgesics afford to achieve an opioid-sparing effect.

6828

Is there an optimal moment to determine Quality of Recovery-15 score after total hip and knee replacement surgery?

Smolders J.¹, Vanhoeylandt E.², Degroof P.¹, Verougstraete M.², Vanwijnsberghe B.², Swinnen W.³

¹UZ Leuven - Leuven (Belgium), ²UZ Gent - Gent (Belgium), ³AZ Sint-Blasius - Dendermonde (Belgium)

Background and Goal of Study: The Quality of Recovery-15 score (QoR-15) has been developed and validated as a patient-centered outcome measure after surgery. To date, however, there is only limited experience with measuring the QoR-15. There are no studies that looked at the optimal moment at which the QoR-15 should be determined. Our goal was to determine the optimal moment for assessing QoR-15: whether there exists a moment where the QoR-15 stops to improve.

Materials and Methods: Patients scheduled for elective total hip or knee replacement (THR, TKR) were screened for inclusion during pre-anaesthesia assessment. Revision or urgent surgery, language barriers and analphabet patients were excluded. Patients who reported no or incomplete results were excluded post hoc. QoR-15 was assessed on postoperative days D1, D4, D7, D14 and D28. Normality of data was assessed with Shapiro-Wilk tests. For not normally distributed data

we used Kruskal-Wallis tests and we performed pairwise post hoc comparisons by Mann-Whitney U-tests with Bonferroni correction. Results with p < 0.05 were considered statistically significant. Bonferroni corrected significance levels were used (p < 0.005), where appropriate.

Results and Discussion: QoR-15 for THR and TKR are shown as box plots in Graph 1 & 2, and continue to improve throughout the study. QoR-15 for THR showed significant difference (p < 0.0001). Pairwise comparisons showed significant differences between D1-D7 (p < 0.0001), D1-D14 (p < 0.0001), D1-D28 (p < 0.0001), D4-D14 (p = 0.002), and D4-D28 (p < 0.0001). QoR-15 for TKR showed also a significant difference (p < 0.0001). Pairwise comparisons showed significant differences between D1-D14 (p = 0.0001), D1-D28 (p < 0.0001), D4-D28 (p < 0.0001) and D7-D28 (p < 0.0001).

Conclusion: There is no optimal moment for measuring QoR-15. QoR-15 might be a tool to identify patients that are not evolving, recovering or rehabilitating properly, and might benefit from an earlier post-operative appointment and appropriate intervention. Future studies should address various intervention strategies for QoR-15 at different moments.

6830

Postoperative outcomes in patients undergoing elective vascular surgery, randomized to air or ≥ 50% oxygen perioperatively

Valadkhani A.¹, Bell M.¹, Hallqvist L.¹, Granström A.¹, Nordstrom J.¹, Gupta A.¹

¹Karolinska University Hospital Solna - Stockholm (Sweden)

Background and Goal of Study: Supplementary oxygen is often administered routinely to increase oxygen delivery to vital organs in the perioperative setting. However, recent evidence suggests that hyperoxia might be of no benefit, or indeed harmful, and increase the rate of myocardial infarction.

Materials and Methods: A total of 192 patients undergoing aortic or peripheral vascular surgery from three centers in central Sweden were randomized to receive an inspired oxygen fraction ≥ 0.5 (group H) or 0.21 (group N) intraoperatively and for ≥ 4 h postoperatively. A composite outcome of pre-defined complications was assessed at follow-up at 30 days (primary endpoint) and one year after index surgery. Troponin T (TnT) and B-type natriuretic peptide (NT-pro-BNP) were measured perioperatively. Data was analyzed using logistic regression, student's t-test or Fisher's exact test, as appropriate.

Results and Discussion: The median (IQR) PaO₂, two hours after start of surgery was 22 kPa (18-27) kPa in group H and 10 (9-12) kPa in group N. At 30-day follow-up, 43 patients (46 %) developed any complication in group H and 36 patients (40 %) in group N, OR 1.26 (95 % CI 0.70-2.27), p= 0.43. Myocardial injury after non-cardiac surgery (hs-TnT > 14 ng/L) was observed in 48 (51 %) vs. 34 (38%) patients in group H and N respectively, 48 hours postoperatively (p = 0.07). No difference was observed in the number of patients who had an elevated NT-proBNP postoperatively. One patient died within 1-year.

Conclusion: No advantage or disadvantage of administering high inspired oxygen perioperatively was observed in patients undergoing vascular surgery.

6835 Relationship between preoperative glycated hemoglobin (HbA1c) with short and long-term outcomes after elective non-cardiac surgery

Nunez M.¹, Beltrán De Heredia S.¹, Sabaté S.², Rueda M.¹, Alonso E.¹, Mases A.¹

¹Parc de Salut Mar - Barcelona (Spain), ²Fundació Puigvert. IUNA. - Barcelona (Spain)

Background and Goal of Study: It is not well established whether preoperative poor glycemic control in Diabetes Mellitus (DM) is associated with an increased risk of perioperative adverse outcomes (PO). Our aim was to evaluate the relationship between preoperative HbA1c with short and long-term major cardiovascular events (MACCE) and all-cause mortality and with perioperative pneumonia, sepsis and acute kidney injury (AKI) after elective non-cardiac surgery.

Materials and Methods: Prospective, single center cohort study (MINSMAR study) recruiting patients from May 2017 to May 2019. Eligible subjects were patients ≥45 yrs. undergoing non-cardiac surgery: 1) high cardiac risk surgical procedures or 2) intermediate cardiac risk procedures in patients with clinical risk factors. All surgeries were elective and under general and/or neuraxial anaesthesia. Preoperative HbA1c was obtained and patients were classified in 5 groups: HbA1c ≤5.5%, 5.6-6%, 6.1-7%, 7.1-8% and >8%. Dependent variables were 1) MACCE (myocardial injury, myocardial infarction, angina, non-fatal cardiac arrest, congestive heart failure, arrhythmias and stroke) and all-cause death at 30 days and 1 year follow-up and 2) perioperative pneumonia, sepsis and AKI. Troponin T during the first 3 postoperative days was obtained. Chi square test (χ^2) was used to assess the association between levels of HbA1c and adverse outcomes. Results and Discussion: A total of 741 patients entered the study. Mean age was 72 yrs. and 67.4% were male. DM was diagnosed in 38.6% patients. Other comorbidities were: chronic kidney disease 28.4%, coronary artery disease 26%, heart failure 48%, peripheral artery disease 36.9% and previous stroke 18.4%. We did not find any association between levels of HbA1c and MACCE and all-cause mortality (Table 1). We also found no association between HbA1c levels and perioperative AKI (P=0.17), sepsis (P=0.82) or pneumonia (P=0.85).

Conclusion: Preoperative HbA1c levels are not associated to an increased risk of PO or to a higher risk of MACCE and all-cause mortality in non-cardiac surgery at 1 year. Complications are probably related to the degree of micro and macrovascular disease.

Table 1: Relationship between levels of HbA1c and MACCE and all-cause mortality at 30 days and 1 year follow-up.

	30 days MACCE		1 year MACCE		30 days mortality		1 year mortality	
	No	Yes	No	Yes	No	Yes	0	1
Total	Count 540	Count 201	Count 491	Count 250	Count 726	Count 15	Count 655	Count 86
	% 72,90%	% 27,10%	% 66,30%	% 33,70%	% 98,00%	% 2,00%	% 88,40%	% 11,60%
HbA1c	≤5.5	Count 219	Count 68	Count 204	Count 83	Count 283	Count 4	Count 254
		% 40,6%	% 33,8%	% 41,5%	% 33,2%	% 39,0%	% 26,7%	% 38,8%
	5.6-6	Count 132	Count 50	Count 117	Count 65	Count 176	Count 6	Count 158
		% 24,44%	% 24,88%	% 23,83%	% 26,00%	% 24,24%	% 40,00%	% 24,12%
	6.1-7	Count 104	Count 40	Count 95	Count 49	Count 140	Count 4	Count 125
	% 19,26%	% 19,90%	% 19,35%	% 19,60%	% 19,28%	% 26,67%	% 19,08%	% 22,09%
7.1-8	Count 42	Count 21	Count 37	Count 26	Count 63	Count 0	Count 57	Count 6
	% 7,78%	% 10,45%	% 7,54%	% 10,40%	% 8,68%	% 0,00%	% 8,70%	% 6,98%
>8	Count 43	Count 22	Count 38	Count 27	Count 64	Count 1	Count 61	Count 4
	% 7,96%	% 10,95%	% 7,74%	% 10,80%	% 8,82%	% 6,67%	% 9,31%	% 4,65%
P. value (P)	0,347		0,154		0,426		0,566	

6852 Intrathecal opioids plus abdominal wall nerve blocks for paracaval paraganglioma resection: a case report

Maliamanis D.¹, Kounnos C.², Kapoulas K.², Bekos C.², Hadjigregoriou A.³, Yiapanas C.³

¹General Hospital Of Nicosia - Nicosia (Cyprus), ²Vascular Surgery department, General Hospital Of Nicosia - Nicosia (Cyprus),

³Anaesthesia department, General Hospital Of Nicosia - Nicosia (Cyprus)

Background: Paragangliomas (PGLs) are rare neuroendocrine tumors that arise from extraadrenal chromaffin cells and secrete catecholamines¹. Most of them are located in the paraaortic sympathetic chains and their treatment is surgical resection. Anaesthetic management can be challenging, because of intraoperative haemodynamic instability.

Case Report: We report a case of a 61 yo male who was incidentally diagnosed with a tumor attached to inferior vena cava, at the level of its formation by common iliac veins. He had high chromogranin A and intermittently high noradrenaline serum levels, but normal urine metanephrines. He reported hypertensive crises during past 3 years and was diagnosed with PGL. He was admitted for surgery and midline laparotomy was scheduled. Before general anaesthesia (GA), a subarachnoid puncture was performed and 300 µg morphine, 20 µg fentanyl and 30 µg clonidine were given. During surgery, occasionally norepinephrine infusion at a maximum dose of 0,07 µg/kg/min was given. No IV fentanyl or morphine. After surgery, bilateral ultrasound guided rectus sheath and TAP blocks were performed. Post extubation, no vasoactive agents were needed and he was monitored in the PACU for 8h before transferred to the ward. No nausea or pruritus were reported. NPRS score was 0/10 at 6h and 1/10 at 12h. He was given 50 mg pethidine IM and 1 gr paracetamol IV at 18h postoperative. No respiratory depression was observed and arterial pCO₂ was within normal limits during 48h postoperative.

Discussion: Common anaesthetic technique for abdominal PGL surgery is GA, sometimes combined with epidural anaesthesia, which might worsen intraoperative hypotension². However, intrathecal opioids can be an alternative for perioperative analgesia³. When given without local anaesthetics, better haemodynamic stability can be reached. Moreover, nerve blocks of the anterior abdominal wall can further reduce postoperative pain.

References:

- Joynt et al. Paragangliomas, Cardiology in Review 2009;17(4):159-164
- Jeon et al. The effect of combined Epidural-general Anesthesia on Hemodynamic Instability during Pheochromocytoma and Paraganglioma Surgery: A multicenter retrospective cohort study. Int J Med Sci 2020;17(13):1956-1963
- Koning et al. Intrathecal hydrophilic opioids for abdominal surgery: a meta-analysis, meta-regression, and trial sequential analysis. Br J of Anaesthesia 2020;125(3):358-372

Learning points: Multimodal analgesia have to be tailored to every case individually.

6855 Two different approaches to management of patient with Pulmonary Hypertension - case report

Samalyuk K.¹, Vaz Gomes M.¹, Gonçalves N.¹

¹Centro Hospitalar e Universitário de Coimbra - Coimbra (Portugal)

Background: Pulmonary hypertension (PH) is a disease of the pulmonary vasculature characterized by elevated pulmonary systolic arterial pressure. Patients with PH are at increased risk of developing intra and post-operative complications, such as right ventricle failure with systemic hypotension, arrhythmias, myocardial ischemia and hypoxemia.¹

Case Report: A 47-year-old female, ASA IV, scheduled for vaginal hysterectomy and salpingectomy. Her background included severe PH (group3), pulmonary embolism ten years previously, obesity hypoventilation syndrome with non-invasive ventilation treatment, respiratory hypoxemic failure requiring long-term O₂ therapy and heart failure NYHA I. The echocardiography showed pulmonary artery dilation, enlarged right atrium and preserved systolic function. At the operating room, the patient

presented with 89/50 mmHg and a peripheral oxygen saturation of 92% receiving O₂ flow through a nasal cannula at 4 L/min. A central venous catheter was placed before the procedure and noradrenaline perfusion was started. Sequential combined spinal epidural anesthesia (CSE) with levobupivacaine (7.5 mg) and sufentanil (25 µg) was performed. Central venous pressure, invasive arterial pressure as well as cardiac output (CO) and pulse pressure variance were used additionally to the standard ASA monitoring. She remained hemodynamically stable during the procedure. On the third postoperative day, the patient developed an hemoperitoneum. An emergency exploratory laparotomy was performed under general anesthesia (GA), which went uneventful.

Discussion: To safely manage a patient with pulmonary hypertension, a meticulous pre-operative planning should be done. The CSE can lead to vasodilatation, compromise coronary artery perfusion pressure and worsen left ventricular function. GA have negative inotropic effects and promotes anesthetic-induced vasodilatation. The positive pressure ventilation can lead to a significant increase in right ventricular afterload.

References:

1. Pritts, Chad D; Pearl, Ronald G Anesthesia for patients with pulmonary hypertension, *Current Opinion in Anaesthesiology*: June 2010-Volume 2 3-Issue 3-p 411-416

Learning points: Patients with severe PH can be safely submitted to CSE and GA under close monitoring and thorough therapeutic approach.

6856

Transpulmonary thermodilution hemodynamic monitoring for giant paraganglioma displacing the aorta and inferior vena cava: a case report

Ramos S.¹, Vaz Gomes M.¹, Goncalves N.¹

¹Centro Hospitalar e Universitário de Coimbra - Coimbra (Portugal)

Background: Paraganglioma is a catecholamine-producing tumor leading to life-threatening complications. Complete surgical resection is the standard treatment. Anesthetic management is challenging, and the mortality rate remains high, especially if the paraganglioma is close to the aorta.¹

Case Report: A 19-year-old boy was scheduled for open resection of an 18.5x17.5x15cm right paraganglioma after administration of oral phenoxybenzamine. Medical history included abdominal pain, dyspnea and complementary exams revealed pulmonary edema. In the operating room, he had blood pressure (BP) of 160/105mmHg, tachyarrhythmia and SatO₂ 93%. In addition to standard ASA monitoring, an arterial line for invasive BP measurement and a central venous catheter for drug administration, pulse contour cardiac output monitoring using a transpulmonary thermodilution (TT) technique was applied before anesthesia induction. After premedication with diazepam, anesthesia was induced with fentanyl, lidocaine and propofol and maintained with sevoflurane. Rocuronium was given for intubation. An infusion of remifentanyl was adjusted according to the degree of surgical manipulation and increased when the mean BP and heart rate increased by more than 30% in relation to the baseline value. Due to tumor manipulation, the patient's BP increasing was treated with sodium nitroprusside infusion. The clamping of the aorta and vein to remove the tumor triggered a reduction in BP, treated with norepinephrine.

Discussion: The manipulation of the tumor, clamping/unclamping of the aorta and other stimuli can significantly alter BP.¹ TT technique provided a basis for early intraoperative therapeutic interventions and a hemodynamically stable course, achieving optimal cardiac preload for organ perfusion and preventing worsening of pulmonary edema from fluid overload.

References:

1. Cheryl Wang, Robert Richmond, Enas Eldesouki. Anesthetic management for resection of paraaortic paraganglioma and unexpected aortic resection: a case report. *Experimental and therapeutic medicine*. 2015;9:1542-44.

Learning points: Paraganglioma has high mortality due to tension variability and difficult anesthetic management. The most important aspects are the control of the risk of blood pressure and the maintenance of an adequate blood volume. The TT technique showed a favorable ability to interpret pathophysiological progression and provide convincing treatment assistance.

6859

Submental intubation for airway management in maxillofacial fracture: a case report

Cunha Y.¹, Vaz Gomes M.¹, Martins C.¹

¹Centro Hospitalar e Universitário de Coimbra - Coimbra (Portugal)

Background: Maintaining the airways in patients with complex maxillofacial injuries is a challenge. Those with facial trauma, when orotracheal and nasotracheal intubations are contraindicated, tracheostomy can be performed. However, this method leads to greater morbidity, making the submentonian technique a better alternative since it shows a low rate of complications.¹

Case Report: A 49-year-old male patient victim of a workplace accident with panfacial trauma had a Le Fort I and II fractures as well as an alveolar fracture. Computed tomography scan ruled out any cervical injuries. He had no past medical history, and was scheduled for surgery 72h after trauma. He had no predictors of difficult airway besides facial trauma. The patient was intubated orally with a reinforced (spiral-embedded) tracheal tube with an internal diameter of 7.5 mm. The orotracheal intubation (OTI) occurred at first attempt via direct laryngoscopy. The equipment for difficult airway was kept ready in the operating room. The OTI was then converted to a submental intubation. The technique was performed as endotracheal tube proximal end deflection from under the chin, with a small incision. After surgery, the intermaxillary fixation (IMF) was removed and the tube was passed on to the oral cavity. The skin incision was sutured. The patient was transferred to the yard after uneventful surgery and was discharged 5 days later.

Discussion: Panfacial fractures represents a challenge for anesthesiologists because it requires optimal capabilities in the management of the airway. In this case nasotracheal intubation was ruled out due to the presence of nasal fractures. OTI was also ruled out due to the need to establish occlusion by IMF. In this technique, the use of a reinforced endotracheal tube is the most indicated.¹ The submental intubation provides a secure airway, optimal field, allows IMF while avoiding the drawbacks and complications of a tracheostomy.¹

References:

Fernandes, B. dos R., Marchiori, D. L., Belloti Neto, (2020). Intubação submentoniana na cirurgia bucomaxilofacial: Relato de casos clínicos.

Learning points: Submental intubation is a safe and low morbidity option, being indicated in cases of multiple facial fractures, where conventional intubations methods are contraindicated. A proper advanced plan to avoid any airway complication is of paramount.

6879

Perioperative management of midline catheters in major head and neck cancer surgical patients: a retrospective clinical study

Saitta T.¹, Locatello L. G.², Paris A.¹, Gallo O.², Adembri C.¹

¹University of Florence - Firenze (Italy), ²University of Florence, Department of Otorhinolaryngology - Firenze (Italy)

Background and Goal of Study: Vascular accesses such as midline catheters (MCs) or peripherally inserted central venous catheters (PICCs) are usually positioned whenever an intravenous therapy is expected to last longer than 6 days. MCs catheters seem particularly suitable for head and neck surgery (HNS) during both the intraoperative period (less risk of malfunctioning during surgical manipulation of major neck vessels) and during the postoperative phase (less risk of infection in tracheostomized patients). However, no specific data on HNS patients were available. We report here our experience with MCs in this particular setting.

Materials and Methods: A retrospective study was conducted at our Institution analyzing data about the patients undergoing HNS in the last five years. Variables such as the percentage of MCs placement in major HNS for cancer, age, sex, ASA class, medical comorbidities (diabetes mellitus, chronic kidney disease, etc.), type of HNS performed (including data on neck dissection, closure of major neck veins and type of reconstruction, dwell time, number and type of intra and postprocedural complications of MCs as well as number of infusions delivered through these devices were retrieved from digital records. Standard descriptive statistics was used while perioperative risk factors potentially associated

with MC-related complications were identified by a logistic regression model.

Results and Discussion: In the study period 126 patients undergoing major HNS received a MCs and were included in the analysis; 65% were male, with a mean age of 71.2 years (IQR 67-78); the average dwell time of MCs was 14.9 days (IQR 8.5-19.5). The overall complication rate was 29.4%. Most of them were minor events, such as peri-catheter thrombosis (15.9%); partial catheter occlusion occurred in 15 cases (11.9 %) while major complications, such as bloodstream infection, occurred in 4 (3.1 %). On univariate analysis, only the number of infusions was associated (OR 1.3, 95% CI 1.086-1.569, $p=0.004$) with the overall development of MC-related complications, while variables such as the presence of diabetes mellitus (24 cases, 19%) or the use of MC for parenteral nutrition (10, 7.9%) did not reach significance.

Conclusion: MCs appear to represent a safe and effective option in the HNS setting. A watchful management of these devices is warranted, especially as the number of drugs infused increases.

6888

Intravenous lipid emulsions do not enhance recovery from ventricular repolarization disturbances induced by ropivacaine

Rodríguez-Rodríguez L.¹, Fernández-Lopez I.¹, Quintela Ó.², García-Ramos S.¹, Melone A.¹, Zaballos M.¹

¹Hospital General Universitario Gregorio Marañón - Madrid (Spain),

²Universidad Complutense de Madrid - Madrid (Spain)

Background and Goal of Study: Ropivacaine (R) is considered to have a wider margin of cardiovascular safety than other local anaesthetics as bupivacaine. However, there are several reports of arrhythmias and cardiac arrest due to ropivacaine toxicity (1). Abnormal cardiac repolarization increases the risk of cardiac arrhythmias and ventricular repolarization markers (corrected QT, QT dispersion, Tpeak-Tend and Tpeak-Tend dispersion) are useful for predicting the risk of malignant arrhythmias (2). Intravenous lipid emulsions (ILE) have recently been shown to be effective antidotes in the treatment of local anaesthetic intoxication (3). We aim to investigate the effects of ropivacaine on ventricular repolarization markers and their reversion following ILE administration.

Materials and Methods: 16 pigs were anaesthetized and instrumented. Ventricular repolarization parameters were recorded by 12-lead ECG and analyzed manually. A non-lethal dose of 5 mg/kg R was then administered. Three minutes after R bolus, the animals received: ILE, 1.5 mL/kg+0.25 mL/kg/ min (ILE-group) or saline solution (SS), 50 ml+1 ml/kg/hour (control, C-group). Electrocardiographic parameters were recorded at baseline, after R infusion and at different intervals after ILE/SS administration. Statistics: area under the curve, Mann-Whitney test and Wilcoxon test.

Results and Discussion: R induced significant changes in ventricular repolarization parameters: QT dispersion (QTD): ($\Delta=51\%$; $P=0.008$), Tpeak-Tend (TpTe): ($\Delta=59\%$; $P=0.002$); corrected TpTe (TpTec): ($\Delta=61\%$; $P=0.002$); TpTe dispersion (TpTeD): ($\Delta=51\%$; $P=0.029$), with no differences between the two groups for most of the parameters: AUCQT $p=0.58$; AUCQTc $p=0.39$; AUCTpTe $p=0.93$; AUCTpTec $p=0.18$; AUCTpTeD $p=1$. QTD was greater in the ILE-group of animals (AUCQTD $p=0.009$).

Conclusion: Ropivacaine induced significant changes in ventricular repolarization parameters. In our experimental model, lipid emulsions did not facilitate recovery from the cardiotoxic alterations of ropivacaine.

References:

1. Chazalon P, Tourtier JP, Villevielle T et al. Ropivacaine-induced cardiac arrest after peripheral nerve block: successful resuscitation. *Anesthesiology* 2003;99:1449-51.
2. Antzelevitch C, Di Diego JM, Argenziano M. Tpeak-Tend as a predictor of ventricular arrhythmogenesis. *Int J Cardiol* 2017;15:249:75-76.
3. Fettiplace MR, Weinberg G. The Mechanisms Underlying Lipid Resuscitation Therapy. *Reg Anesth Pain Med* 2018;43:138-149.

6891

Is a peripherally inserted central catheter as useful as a central venous catheter for anesthetic management?

“Comparison of flow rate and intra-circuit pressure relationship”

Ide T.¹, Maki J.², Sumie M.³, Shirouzu K.¹, Higashi M.³, Yamaura K.³

¹Anesthesiology & Critical Care Medicine, Kyushu University Hospital - Fukuoka (Japan), ²Department of Critical Care, Kyushu University Hospital - Fukuoka (Japan), ³Department of Anesthesiology and Critical Care Medicine, Graduate School of Medical Sciences, Kyushu University Hospital - Fukuoka (Japan)

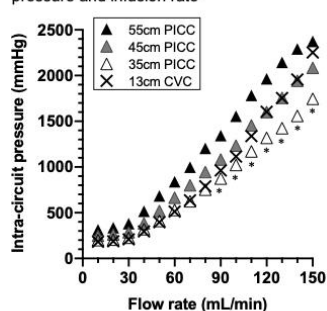
Background and Goal of Study: Central venous catheter (CVC) is expected to play roles of a reliable route for drug administration, central venous pressure (CVP) measurement and an infusion route for volume resuscitation. Peripherally inserted central catheter (PICC) has been widely used for drug administration and parenteral nutrition. It has been reported that CVP measured via PICC is as accurate as that via CVC. Furthermore, PICC is safer and easier to insert than CVC. However, PICC is less used for anesthetic management, because of the concern that PICC is inappropriate for rapid fluid infusion. The aim of this study is to evaluate the relationship between the flow rate of fluid and circuit pressure in PICC and CVC.

Materials and Methods: Intra-circuit pressure was measured in a similar size of double-lumen catheters; PICC (O.D. 1.33 mm, length 55, 45 and 35 cm) and CVC (O.D. 1.35 mm, length 15 cm), at flow rates of saline decided using a roller pump system. The flow rate at intra-circuit pressure 300 mmHg, the pressure that hemolysis occurs, was measured in each catheter.

Results and Discussion: At flow rate of 80 mL/min or less, intra-circuit pressures were not different between 35 cm PICC and CVC, and at a flow rate of 90 mL/min or more, intra-circuit pressure in 35 cm PICC was lower than that of CVC (Figure 1). There was a positive correlation between the length of PICC and intra-circuit pressure. Flow rates at intra-circuit pressure of 300 mmHg were not different between 35 cm PICC and CVC (Figure 2). In the present study, PICC was shown to be useful for rapid fluid infusion, and to be possible to use a blood transfusion.

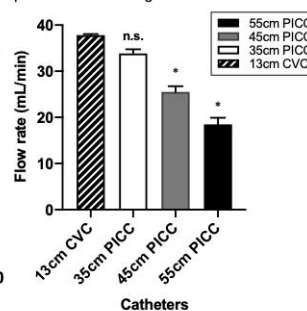
Conclusion: PICC was proved to provide an infusion rate comparable to CVC, suggesting that PICC was as useful as CVC for a perioperative rapid infusion route.

Figure 1. Relationship between intra-circuit pressure and infusion rate



* Intra-circuit pressures were significantly lower in 35cm PICC than CVC

Figure 2. Infusion rate at the intra-circuit pressure 300 mmHg



n.s. Not significantly different from CVC
* Significantly lower than CVC

6899

Extremely low potential of drug-drug interactions of remimazolam via carboxylesterase 1: in vitro studies and a systematic review

Petersen K. U.¹, Stoehr T.¹, Schmalix W.¹, Pestic M.¹
¹PAION Deutschland GmbH - Aachen (Germany)

Background and Goal of Study: Remimazolam (RMZ) is a new ultra-short acting benzodiazepine whose action is rapidly terminated by carboxylesterase (CES) 1. Possible drug interactions of RMZ as a victim, mediated by CES1 or other esterases, were studied in vitro and in a systematic review of known or possible CES1 inhibitors.

Materials and Methods: Known or potential CES1 inhibitors were studied in human liver S9 fractions (atorvastatin, bupropion, carvedilol, diltiazem, nelfinavir, nitrendipine, remifentanil, simvastatin, and telmisartan) and human liver homogenates (esmolol and landiolol). Moreover, substrates and inhibitors of CES1 were identified in a systematic literature search. Available pharmacokinetic (C_{max}) data and K_i or IC₅₀ values were used with algorithms provided in regulatory guidances to determine the likelihood of these compounds being relevant inhibitors of RMZ metabolism in vivo. Drugs with inhibition data of a single concentration and CES1 substrates with no inhibition data were assigned highly conservative K_i values and the potential of their interaction predicted. Experimental and literature-based outcomes were assessed using the basic model of the current FDA guidance, where $R1 = 1 + (\text{unbound Cmax}) / (\text{unbound Ki})$ denotes the predicted ratio of the victim drug's AUC in the presence and absence of an inhibitor, and $R1 \geq 1.02$ is seen as a signal for further investigation.

Results and Discussion: Regarding RMZ metabolism, K_i values of simvastatin (0.69 μM) and diltiazem (57 μM) could be experimentally determined, whereas those of atorvastatin (> 100 μM), bupropion, carvedilol, nelfinavir, nitrendipine, remifentanil, and telmisartan (> 30 μM), landiolol (> 98 μM), and esmolol (> 169 μM) were above the tested concentration range. No experimental effects were identified to suggest a clinical relevance of observed inhibitions. Literature evaluation returned 5 of 74 analyzed drugs as possible weak CES1 inhibitors. Of those, acemetacine, sacubitril, diclofenac (fast elimination and/or preoperative drug pausing) and thioridazine (low therapeutic plasma concentrations) are highly unlikely RMZ metabolism inhibitors, leaving rufinamide as the only likely in-vivo inhibitor.

Conclusion: Thus, the present data and analyses suggest a very low potential of RMZ for pharmacokinetic drug interactions. The employed theoretical approach and the compiled pharmacokinetic and inhibition data may also be useful in evaluation of other CES1 substrates.

6902

Effect of noradrenaline on hepatic blood flow: a prospective observational trial

Verougstraete M.¹, Van Limmen J.¹, Wyffels P.¹, Berrevoet F.¹, De Hert S.¹, De Baerdemaeker L.¹
¹University Hospital Ghent - Gent (Belgium)

Background and Goal of Study: Noradrenaline (NOR) is frequently used to maintain adequate blood pressure. Hepatic blood flow (HBF) is altered by adrenergic stimulation¹. However, previous animal studies showed different results of NOR infusion and human studies are lacking². The aim of the study was to evaluate the effect of noradrenaline infusion on HBF.

Materials and Methods: After ethical committee approval and written informed consent, patients scheduled for Whipple procedure were included. Anaesthesia was provided using target-controlled anaesthesia with propofol (Schnider) and remifentanil (Minto). PulsioflexTM was used to measure, guide and record haemodynamic data. HBF was measured using ultrasound transit time (Medi-Stim AS). After baseline measurements (T1), NOR infusion was started and mean arterial pressure (MAP) was titrated to respectively 10 – 20% (T2) and 20 – 30% (T3) of baseline. Haemodynamic variables and hepatic arterial flow (HAF) and portal vein flow (PVF) were simultaneously measured and recorded. HBF, HAF and PVF were indexed to body surface area. Linear mixed modelling was used to assess the relation between MAP and HBF.

Results and Discussion: A total of 28 patients were included. Low dose NOR was used to increase MAP. NOR significantly increased MAP but low dose NOR had no effect on cardiac index. During NOR administration total HBF was significantly reduced ($p < 0.01$) mainly by a reduction in HAF ($p < 0.01$), while this effect on PVF was not consistent (see table).

Conclusion: NOR reduced total HBF and this reduction is primarily the result of a reduction of HAF. The effect of NOR on PVF is less clear and not consistent. The underlying mechanisms for the different response pattern between arterial and portal HBF remain to be elucidated.

References:

1. Gelman S, Mushlin PS. *Anesthesiology* 2004; 100: 434–9
2. Hildebrand LB, et al. *Anesthesiology* 2011; 114: 557–64

6908

Drug-drug interaction potential of remimazolam: No relevant interactions via cytochrome P450 isoforms, drug transporters, and protein binding in vitro

Petersen K. U.¹, Stoehr T.¹, Schmalix W.¹, Pestic M.¹
¹PAION Deutschland GmbH - Aachen (Germany)

Background and Goal of Study: Remimazolam (RMZ) is a new ultra-short acting benzodiazepine whose action is rapidly terminated by carboxylesterase (CES) 1. Here, we have evaluated the drug-drug interaction potential of RMZ and its principal metabolite, CNS7054, at sites unrelated to CES1.

Materials and Methods: RMZ and CNS7054 were studied in conventional co-exposure experiments using inhibitor-spiked plasma and guidance-conforming inhibitors and panels of cytochrome P450 (CYP) isoforms. CYP studies were performed with human liver microsomes and CYP-overexpressing cells (inhibition studies) or cultured human hepatocytes (induction studies). Drug transporters were investigated using cultured cells specifically expressing the concerned transport protein or vesicles thereof. Results were evaluated within the framework of current FDA and EMA guidelines.

Results and Discussion: Neither RMZ nor CNS7054 induced relevant CYP isoforms (CYP1A2, CYP2B6, CYP3A4). Inhibition, where observed, required supra-therapeutic concentrations. The IC₅₀ values of RMZ and CNS7054 for inhibition of CYP2C8 (the isoform most potently inhibited), amounted to 29.2 and 578 μM, respectively, exceeding unbound C_{max} in a human reference trial (RMZ 0.9 μM; CNS7054, 3.6 μM) by factors of 32 and 161. Likewise, neither RMZ nor CNS7054 caused effects suggestive of a clinically relevant alteration of drug transporter activity (OATP1B1, OATP1B3, OAT1, OAT3, OCT2, MATE1, MATE2-K, MDR1, BCRP, BSEP). CNS7054, but not RMZ was found to be a substrate of MDR1 and BCRP. Protein binding of RMZ in human plasma spiked with propofol, isoflurane, sevoflurane, thiopental, remifentanil, rocuronium or succinylcholine (91.4 to 92.6 %) was hardly different from that in controls (92.5 %).

Conclusion: The present data and analyses suggest a very low potential of remimazolam and CNS7054 for pharmacokinetic drug-drug interactions mediated by CYP isoforms, drug transporters, and protein binding.

6909 Pharmacokinetics of Remimazolam: pre-dominance of metabolic elimination by carboxylesterase I with negligible roles of alternative pathways

Schmalix W.¹, Stoehr T.¹, Petersen K. U.¹, Pesic M.¹
¹PAION Deutschland GmbH - Aachen (Germany)

Background and Goal of Study: Remimazolam (RMZ) is a new benzodiazepine designed to be rapidly cleaved to an inactive metabolite (CNS7054) to achieve particularly short recovery times. This study aimed at investigating the primary and secondary metabolic elimination pathways of RMZ.

Materials and Methods: Gene expression and enzyme inhibition studies were used to identify the hydrolases involved in RMZ metabolism. Venous plasma and urine samples from clinical trials were examined by liquid chromatography and mass spectrometry. Minor metabolites were structurally elucidated in extracts from incubations with human and rodent liver microsomes or hepatocytes by interpreting LC-MS/MS fragmentation patterns and by 1H-NMR spectrometry.

Results and Discussion: Expression of the respective human genes in vitro showed that tissue carboxylesterase (CES) 1 rather than CES2 is responsible for RMZ hydrolysis. Furthermore, RMZ hydrolase activity in tissues corresponded to the tissue-specific expression pattern of CES1 in humans and animals. RMZ hydrolase was sensitive to CES inhibitors but resistant to inhibitors of aryl or choline esterase suggesting little relevance of hydrolases other than CES1. In urine only 2.3 area% of the total mass chromatogram accounted for ten minor RMZ metabolites other than CNS7054, all of them being secondary derivatives of CNS7054. Changes were noted at the pyridine moiety (hydroxylation, O-glucuronidation), at the methyl imidazole (various oxidation intermediates and elimination) and at the free carboxylic acid (acyl glucuronidation, lactam condensation). None of the single species accounted for more than 0.7 area% of the total chromatogram. Unchanged RMZ was present in traces of 0.1%. In a plasma pool from representative patients undergoing general anaesthesia the urinary species were confirmed to be circulating at very low levels summing up to 0.55 area% of drug-related material, the remainder of area% being accounted for by unchanged RMZ (27.02 area%) and CNS7054 (72.43 area%). In few instances, in individual patients, additional minor species derived from parental RMZ with intact methyl ester were detectable with mass shifts suggesting oxidative and conjugative changes in the RMZ molecule analogous to CNS7054 derivatives.

Conclusion: This suggests minimum contribution of alternative pathways to overall plasma elimination predominated by CES1 activity, the abundance of which in liver promises predictable pharmacokinetics.

6913 Key points in the anesthetic management of simultaneous liver-kidney transplantation.

Rubio Baines I.¹, Lara Jiménez A.¹, Hidalgo Martínez F.¹, López Olaondo L.¹, Echarrí González G.¹
¹Clinica Universidad de Navarra - Pamplona (Spain)

Background: Performing simultaneous liver-kidney transplantation is a challenge for the anesthesiologist. Ionic disbalance, acid-base alterations, hemodynamic instability, coagulopathy and management of volemic status (VS) are the main aspects of control during surgery. Management of VS is important: what is beneficial to the renal graft, however, goes against the optimal conditions for the liver. In some cases, the use of intraoperative Continuous Renal Replacement Therapy (CRRT) can be very useful in order to control VS and acid-base alterations. We present a retrospective evaluation of 9 patients undergoing simultaneous liver-kidney transplantation.

Materials and Methods: We analyzed intraoperative management of 9 patients undergoing liver-kidney transplantation from 2010 to 2020 in our hospital. We collected patient's demographic characteristics, intraoperative renal replacement therapy requirement, vasopressors use, blood transfusion and various analytical data.

Results: The table shows the most relevant data (N=9).

Age (years)	54 [49-65]
Men	6
Hypertension	8
Dyalisis	8
Residual diuresis	
0ml	4
<100ml	1
100-500ml	3
>500ml	1
Haemoglobin (g/dL)	9.8 [8.5-12.85]
Platelets (x103/µL)	103 [84-161]
Serum Creatinine (mg/dL)	5.1 [3.3-5.6]
Serum Urea Nitrogen (mg/dL)	68 [44-92]
Intraoperative hemodialysis	2
Intraoperative transfusion	9

Continuous variables are given as median; categorical as numbers. Intraoperative CRRT was performed in two patients. One of them required postoperative CRRT due to delayed recovery of kidney function.

Conclusions: The anesthetic management of liver-kidney transplantation requires anticipating various problems derived from volume overload and acid-base balance. CRRT could be used to help us in achieving successful outcomes.

6923 Quality improvement program to reduce Postoperative Residual Curarisation: impact on reversal use over a 4-years period.

Greco M.¹, Caruso P. F.¹, Pugliese L.¹, Bash L. D.², Albini M.¹, Cecconi M.³
¹IRCCS Humanitas Research Hospital - Milan (Italy), ²Merck & Co., Inc - Kenilworth (United States), ³IRCCS Humanitas Research Hospital - Milan (Italy)

Background and Goal of Study: Incomplete reversal of neuromuscular blocking agents (NMBA) is a widely recognized risk factor for postoperative pulmonary complications (PPC). Compared to neostigmine, faster NMBA reversal has become available with sugammadex. Despite safety and efficacy data, real world data show low adoption of NMBA reversal agent (NMBRA). We aimed to describe real-world NMBA use and reversal in non-cardiac surgery patients, in the context of a quality improvement (QI) program.

Materials and Methods: We implemented a QI program on NMBA monitoring and reversal in a large teaching hospital in Northern Italy. To assess its effect, we retrospectively included intraoperative data from all patients over 18 years old, undergoing noncardiac surgery with NMBA use, from Jan 1, 2016 to Dec 31, 2019. Patients with history of myasthenia gravis were excluded.

Results and Discussion: From a total of 115046 surgeries over 4 years, 37882 surgeries were included. The use of NMBRA increased from 27.6% in 2016 to 44.2% in 2019 (fig. 1), with sugammadex use increasing from 71.0% of reversals in 2016 up to 90.8% in 2019. There was a progressive shift in the type of NMBA employed over time, with rocuronium use increasing from 58.6% in 2016 to 94.5% in 2019. This shift in NMBA and NMBRAs was confirmed across all four ASA Classes and was more noticeable among higher risk classes. (fig. 2)

Conclusion: This study shows an increase in the use of NMBRA, and in particular of sugammadex, over 4 years, supported by our QI program on the importance of NMBA monitoring and antagonism. We also report a change in NMBA choice, with a shift toward increased use of rocuronium. This shift may be related to the increased awareness of the risk of residual NMB and the availability of other reversal strategies. Further research is needed to better understand trends in NMBRA/NMBA use in clinical practice.

6941
Laparoscopic cholecystectomy in patient with Wolff-Parkinson White syndrome: don't wake the beast! - A case report

Vieira D.¹, Castro M.², Macedo A.²
¹Centro Hospitalar e Universitário de Coimbra (CHUC) - Coimbra (Portugal), ²Centro Hospitalar e Universitário de Coimbra (CHUC) - Coimbra (Portugal)

Background: Wolff-Parkinson White syndrome (WPW) is characterized by the presence of an accessory pathway (AP) on the heart's conduction system, permitting either anterograde or retrograde conduction. This condition represents an increased risk of perioperative arrhythmia, which incorrect treatment may cause rapid deterioration and cardiopulmonary arrest. Therefore, its prevention is of maximum importance.

Case Report: We present a woman, aged 46, ASA III, with asymptomatic WPW, who underwent urgent laparoscopic cholecystectomy. Other comorbidities were obesity and hypertension. Her preoperative EKG showed sinus rhythm, short PR interval and delta waves. Before induction, immediate availability of emergency cart with defibrillator was confirmed. Since the patient was taking carvedilol and omitted it that day, 1mg of iv propranolol was given. A rapid sequence induction was performed, with fentanyl, propofol and suxamethonium. Desflurane and rocuronium were used for maintenance and neuromuscular blockade, respectively. The peritoneum was insufflated slowly, with care not to exceed 12mmHg of intraabdominal pressure. During surgery, moments of stimulation were covered with additional opioid, providing analgesia throughout the procedure. The surgery had no incidents and the patient was extubated after reversal of neuromuscular blockade and administration of 100mg of iv lidocaine. She was admitted to the PACU and was discharged from the hospital 2 days after, with no complications.

Discussion: The main goal in WPW patients is to avoid anything that favours conduction through the AP, such as increased sympathetic tone (pain, anxiety, hypovolemia or certain drugs that block the AV node). In general anesthesia, propofol is the inductor of choice. For neuromuscular blockade reversal, one should avoid the use of neostigmine, since it promotes conduction through the AP. Therefore rocuronium is a good choice, for its cardiostability and reversal with sugammadex. The AV node is dependent on calcium channels, whereas the AP is dependent on sodium channels. Extubation after a lidocaine bolus safeguards both stimulation of the airway and conduction through the AV node, since it blocks sodium channels.

Reference:
 1. Bengali R et al. Perioperative management of the wolff-parkinson-white syndrome. J Cardiothorac Vasc Anesth. 2014;28(5):1375–86
Learning points: WPW patients can be safely managed with judicious choice of drugs, reducing the risk of degeneration into arrhythmias.

6947
Fabry Disease (FD) and Its Anesthetic Challenges: Approach of a Not So Rare Multisystemic Disease in an Urgent Setting

Neri M. L.¹, Freire P.¹, Dinis I.¹
¹Centro Hospitalar de Lisboa Ocidental - Lisboa (Portugal)

Background: FD is an X-linked lysosomal storage disorder, which translates into multisystemic manifestations.¹ Although its reported incidence is as high as 1 per 1000 newborns in high-risk populations, the perioperative management of such patients consistently represents a challenge for the most experienced anesthesiologist.²

Case Report: A 72-year-old woman presented with a humerus fracture for urgent surgical reduction. She had been diagnosed with FD and was under enzymatic replacement therapy (ERT). Cardiac function was severely affected, with hypertrophic cardiomyopathy and paroxysmic atrial fibrillation. She also had stage IIIb chronic kidney disease. We performed a general anesthesia, in which induction was performed with Propofol and Fentanyl, maintenance was achieved with Sevoflurane in an oxygen/air mixture and atracurium was the neuromuscular blocking agent chosen for orotracheal intubation and immobilization. Ephedrine was administered in bolus for treatment of mild hypotension. After procedure was completed

without any drawbacks, neuromuscular block was reverse and patient extubated.

Discussion: Since our patient regularly received specialized consultation, an optimized clinical status before anesthesia was guaranteed. Nevertheless, electrocardiogram was repeated, as defects of the conduction system are known to develop fast and even insidiously. A major challenge sets on a potential need for rhythm control in these patients, as amiodarone is contraindicated and intolerance to beta-blockers is characteristic. Therefore, it is useful to assess the utility of Flecainide and Propafenone. While ERT doesn't appear to interfere with the anesthetic approach, lifelong anticoagulant therapy should be suspended according to the renal clearance. FD patients are at increased risk for cerebrovascular disease, so that any sign of cerebral ischemia should be timely identified and managed in the immediate postoperative period.

References:
 1. Anaesthesia recommendations for Fabry disease. OrphanAnesthesia. Consultation online at may, 2021, via www.orphananesthesia.eu.
 2. Tsai-Shan Wu et al. Fabry disease and general anesthesia: A case report and literature review. Journal of Medical Sciences, 2019; 39:289-292.
Learning points: As an essential part of a thoughtful perioperative assessment, strategies for rhythm control and the need for hemodialysis are to be identified and applied, as well as for monitoring postoperative major complications, in FD patients.

6949
Baseline estimated glomerular filtration rate (eGFR) as a predictor of MINS and mortality in non-cardiac surgery. Analysis of MINSMAR database.

Román Rosa L.¹, Mases A.¹, Sabaté S.², Núñez M.¹, Bachero A.¹, Beltrán S.¹
¹Department of Anaesthesia and Intensive Care Medicine, Hospital del Mar - Barcelona (Spain), ²Department of Anaesthesiology. Fundació Puigvert. IUNA. - Barcelona (Spain)

Background and Goal of Study: Chronic kidney disease (CKD) is an independent predictor of perioperative cardiovascular morbidity and mortality. The relationship between the preoperative estimated glomerular filtration rate (eGFR) and perioperative major adverse cardiovascular and cerebrovascular events (MACCE) has been already established. Our aim was to analyze basal eGFR as a risk factor for myocardial injury after non-cardiac surgery (MINS) and short and long-term mortality.

Materials and Methods: A post hoc analysis of the MINSMAR database was carried out. This is a prospective single center cohort study recruiting patients for 2 years (2017-2019). Eligible subjects were patients older than 45 years electively submitted to: 1) high cardiac risk non-cardiac surgery or 2) intermediate cardiac risk non-cardiac surgery with clinical risk factors, under general and/or neuraxial anesthesia. Preoperative CKD severity was classified based on eGFR according to KDIGO guidelines (stages 1, 2, 3a, 3b, 4 and 5). Postoperative troponin T surveillance was accomplished at 3h, 1st, 2nd and 3rd postoperative day. Dependent variables were MINS at 30 days and all-cause mortality at 30 days, and 6 and 12 months after surgery. Logistic regression analysis was performed and odds ratio (OR) was calculated with a 95% confidence interval (CI).

Results and Discussion: We analyzed 747 patients. eGFR was available in 744 patients. Median age was 72 years, 67% of patients were male. MINS occurred in 166 (22%) of patients. All-cause mortality was 0.02% at 30 days, 0.07% at 6 months, 0.12% at 12 months. Baseline eGFR levels and its relationship with MINS and mortality are shown in table 1

CKD according to baseline eGFR in mL/min/1.73m2:(N)	MINS OR (95%CI)	Mortality at 30 days OR (95% CI)	Mortality at 6 months OR (95% CI)	Mortality at 12 months OR (95% CI)
Stage 1: ≥ 90, (182)	1	1	1	1
Stage 2: 60 – 89, (354)	1.15 (0.697 - 1.904)	1.28 (0.240 - 6.712)	1.64 (0.603 - 4.241)	1.24 (0.675 - 2.304)
Stage 3a: 45 – 59, (112)	2.58 (1.402 - 4.489)	0.81 (0.073 - 9.045)	1.66 (0.522 - 5.280)	0.79 (0.339 - 1.931)
Stage 3b: 30 – 44, (58)	4.87 (2.511 - 9.465)	3.21 (0.443 - 23.345)	4.02 (1.295 - 12.515)	2.16 (0.921 - 5.072)
Stage 4: 15 – 29, (24)	8.40 (3.376 - 20.991)	12.85 (2.031 81.393)	12.07 (3.643 - 40.049)	5.18 (1.924 - 13.985)
Stage 5: <15, (14)	15.00 (4.377 - 51.402)	15 (1.940 - 115.963)	16.29 (4.171 - 63.671)	10.37 (3.231 - 33.312)

Table 1

MINS increased progressively with eGFR impairment from stage 3a onwards. All-cause mortality at 30 days of surgery increased in stages 4 and 5. All-cause mortality at 6 months of surgery increased from stage 3b onwards. All-cause mortality a year after surgery increased in stages 4 and 5.

Conclusions: Preoperative basal eGFR is associated with a higher risk of MINS and postoperative and one year mortality. Baseline level of eGFR should be routinely measured in order to assess perioperative cardiovascular risk.

6955

Predicting personalised remifentanyl effect site concentration for surgical incision with a nociception level index: a prospective calibration and validation study

Perrin L.¹, Bisdorff M.², Saxena S.², Engelman E.¹, Barvais L.¹, Coeckelenberg S.¹

¹Erasmus Hospital ULB - Brussels (Belgium), ²Grand Hopital Charleroi - Charleroi (Belgium)

Background and Goal of Study: Inadequate antinociception can cause hemodynamic instability. The Nociception Level (NOL) Index measures response to noxious stimuli, but its capacity to predict optimal antinociception is unknown. We aimed to determine if the NOL index change to a tetanic stimulus in cardiac and non-cardiac surgery patients at a predefined remifentanyl level could predict the required remifentanyl effect site concentration (Ce) for hemodynamic stability at incision (i.e., return to baseline heart rate (HR) and mean arterial pressure).

Materials and Methods: This study consisted of calibration and validation phases. During calibration, investigators evaluated tetanic induced NOL index change under standardized target TCI remifentanyl-propofol anaesthesia. If the NOL index value surpassed 20, investigators repeated the tetanus at higher remifentanyl Ce until the response was blunted. Surgeons incised at this remifentanyl Ce. Investigators derived a prediction model from these patients and, in the validation phase, calculated the incision remifentanyl Ce from the NOL response to a single tetanus.

Results and Discussion: During the calibration phase, MAP, but not HR, returned to baseline values. No patient had a MAP over 100mmHg, a HR over 100bpm, or a HR under 40bpm at incision. Patients in the validation phase maintained lower HR at incision while MAP increased to baseline values in cardiac (mean±SD-IQR[Q25-Q75]: 75±8-75[70-83] vs. 92±11-90[83-101], p=0.000063) and non-cardiac (75±9-73[69-82] vs. 81±8-79 [75-88], p=0.0216) patients. No patient had a HR above 100bpm or below 40bpm after incision, but two chronically hypertensive patients had MAP slightly above 100mmHg.

Conclusion: NOL index response to a tetanic stimulus at a predefined remifentanyl Ce can help to predict a personalised remifentanyl Ce before incision.

6987

Comparison of analgesic efficacy of varieties of multimodal anesthesia in renal laparoscopic surgery

Ovsiienko T.¹, Bondar M.², Loskutov O.²

¹Institute of Urology - Kiev (Ukraine), ²Shupyk National Healthcare University of Ukraine - Kiev (Ukraine)

Background and Goal of Study: Optimization of anesthesia is especially important in urological patients due to the delayed elimination of drugs, especially opioids, which have numerous side effects. The aim of our work was to evaluate the effectiveness of the multimodal low-opioid (MMLO) general anesthesia varieties.

Methods: Fifty patients who underwent laparoscopic kidney surgery under three types of general anesthesia were examined. All patients underwent surgery under endotracheal anesthesia. Induction: propofol i/v 2 mg/kg, fentanyl i/v 1.5-2 µg/kg, atracurium i/v 0.1 mg/kg. Maintaining of anesthesia: sevoflurane (MAC - 1.44 ± 0.25 vol.%). In group 1 (control group) analgesia was provided by fentanyl 4.34 ± 2.1 µg/kg/h. In group 2, MMLO general anesthesia was used, using fentanyl 1.76 ± 1.2 µg/kg/h and i/v lidocaine 1.5 mg/kg/h and sub-anesthetic doses of ketamine. In group

3, MMLO anesthesia with fentanyl 2.44 ± 1.1 µg/kg/h and the addition of dexmedetomidine - 0.7 µg/kg/h was used. The effectiveness of analgesia was assessed by the dynamics of changes in the concentrations of stress hormones, glucose and hemodynamic parameters.

Results: The total average dose of fentanyl used during the entire period of anesthesia was: in group 1 - 373.3 ± 50.8 µg, in group 2 - 217.39 ± 49.1 µg, in group 3 - 308.33 ± 51.49 mcg. The comparison of cortisol plasma concentrations dynamics before surgery and in the early postoperative period was made. In group 1, the average cortisol level before surgery was 386 ± 170.48 nmol/l, after surgery - 576.57 ± 177.55 nmol/l. In group 2, 545.52 ± 210.85 nmol/l, and 838.82 ± 237.66 nmol/l, respectively, and in group 3 - 350.58 ± 94.63 nmol/l, and 385.75 ± 194.25 nmol/l. The percentage increase in cortisol in group 1 was 56.34%, in group 2 - 62.94%, in group 3 - 12.74%. Blood glucose levels in the postoperative period in all groups did not exceed 6.16 ± 1.23 mmol/l. Hemodynamic parameters and BIS, maintained within 44 ± 6.4%, indicated a sufficient level of anesthesia. In group 1 in the p/o period, 6 patients (out of 21) had the need for additional anesthesia with opioid analgesics (the level of pain according to VAS exceeded 4 points). In group 2 and group 3, none of the patients required opioid analgesia. The next day after surgery, all patients were mobilized (sitting in bed, walking).

Conclusion: The use of dexmedetomidine in MMLO general anesthesia provides more complete analgesive protection and reduces the stress response.

6999

Comparative Study of Oral Melatonin, Pregabalin, and Clonidine as Premedication for the attenuation of haemodynamic response to laryngoscopy and tracheal intubation—A prospective randomised double blind study

Gherghina V.¹, Cindea I.¹, Balcan A.¹, Prazaru M.¹, Costea D.¹, Popescu R.¹

¹Facultatea de Medicina Universitatea Ovidius Constanta - Constanta (Romania)

Background and Goal of Study: Laryngoscopy and endotracheal intubation are considered as potent stimuli which lead to an increase in heart rate and blood pressure. Attenuation of anxiety and hemodynamic response to laryngoscopy and intubation are cornerstone of better anesthetic outcome. The present study evaluated the clinical efficacy of oral premedication with melatonin, pregabalin or clonidine for controlling the pressor responses to laryngoscopy and tracheal intubation.

Materials and Methods: 60 patients with ASA I-III, ages 18–60 years, scheduled to undergo elective surgery under general anaesthesia, were included in this prospective, double-blind randomized controlled study. Patients were randomly allocated to one of three groups according to the agents to be used before the induction of anaesthesia: Group M (n = 30) received oral 6 mg of melatonin, Group P (n = 30) received pregabalin 150 mg, and Group C (n = 30) received 0.3 mg of clonidine 120 minutes prior to surgery. The haemodynamic parameters-HR, SBP, DBP and MAP were recorded before and 120 min after the administration of the study drug, before induction, immediately after intubation and at 1, 3, 5 and 10 min following intubation. Level of sedation, postoperative pain scores and any adverse effects were also noted and compared. Statistical analysis of data was done with repeated measure ANOVA and chi-square test. A p value <0.05 was considered as statistically significant.

Results and Discussion: HR significantly decreased in Group M and Group C at 5, 10, and 15 minutes after tracheal intubation compared with those just before laryngoscopy (p < 0.05). SBP, DBP, MAP at 1, 3, 5, 10, and 15 minutes after intubation were significantly lower in Group M compared with Group P (p < 0.05). There was no significant difference between Group C and Group P in this regard. No significant differences in the parameters of recovery were observed between the groups. None of the premedicated patient has suffered from any postoperative side effects.

Conclusion: All three drugs are very effective for relieving anxiety and can be used as premedicant to attenuate the sympathetic response to laryngoscopy and tracheal intubation without much side effects and the added advantage of intraoperative and postoperative analgesia. Oral melatonin proved superior in attenuating the haemodynamic response to laryngoscopy and tracheal intubation without any side effects.

7010

Local anesthetics: novel anticancer agents to control residual cancer cells during oncological surgery

Bezu L.¹, Wu Chuang A.¹, Sauvat A.¹, Durand S.¹, Kepp O.¹, Kroemer G.¹
¹*Gustave Roussy Cancer Center - Villejuif (France)*

Background and Goal of Study: Many retrospective studies observed an unexpected better survival and less relapses after local anesthetics (LAs) injection during oncological surgery. LAs may contribute to control residual cancer cells. We hypothesized that LAs may foster direct cytotoxic effects on cancer cells and may trigger a specific antitumor immune response.

Materials and Methods: Different cell stress and cell death modalities were investigated after treatment with several LAs (bupivacaine, chloroprocaine, levobupivacaine, lidocaine, ropivacaine and prilocaine) *in vitro*. Tumor growth, survival and immune response were studied *in vivo* in immunocompetent mice C57Bl/6 transplanted with subcutaneous murine tumors (fibrosarcoma, colon or breast cancer) and treated with LAs alone or combined with immune checkpoint blockade.

Results and Discussion: LAs induced cancer cell death after triggering mitochondrial toxicity and two premortem stress called autophagy and endoplasmic reticulum stress, both dependent on the kinase EIF2AK3. LAs also activated specific hallmarks of immunogenic cell death (ATP and HMGB1) except calreticulin exposure. *In vivo*, LAs decreased tumor growth and improved survival in different models of tumors established in immunocompetent mice. Combined with immunotherapy or with recombinant calreticulin, these effects were significantly potentiated. Interestingly, LAs did not induce antitumor effects in immunodeficient mice or in tumors unable to foster endoplasmic reticulum stress or autophagy. Moreover, cured mice rechallenged with cancer cells did not develop tumors suggesting an immunological memory. Taken together, these observations suggest that cellular stress induced by LAs provoke an immune response. In fine, after integration of biological effects and physicochemical properties of drugs, we designed an algorithm predicting anticancer effects of anesthetics. This algorithm concluded that intravenous agents also possess anticancer properties whereas opioids and volatile agents promote protumoral activity.

Conclusion: LAs product direct cytotoxicity on cancer cells triggered by premortem stress and mitochondrial toxicity. These effects lead to anticancer immunity potentiated by immune checkpoint blockade or by recombinant calreticulin. An algorithm predicting tumoral effects of anesthetics was designed based on observed biological effects and on physicochemical properties to help anesthesiologists during oncological surgery.

7015

Effect of preinduction low-dose ketamine bolus on intra-operative opioid requirements during Nociception Level Index-guided antinociception : A randomised controlled trial

Gherghina V.¹, Cindea I.¹, Balcan A.¹, Prazaru M.¹, Popescu R.¹, Costea D.¹
¹*Facultatea de Medicina Universitatea Ovidius Constanta - Constanta (Romania)*

Background and Goal of Study: During surgery, the administration of opioid analgesics is directed at controlling nociception and accordingly preventing an adrenergic stress response evoked by surgical tissue injury. The Nociception Level (NOL) monitor is able to reliably detect and quantify mild to intense noxious stimulation during anaesthesia and surgery. Intraoperative use of ketamine has been shown to generate a reduction in acute postoperative opioid consumption and pain intensity up to 48 h after the surgical insult. The goal of this study was to determine if the antinociceptive effects of preinduction low-dose ketamine bolus would affect intra-operative opioid requirements during NOL Index-guided antinociception. We also investigated its effects on postoperative outcomes and opioid-related adverse event.

Materials and Methods: 58 patients with ASA physical status of I-III, between 18 and 60 years of age, who were scheduled for elective surgery under general anesthesia, were included in this prospective,

randomized study. Patients were randomly divided into two groups by a sealed envelope technique. Group A (study group) patients were administered ketamine 0.3 mg/kg and Group B patients received saline IV (control). The primary outcome was the intra-operative requirement of fentanyl to maintain NOL Index between 10 and 25. Postoperative variables included morphine requirements, pain number rating scale, occurrence of postoperative opioid-related side effects (PONV within the first 24 h), postoperative hypoxaemia. The data obtained were analyzed with SPSS software with a significance level of p.

Results and Discussion: Intra-operative opioid requirements during Nociception Level Index-guided antinociception (mean \pm SD) were statistically lower in Group A (ketamine group) ($p < 0.05$). Morphine requirements were also significantly less in the study group but postoperative pain number rating scale and opioid-related complications (postoperative nausea or vomiting, hypoxaemia or bradypnoea) were not statistically different between groups.

Conclusion: In ASA I-III patients receiving NOL Index-guided antinociception, preinduction low-dose ketamine bolus reduces intra-operative fentanyl requirements. Integrating a wide range of relevant factors into an algorithm, as is used in the Nociception Level index, has shown some promise in guiding analgesia.

7024

Audit of plastic waste generated by anesthetic practice in the operating room of a burn unit

Suels E.¹, Alfani Veses O.¹, Usua G.¹, Munar F.¹
¹*Hospital Vall D'hebron - Barcelona (Spain)*

Background and Goal of Study: Quantify the amount of plastic waste generated by anesthesiologists in daily practice and correlate with different independent variables (ASA, type of anesthesia, time of surgery, etc.).

Materials and Methods: Descriptive study of the patients operated on in the burn unit during the month of November 2020. Patients colonized by isolable germs were excluded. Data was collected for each intervention and an inventory was made with all the plastic items used in the operating room, excluding waste generated by other professionals. At the end of each procedure, the amount of plastic waste generated was weighed and analyzed according to the different variables of the cases.

Results and Discussion: In each anesthetic act, an average 1057.29g of plastic waste was generated. While 1407.05g is produced in each general anesthesia, in sedation (with or without locoregional technique) 492.31g are produced. The wrappers represent the most numerous waste. There was a positive Pearson correlation of 0.848 between the duration of the procedures in minutes and the amount of waste in grams.

Conclusions: The amount of plastic waste generated varies depending on the patient's ASA, surgery time and anesthetic technique. Through the implementation of recycling programs, the packaging that represents the most numerous waste could be recycled.

7025

Bubble struggle - Subcutaneous emphysema in a hiatal hernia repair

Matos S.¹, Santos A.², Fernandes P.³, Silva C.³, Guimarães D.³
¹Hospital Espírito Santo Evora EPE - Evora (Portugal), ²Hospital Espírito Santo de Évora - Bom-Vento (Portugal), ³Hospital Espírito Santo de Évora - Evora (Portugal)

Background: Subcutaneous emphysema (SE) is a rare complication in laparoscopic procedures and a condition that often causes minimal symptoms, but can be severe and life-threatening (1).

Case Report: A 56 years-old patient, ASA PS III, with obesity hypoventilation syndrome, gastroesophageal reflux disease, and hiatal hernia was proposed for an elective laparoscopic gastric bypass Y-de-Roux and crurorrhaphy. Balanced general anesthesia was conducted and ventilation maintained by pressure-controlled ventilation volume-guaranteed. The pneumoperitoneum was kept within 12-15cmH₂O. Approximately 75min after the beginning of surgery, hypercarbia was observed with a maximum EtCO₂ of 52mmHg. Initial management was conducted with minute volume adjustment by increasing respiratory rate and afterwards by increasing tidal volume, within the safety range, with small improvement. After 5h of surgery, the patient returned to supine position and SE surrounding the neck, scalp and orbital area was detected. Considering the risk of post extubation airway obstruction, extubation was delayed. Arterial blood gas revealed respiratory acidosis. Videolaryngoscopy did not reveal airway edema or compression and the chest x-ray confirmed SE without further findings. We proceed with extubation approximately 30min after diagnosis, when EtCO₂ dropped to 42mmHg and the patient went to the PACU and where he remained hemodynamically stable.

Discussion: The incidence rate of SE has been described varying from 0.43% to 2.3% (1). The pathophysiology could be explained by the air in the mediastinum spreading into the cervical viscera and other connected tissue planes. The underlying causes of SE in this case could be EtCO₂>50mmHg and duration of the procedure. In a patient who develops SE post-operatively we could consider postponing extubation as well as transfer to ICU so we can guarantee airway protection.

References:

- Indian J Surg. 2015 Dec;77(Suppl 2):673-7
- Subcutaneous Emphysema. StatPearls Publishing; 2021 Jan. In: <https://www.ncbi.nlm.nih.gov/books/NBK542192/>

Learning points: Intraoperative hypercarbia differential diagnosis includes integrity of the anesthesia circuit, position of the ETT, obstructive lung disease and SE (2). Anesthesiologists must be vigilant and aware of the risk factors. Identification of clinical signs such as sudden or persistent hypercarbia or the presence of crepitus in the early stages of SE development may help prevent and manage such cases more effectively.

7049

Prediction of sensory blockade of spinal anesthesia via machine learning approach – a preliminary study

Cheng H. W.¹, Lee M. Y.², Ting C. K.¹
¹Taipei Veterans General Hospital - Taipei City (Taiwan), ²Providence University - Taichung City (Taiwan)

Background and Goal of Study: Spinal anesthesia is one of the most used techniques for surgery. Anesthesiologists usually check the block height (dermatome) of spinal anesthesia before surgery start. More than 20 factors have been postulated to alter spinal anesthetic block height. Varying results from previous studies may be attributable to incomplete control of potential confounding variables and other methodological limitations. Therefore, we would like to use machine learning to comprehensively consider various factors such as physiological parameters and different drug characteristics to establish a predictive model to evaluate the sensory blockade of spinal anesthesia.

Materials and Methods: After IRB approval, we retrospectively collected the electronic medical record of patients receiving spinal anesthesia from July 1, 2018, to Dec 31, 2018. A total of 2955 records were enrolled. Anesthesia-related factors such as anesthesiologist's expertise, injection

site, patient position, the dosage of local anesthetics, needle size, the direction of needle bevel, and basic demographic information of the patients were used for data analysis. Patients less than 18 years old were excluded from this study. Twenty percent of the dataset was used as a testing dataset, and the remaining were used for model training. We utilized four machine learning algorithms as XGBoost (Extreme Gradient Boosting), AdaBoost (Adaptive Boosting), Random Forest (RF), and support vector machine (SVM). Model performances were evaluated visually with a confusion matrix.

Results and Discussion: We used three machine learning algorithms to develop the prediction model. Figure 1 showed the confusion matrix of each model. The SVM model presented an acceptable prediction. True positive rate of sensory blockade prediction was 0.87, 0.55, 0.86, and 0.98 for sensory blockade from T4-6, T6-8, T8-10, and T10-12, respectively.

Conclusion: This preliminary study establishes a novel prediction model based on SVM for spinal anesthesia sensory level prediction. Adding more clinical information into the current model or assemble various models would further improve the future study's prediction power.

7052

Preoperative evaluation for elective ICU admission in a limited resources environment. A pilot study.

Zafeiriadis D.¹, Grousouzakou E.¹, Karras G.¹, Tzima M.¹, Katsanoulas K.¹, Katsika E.¹
¹Hippokratein General Hospital Thessaloniki - Thessaloniki (Greece)

Background and Goal of Study: During COVID-19 pandemic, shortage of ICU available beds for elective postoperative care, leading to cancellations, has been challenging our anaesthetic practice. Moreover, as in the case of our hospital, where no post-anaesthetic unit is available. We tried to define parameters that may objectively justify postoperative ICU bed reservation.

Materials and Methods: During 2020, 52 adult candidates for ICU postop ICU care after high risk surgery (94% for cancer), were included after preanesthetic evaluation. 36.5% were male, median age 68y, mean BMI 27.89, ASA II, III, IV, V, 25%, 50%, 21.2%, 1.9% respectively. Mean Revised Cardiac Risk Index was 2.58%. 44% were hypertensive, while 29% had no cardiovascular illness. Mean ejection fraction was 60.4%. METs<4 were found in 26.9%. Gupta Perioperative MICA Risk score was <1%(44.2% pts), 1-5%(36.5%), ≥5%(15.4%). 7.7% suffered OSAS with 1.9% CPAP use. 11.5% were diabetic under treatment. Median P-POSSUM scores: Physiology 18, Operative Severity 17, Morbidity 61%, Mortality 4%. Mean preop lab values: Hgb 12.2, Creat 1.45, Albumine 4.3, while 7.7% were transfused preoperatively. According to attending anaesthetist 52% of pts were considered suitable for PACU admission-if it was available-while 90.4% should have an ICU bed standing by due to operational invasiveness. The main question was: is there any significant correlation between preoperative values and scores and extubation in the OR without ICU transfer?

Results and Discussion: 44.2% were extubated in the OR and were transferred to the ward. Generally, after all statistical tests no correlation could be found between extubation in the OR and severity scores, preexisting pathologic entities and preoperative lab values. Only two statistically important correlations were found, these are METs score and P-POSSUM risk for mortality, the later being statistically different. These rather disappointing results, failing to reveal any other correlations are much probably due to the very small patient number.

Conclusion: Physiologic and prediction scores are useful tools for preoperative elective triage and ICU bed allocation. Further study with bigger sample is necessary and will hopefully reveal more statistically significant results.

7087
Dexmedetomidine as a component of anesthesiological support of laparoscopic abdominal surgery

Tarabrin O.¹, Hrushevskaya A.¹, Sukhonos R.¹, Suslov O.¹
¹Odessa National Medical University - Odessa (Ukraine)

Background and Goal of Study: The popularity of laparoscopic surgery (LS) is associated with advances in technology and advances in anesthesiology, due to the emergence of new drugs for anesthesia with improved pharmacological properties, which better ensure the controllability and safety of anesthesia. The goal of the study was to evaluate the efficacy and safety of the inclusion of dexmedetomidine in the scheme of general combined anesthesia during abdominal LS.

Materials and Methods: Patients aged 18-70 years with abdominal pathology who are subject to abdominal LS (n=60). Patients were divided into 2 groups. Group A (n=30): patients who underwent general anesthesia (TIVA) + mechanical ventilation, using propofol 1% 2-2.5 mg/kg and fentanyl 0.005%. Group B (n=30): patients were infused with dexmedetomidine 0.2-1.4 µg/kg/h + TIVA by propofol 1% 2-2.5 mg/kg with mechanical ventilation + fentanyl 0.005%. During the study, the following parameters were evaluated: blood pressure (NIABP), heart rate, assessment of the depth of sedation (BIS-monitoring), ANI monitoring to assess perioperative analgesia and assessment of the need for opioids in the postoperative period.

Results and Discussion: Blood pressure parameters in group B were 10-15% lower at all stages of the study than in group A, and heart rate did not differ between groups. For analgesia during surgery, group A used 1.5 times more fentanyl than group B. Patients receiving dexmedetomidine woke up more easily, regained consciousness and contact compared with patients in group A. In group B, there was a reduced overall need for opioids in the postoperative period.

Conclusion: This research demonstrated that dexmedetomidine is an effective and safe drug. The inclusion of dexmedetomidine in the scheme of general combined anesthesia during laparoscopic abdominal surgery can reduce the total number of opioids and their complications in the intra- and postoperative period.

7103
Risk stratification in Bariatric Surgery: Time to re-assess the value of ASA grade linked to BMI?

Gill T.¹, Oakey M.¹, Amin K.¹, Albon L.¹, Margaron M.¹
¹Western Sussex Hospitals NHS Trust - Chichester (United Kingdom)

Background: The population offered bariatric surgery is relatively young with a mortality rate of 1:500 frequently quoted, yet there are higher and lower risk patients. Surgical complication and re-operation are strongly associated with mortality, but it is likely cardio-respiratory reserve has the major role in predicting survival. ASA grading should reflect this and inform risk judgements; so like many bariatric units, we chose not to follow the 2014 guidance which states that BMI >40 is automatically classed ASA 3. To aid risk stratification, in 2006 we added a sub-division of ASA 3+ for morbidly obese patients with significant cardiopulmonary limitation (i.e. unable to climb a flight of stairs), but not fulfilling NYHA criteria for ASA 4. We analysed our anaesthetic database of >5,000 procedures to review how this grading was associated with mortality.

Materials and Methods: All deaths within thirty days of a primary procedure (gastric bypass, sleeve gastrectomy or gastric band) were identified. The allocated ASA status and mortality rate were compared. We then repeated the analysis, upgrading all bariatric patients' ASA status as per the 2014 ASA guideline; and without differentiating ASA 3+ from ASA 3.

Results and Discussion: Full data was available for 3184 (74%) patients, 3413 were female (77.8%) with median age of 44 years and median BMI of 49. The table below shows the numbers within each ASA cohort and associated mortality rates; rows 1 & 2 using our actual gradings, rows 3 & 4 using the modelled analysis as per the 2014 ASA guideline.

Conclusion: Using either system, one in 42 patients were classed as ASA 4, with an associated 30-day mortality of 4.4%. In our original

series 52.9% of patients were classed as ASA 1 or 2 (zero mortality), and 4.2% were classed ASA 3+ (mortality 2.5%). When modelling using the 2014 ASA recommendations, 84.1% of patients (almost 6 out of 7) were classed as ASA 3, more than double the 40.5% allocated ASA 3 under the original system. To use ASA status as a useful discriminator for risk stratification in bariatric surgery, it may be helpful to include an ASA 3.5, and to grade ASA status on co-morbidities, ignoring BMI.

	ASA 1	ASA 2	ASA 3	ASA 3+	ASA 4
Number (% of cohort)	197 (5.3%)	1784 (47.6%)	1517 (40.5%)	159 (4.2%)	90 (2.4%)
Mortality (rate)	0/197	0/1784	5/1517 (0.33%)	4/159 (2.5%)	4/90 (4.4%)
Modelled No. (% of cohort)	16 (0.4%)	489 (13.0%)	3153 (84%)	N/A	90 (2.4%)
Modelled mortality	0/16	0/489	9/3153 (0.29%)	N/A	4/90 (4.4%)

7106
Cardiac arrest after Sevoflurane-Alfentanil induction in a patient with epileptic encephalopathy treated by lacosamide

Hubert R.¹, Potié A.¹
¹CHUV University Hospital Lausanne - Lausanne (Switzerland)

Background: Sevoflurane and alfentanil are often used in anaesthetic inductions. Both have a well-known bradycardia potency. So far, few articles describe adverse events relative to their use simultaneously. In this report, we describe the case of a patient who has experienced severe bradycardia and cardiac arrest when receiving a sevoflurane-alfentanil anaesthetic induction.

Case Report: A 46-year-old female with tuberous sclerosis (TS) and treated epileptic-encephalopathy presented for a follow-up abdominal CT-Scan and dental care under general anaesthesia. She took several medications including lacosamide. She was agitated, and the induction had to be performed directly in the chair. We used 6% sevoflurane, nitrous oxide and 35% IFO2. She was placed in bed, a venous catheter was inserted, and 500mg of alfentanil were injected. Then we observed a severe bradycardia immediately followed by a cardiac arrest. After 2 minutes of CPR and the injection of 0.5mg of atropine, return of spontaneous circulation was obtained. She was then intubated and we proceeded to the intervention. She did not present any hemodynamic or respiratory problems during the procedure nor postoperatively. No additional tests were performed and she was able to go back to her institution. A cardiac check-up was scheduled.

Discussion: Bradycardias result from abnormalities of action potential generation or conduction. Causes include autonomic imbalance, sinus node dysfunction, drugs and heart blocks. Electrophysiological effects of pharmacologic agents are mainly linked to modulation of permeability of ionic channels. Even at standard doses, sevoflurane with alfentanil induction can lead to severe bradycardia or cardiac arrest by a different but synergistic effect. Lacosamide is an anti-epileptic drug which inactivates voltage-gated sodium channels. TS may also have altered cardiac conduction if rhabdomyomas were present. Therefore, the patient's background may have worsened the situation.

References: Anesthesiology 1990; 85:369-370. Anesthesiology 2001; 94:982-99. Anesthesiology 2014; 120:829-38. Epilepsy & behavior reports 2020; 14:100372

Learning points: Sevoflurane and alfentanil, can be a harmful association for anesthetic induction under certain circumstances. The knowledge of each drug's mechanisms and interactions should be well-known by the practitioner and integrated with the patient's background. Extreme caution should be taken with recently marketed drugs like lacosamide.

7124
Mortality amongst patients undergoing Bariatric Surgery: The relative power of ASA status, BMI, Weight, Age and Gender as predictors of 30-day Outcome

Gill T.¹, Oakey M.¹, Amin K.¹, Albon L.¹, Margaron M.¹
¹Western Sussex Hospitals NHs Trust - Chichester (United Kingdom)

Background: Bariatric Surgery is reported to have significant benefits upon reducing long term morbidity and mortality. The population offered bariatric surgery is usually young and the overall quoted mortality rate is around 1:500. Our tertiary bariatric surgical service deals with a higher-risk cohort (160 patients with BMI >70) and has experienced a total of 13 deaths within 30-days (seven in-hospital) amongst nearly 4,300 patients undergoing primary surgery. We wished to explore how this mortality was related to ASA status and other baseline demographics.

Materials and Methods: A database of over 5,000 bariatric surgical patients operated on at our hospital was interrogated. Deaths within 30 days of a primary procedure (gastric bypass, sleeve gastrectomy or gastric band) were identified. The relative importance of BMI, Total Body Weight, Gender, Age and ASA status were compared.

All patients are pre-operatively assessed by a bariatric anaesthetist, with ASA gradings based on co-morbidities alone. Those patients clinically assessed as high risk, with a markedly limited cardio-respiratory reserve (unable to climb single flight of stairs, but not fulfilling NYHA grade of dyspnoea to qualify as ASA 4), are further highlighted by the allocation of an ASA grade 3+.

Results and Discussion: Full data was available for 4289 patients who underwent a primary bariatric surgery (3413 females, 79.6%). The median age of the cohort was 44 and the median BMI 49.

Conclusion: Whilst a retrospective study is inevitably at risk of unrecognized bias, it appears that elevated ASA status, increased BMI and male gender, each confer a relative mortality risk markedly in excess of that associated with age. These conclusions are derived from patients accepted for bariatric surgery and selection bias is inevitable. Many higher-risk older patients are advised against bariatric surgery, whereas younger morbidly obese patients are offered surgery. Clinicians involved in pre-operative assessment and the discussions of the risk/benefits of bariatric surgery, should be aware of these relative risks and consider unconscious bias in the choice of the patients offered bariatric surgery.

Variable and (deaths / denominator)	Relative Risk of Mortality
ASA 1-3 (5/3498) vs ASA 3+ or 4 (8/249)	22.5
BMI <50 (2/1958) vs BMI >70 (5/132)	37
Weight <150kg (3/1995) vs >200kg (4/165)	16
Age <40 years (4/1436) vs >60 years (3/268)	4.0
Gender: Female (3/3413) vs Male (10/976)	12

7134
Bilateral palsy of hypoglossal (XII) nerve following general anaesthesia for emergency surgery

Brattou P.¹, Iliakopoulos K.¹, Polydorou A.¹, Theodoraki K.¹
¹Aretaieion University Hospital, National and Kapodistrian University of Athens - Athens (Greece)

Background: We describe a case of bilateral hypoglossal nerve damage, which can be a rare complication of airway manipulation. Typical symptoms and signs are dysarthria, accumulation of saliva in the oropharynx and dysphagia, due to inability to propel food to the oesophagus.

Case Report: A 65-year-old male patient with a history of pancreatic cancer was urgently readmitted to the operating room due to massive hemorrhage of the lower gastrointestinal tract and hypovolaemic shock on the sixth postoperative day after Whipple's surgery. Emergent administration of general anesthesia ensued and endotracheal intubation was accomplished with a video laryngoscope due to known difficult intubation from his previous surgery. An endotracheal tube of 8mm internal diameter was inserted with a relative difficulty with an anticlockwise maneuver. The patient continued to be haemodynamically unstable during surgery and required transfusion and vasopressors.

After the operation, which lasted for 190 minutes, he was transferred to the ICU, where after a 3-day mechanical ventilation period he was gradually weaned. After extubation he presented with dysarthria, pooling of saliva, dysphagia and symmetric inability to move and protrude his tongue. Detailed neurological examination revealed no other evidence of central or cranial nerve impairment. Therefore, a diagnosis of isolated bilateral hypoglossal nerve paralysis was considered, which was confirmed by electromyographic examination that showed symmetrical denervation of the tongue. Hydrocortisone 200mg/24hr for 4 days was prescribed without however any significant improvement. Fortunately, the hypoglossal palsy improved slowly. The patient was able to swallow liquids and extend his tongue symmetrically for a few centimeters one month later. He was able to swallow solid food two months after surgery and eat normally three months after surgery. Four months after surgery there were not any residual symptoms of dysarthria.

Discussion: Bilateral hypoglossal nerve palsy is very rare and tracheal tube malposition or prolonged but unnoticed tracheal cuff pressure especially in the face of low blood pressure should be considered as possible causative mechanisms for this condition. As the hypoglossal nerve has a superficial course beneath the angle of the mandible, nerve damage is also possible during mask ventilation.

Learning points: Due to the rarity of the syndrome, vigilance is required for early diagnosis and optimal outcome.

7153
Association of perioperative inspiratory oxygen fraction and cancer-free survival after elective cancer surgery

Spang V.¹
¹Heidelberg University Hospital - Heidelberg (Germany)

Background and Goal of Study: Choice of fraction of inspiratory oxygen (FiO2) during cancer surgery is controversial. The objective of this analysis was to evaluate whether the choice of intraoperative FiO2 was associated with cancer-free survival after elective abdominal cancer surgery. We analyzed patients operated on before WHO guidelines recommended increased FiO2 for prevention of surgical site infections. **Materials and Methods:** In this retrospective, single-centered study, adult patients undergoing elective resection of pancreatic cancer (PC, n=652), colorectal cancer (CRC, n=405), and hepatic cancer (HC, n=27) between 2009 and 2016 at Heidelberg University Hospital, Heidelberg, Germany were analyzed with ethic committee approval. For each patient intraoperative mean FiO2 was calculated. Patients were sorted by ascending mean FiO2 values and equally divided into a low and a high FiO2 group. The primary outcome measure was cancer-free survival. Groups were compared using Kaplan-Meier analysis. For subgroup analyses a stratified log rank test was used to compare pancreatic, colorectal and hepatic cancer surgery groups individually. Cox-regression analyses were used to control for differences in baseline variables. Sepsis, re-operations, surgical site infections and cardiovascular events during hospital stay and overall survival were evaluated as secondary outcomes.

Results and Discussion: The observed mean FiO2 was 40.9 % (38.3; 42.9) vs. 50.4 % (47.4; 54.7). Median follow-up was 3.28 (1.68, 4.97) years. Cancer-free survival was significantly higher in the high FiO2 group (p<0.001). This effect was preserved when accounting for the different tumor entities (p=0.007). The cox proportional hazard model demonstrated an independent association of FiO2 mean with cancer-free survival in colorectal cancer surgery (B=-0.033; p=0.032). The effect was not significant in pancreatic cancer surgery and we did not find differences in any of the secondary endpoints.

Conclusion: Our study can generate new hypothesis regarding the amount of inspiratory oxygen fraction in patients undergoing cancer surgery.

7155

Use of rotational thromboelastometry (ROTEM) to assess the coagulation phenotype and the need for tranexamic acid administration in polytrauma patients undergoing delayed major orthopaedic surgery: A case series study

Nyktari V.¹, Diamantaki E.², Stefanakis G.², Koutoulaki E.², Vasilos P.², Papaioannou A.¹

¹University Hospital of Heraklion, Medical School, University of Crete - Heraklion (Greece), ²University Hospital of Heraklion - Heraklion (Greece)

Background and Goal of Study: Tranexamic acid (TXA) administration reduces perioperative blood transfusion including elective orthopaedic procedures. Orthopaedic trauma patients have a 0.4%–7.5% increased risk of fatal pulmonary embolism compared to elective arthroplasty patients. CRASH-2 study showed that in trauma patients TXA reduced hemorrhage mortality when administered within 3 hours of injury, but afterwards it increased mortality. The goal of the study was to investigate the haemostatic phenotype of polytrauma patients undergoing delayed major orthopaedic surgery with the use of ROTEM, and how this affects the decision for TXA administration.

Materials and Methods: Trauma patients > 18 years old who underwent major orthopaedic surgery > 12 hours from admission to the emergency department (ED) and who were assessed with ROTEM before surgical incision, were recruited. Data from anaesthetic charts and intensive care unit records were analysed. Descriptive statistics were used to report patient characteristics and outcomes. For non-parametric variables Mann-Whitney test was used in SPSS.

Results and Discussion: 49 polytrauma patients were identified but ROTEM was used only in 14 in order to guide the decision for TXA administration. Temograms revealed either a hypercoagulable state or normal coagulation and TXA was not administered in any of these patients. Eight patients (57%) were hypercoagulable while six (42.85%) had a normal coagulation temogram. 50% of patients had a fibrinolysis inhibition phenotype. ASA physical status 3 or 4 was associated with fibrinolysis shutdown ($p=0.03$). In patients with hypercoagulability the mean delay time from initial ED admission to surgery was 4 days (4.1 ± 3.8). Our findings showed that ROTEM revealed fibrinolysis inhibition in 50% of polytrauma patients undergoing delayed major orthopaedic surgery. In these patients the possibility of additional increase in thrombotic risk with TXA use is a major theoretical concern and explains the reluctance for its use.

Conclusion: Individualised decision for TXA administration may be more appropriate in polytrauma patients undergoing delayed major orthopaedic surgery beyond 12 hours from hospital admission.

7160

In 25 degrees backup position, glottic view becomes easier as compared to supine sniffing position

Arslan M.¹, Zia A.²

¹Our Lady of Lourdes Hospital Drogheda - Drogheda (Ireland), ²Jinnah Hospital Lahore - Lahore (Pakistan)

Background and Goal of Study: The horizontal supine sniffing position for intubation aligns the oral axis with pharyngeal and laryngeal axis allowing the line of sight on the glottis. Our goal is to compare the mean time to intubation with 25° back-up position compared to horizontal supine sniffing position in patients undergoing elective surgery.

Materials and Methods: Study Design: Randomized control trial.

Setting: The operation theaters of Jinnah hospital, Lahore

Duration: 06 months

Data collection: After meeting the inclusion criteria 200 patients were enrolled. Then patients were randomly divided into two groups. Group A managed with 25° back-up position and group B with horizontal supine sniffing position. Direct laryngoscopy was performed using an adult Macintosh blade. The time between the beginning of laryngoscopy and detection of end-tidal CO₂ after the successful placement of the endotracheal tube was recorded.

Results and Discussion: The mean age of the patients was 42.49 ± 12.95

years, 124(62%) were male. ASA type I was noted in 137(68.5%) patients. In 25° back-up group the mean time of intubation was 23.84 ± 2.004 seconds while in control group was 26.82 ± 2.64 seconds (p -value < 0.05) Conclusion: Intubation with 25° back-up position increases the ease of intubation than to intubation in horizontal supine sniffing position.

7176

Effects of an “Individualised Open Lung Approach” (iOLA) on the right ventricular function in obese patients with severe obstructive sleep apnoea syndrome undergoing bariatric surgery

Del Río Morales M. E.¹, Ibañez Esteve C.¹, Martínez Ocón J.¹, Pino Flores M.¹, Rivas Gallardo N.¹, Rivas Ferreira E.¹ Anesthesiology service, Clinic Hospital (Barcelona)

¹Hospital Clinic of Barcelona - Barcelona (Spain)

Background and Goal of Study: Anaesthesia-induced atelectasis may increase the risk of developing right ventricular dysfunction and postoperative pulmonary complications. We aim to test whether an individualised open-lung approach (iOLA) strategy improves right ventricular function in obese patients with severe obstructive sleep apnoea (OSA) syndrome undergoing bariatric surgery.

Materials and Methods: Ventilatory settings: tidal-volume 6-8ml/kg, respiratory-rate for end-tidal of CO₂ between 35-45mmHg, inspiratory oxygen fraction to achieve a peripheral oxygen haemoglobin saturation >90% and positive end-expiratory pressure of 5cmH₂O. A recruitment manoeuvre plus individualised-PEEP (iOLA) was performed (Fig 1). Haemodynamics through an arterial pulse-pressure monitor, arterial blood gases and cardiac function by transoesophageal echocardiography were registered at baseline, at 30-min and 10-min after the iOLA. Comparisons were made with general lineal model for repetitive samples using “SPSS” software. Values were given as mean \pm standard deviation. P -value < 0.05 was considered significant.

Results and Discussion: Fourteen patients (8 female) were included. Age and BMI were 56 ± 9 and 44 ± 4 , respectively. 64% had arterial hypertension, 35% diabetes and 14% ischemic heart disease. Individualised PEEP was 15cmH₂O. The iOLA significantly improved oxygenation and respiratory system mechanics. Modified tricuspid annular plane systolic excursion, right ventricle fractional area change, and left ventricular outflow tract velocity time integral significantly improved their values after the iOLA. Although not significant, right ventricular outflow tract velocity time integral mean value improved after the iOLA (Fig 2).

Conclusion: The iOLA in obese patients with severe OSA undergoing bariatric surgery improved right ventricular function and respiratory system mechanics.

7212 Pleth Variability Index guided volume optimization in major gynecologic surgery: a prospective randomized controlled study

Dalkilinc Hokenek U.¹, Kosluk Gurler H.¹, Saracoglu A.², Kale A.¹, Saracoglu K. T.¹

¹Health Sciences University, Kartal Dr. Lutfi Kirdar City Hospital - Istanbul (Turkey), ²Marmara University, School of Medicine - Pendik-Istanbul (Turkey)

Background and Goal of Study: Fluid management in the intraoperative period is important in terms of maintaining organ perfusion and preventing complications that may develop by hypovolemia. Intraoperative hypovolemia can lead to various complications such as acute renal failure, hypotension, cardiac arrhythmia and anastomotic leak, while hypervolemia can cause pulmonary edema, postoperative pneumonia, prolonged need for mechanical ventilation, delayed wound healing, intestinal edema, and decreased bowel motility. The aim of this study is to compare the effects of conventional fluid management (CFM) and Pleth Variability Index (PVI) goal-directed fluid management (GDFM) on intraoperative fluid management and patient outcomes during elective total abdominal hysterectomy and bilateral salpingo-oophorectomy surgery.

Materials and Methods: Following Ethics Committee approval (RB:2020/514/172/4, date: 26.02.2020) and clinical trial registration (NCT04775576), this prospective, randomized and controlled trial included 80 patients aged 18-65 years with ASA I-III undergoing elective hysterectomy under general anesthesia. Written informed consent was obtained from all patients. Following randomization with the closed envelope method, standard monitoring was performed and 250 ml crystalloid infusion was given during anesthesia induction. Maintenance fluid therapy was administered at 8-10 ml/kg/hour to the control group and 2-3 ml/kg/hour to the PVI group. If the mean arterial pressure (MAP) was ≤ 65 mmHg and/or the MAP was decreased by more than 20% and the PVI was $>13\%$, a 250 ml colloid bolus was given again. If there was no response, vasoactive drug was administered.

Results and Discussion: The mean age of the patients was 48.78 ± 5.76 years, and there was no statistically significant difference in terms of demographic data, intraoperative blood and blood product use, urine output, hospital stay, and postoperative complications ($p > 0.05$). The total amount of crystalloid used in the PVI group was found to be lower ($p < 0.001$). Base Excess values in the PVI group was lower than the control group ($p < 0.05$). In terms of other laboratory values, no significant difference was determined ($p > 0.05$). The proportion of patients with $PVI > 13$ at any time in the PVI group was 89.7%.

Conclusion: We concluded that PVI-guided GDFM can prevent unnecessary volume overload by optimizing intraoperative fluid management in elective total abdominal hysterectomy surgery.

7214 Effect of direct laryngoscopy on optic nerve sheath diameter/ eyeball transvers diameter index

OZKOCBUYUKAKKUS E.¹, Akça B.¹-Başak AKÇA, Aysun ANKAY YILBAŞ, Oğuz KUŞÇU, Banu KILIÇASLAN

¹Hacettepe University Faculty of Medicine - ANKARA (Turkey)

Background and Goal of Study: Direct laryngoscopy (DL) is the most frequently performed procedure to visualize, diagnose and to treat the pathologies of the larynx. The most preferred position for direct laryngoscopy is the sniffing position. This position can affect intracranial pressure (ICP). Increase in ICP could lead to secondary insults to central nervous system. Ultrasonographic measurement of optic nerve sheath diameter (ONSD) have been used for detecting an elevation in ICP worldwide. Latest trials suggest that the ratio between eyeball transverse (ETD) diameter and ONSD might provide more reliable data as a marker of ICP. The aim of this research was to evaluate the effect of DL on ONSD/ETD ratio at different time intervals.

Materials and Methods: Fifty-nine patients scheduled for DL were enrolled. Sonographic ONSD/ETD measurements and hemodynamic parameters were recorded at specific time points; T0; immediately after

induction, T1; 10 minutes after intubation, T2; 10 minutes after insertion of the direct laryngoscope, T3; 10 minutes after the direct laryngoscope removal while patient is in neutral supine position.

Results and Discussion: There was a statistically significant change in the ONSD levels in time ($p < 0.001$). No statistically significant difference was obtained in terms of ETD levels. A correlation between ONSD and ONSD/ETD ratio were obtained at T1-T3. These measurements were also found to increase and also remained above the baseline values (Table 1). Table 1. Sonographic measurements in different time intervals,

	T0	T1	T2	T3	P-VALUE
ONSD	0,588±0,051	0,606±0,049	0,613±0,048	0,607±0,053	<0,001
ETD	2,293±0,114	2,305±0,119	2,302±0,119	2,310±0,118	0,263
ONSD/ETD	0,257±0,022	0,263±0,021	0,267±0,023	0,263±0,022	0,003

mean \pm standard deviation

There was no statistically significant correlation with age, body mass index, total length of the procedure and the time between intubation and mouth opening ($p > 0.0083$).

Conclusion: As a conclusion, we believe that during direct laryngoscopy especially performed for laser treatment sonographic measurement of ONSD and ONSD/ETD ratios could be used as a noninvasive indicator of elevated ICP especially in patients at risk for intracranial hypertension.

7224 Kearns-Sayre Syndrome – Anaesthetic management of a patient with a rare mitochondriopathy – case report

Nogueira G.¹, Santos Pinheiro R.¹, Esteves C.¹, Freire Carvalho R.¹, Aguiar Silva B.¹

¹Hospital Vila Franca de Xira - Povos, Vila Franca de Xira (Portugal)

Background: Kearns-Sayre syndrome (KSS) is a rare mitochondriopathy, caused by m-DNA deletions. Dysfunctional mitochondria and impaired aerobic energy production affect every organ, with the CNS and cardiac/skeletal muscle at higher risk. Life-span is reduced. Ocular and cardiac features often motivate surgery and life-threatening interactions with anaesthesia may occur. We present the anaesthetic management of a patient with KSS submitted to blepharoplasty.

Case Report: An 18yo female with KSS was scheduled for blepharoplasty. Preoperative evaluation revealed ataxia and short stature (1,26m, 26kg). She attended regular Endocrinology consultation. Cardiac related symptoms were excluded. ECG/Holter were unremarkable, except for a complete right BBB. Echocardiogram revealed preserved structure/function. Gastroesophageal reflux symptoms were excluded. After informed consent, standard ASA, temperature and BIS monitoring were started. GA was induced with thiopental plus fentanyl and a laryngeal mask inserted. Muscle relaxants were avoided and anaesthesia maintained with sevoflurane. Adequate oxygenation and analgesia were provided, as well as normothermia and normoglycemia. Hemodynamic stability was constant and no dysrhythmia recorded. A lactate-free fluid was used for replacement. Emergence was uneventful. She was discharged after 24h monitoring.

Discussion: Although the diagnostic triad is external ophthalmoplegia/ptosis, retinitis-pigmentosa and cardiac conduction defects, additional features include myopathy, dementia, ataxia, gastroparesis and various endocrinopathies. Conduction blocks, dilated cardiomyopathy and sudden death are frequent cardiac manifestations. Thus, an individual detailed preoperative evaluation is warranted. Oxygen delivery-demand balance should be preserved with adequate fasting, sympathetic response blunting, normothermia, shivering avoidance and lactate monitoring. Thiopental was used due to concerns on propofol-related infusion syndrome propensity. Reports of respiratory depression due to blunted hypoxic drive and muscle weakness mandate neuromuscular block avoidance (or full reversal). Owing to potential arrhythmic complications, external pacing/defibrillation was on the OR. Ambulatory surgery is contraindicated.

References: Genet Med. 2015 Sep;17(9):689-701

Learning points: KSS is rare and anaesthesia reports are scant. This case adds to existing literature. Adequate management of KSS patients can reduce their anaesthetic risk.

7227

Osteogenesis Imperfecta – Neuraxial anaesthesia and challenges

Nogueira G.¹, Santos Pinheiro R.¹, Aguiar Silva B.¹, Freire Carvalho R.¹
¹Hospital Vila Franca de Xira - Povos, Vila Franca de Xira (Portugal)

Background: Osteogenesis imperfecta (OI) is a rare genetical disease with abnormal type1 collagen. Its major phenotypic trait is bone fragility and fracture susceptibility, motivating multiple surgeries during lifetime. Airway abnormalities, spinal fragility/deformations with CNS involvement, thoracic dysmorphology, cardiovascular, hypermetabolic or coagulation anomalies may pose additional challenges to the anesthesiologist.

Case Report: 41yo male, diagnosed with OI, was admitted after a motorcycle crash which resulted in multiple rib and a left leg fracture, demanding surgery. Positive findings on preoperative assessment were an old L3 fracture and ECG frequent supraventricular extrasystoles. Coagulation testing and platelet values were normal. After informed consent, careful positioning in right-lateral knee-chest position and standard ASA+temperature monitoring were initiated. Spinal anaesthesia was performed with levobupivacaine, sufentanyl and morphine, administered, in a single 27G-L4/L5 atraumatic puncture. A propofol infusion was titrated for moderate sedation and spontaneous breathing with supplementary oxygen was maintained. Multimodal analgesia and PONV prophylaxis were administered. Femoral tourniquet with reinforced padding and reduced pressure was used. EBL was negligible. No respiratory, circulatory, skeletal, or temperature related events were recorded. Surgery went uneventfully.

Discussion: This case presented some challenges to the entire OR team: team-briefing, careful positioning, careful pressure-point padding and limited NIBP inflation pressure were adopted strategies in order to prevent iatrogenic fractures. A regional anesthesia technique was chosen due to concerns with airway manipulation, particularly, C-spine manipulation and eventual pneumothorax augmentation. There is a growing number of reports concerning successful neuraxial anesthesia in pregnant OI patients. Besides the unconfirmed hypothetical hemorrhagic risk, a spinal anesthesia is safer than a continuous block and provides better pain control. In our opinion, the benefits outweigh the risk of GA in this setting.

References: Curr Anesthesiol Rep.2017;7(2):142-149.

Learning points: This case-report aims to highlight the anaesthetic challenges of OI, as well its successful management, with the purpose of raising awareness to this rare entity.

7287

Use of dexmedetomidine as an anaesthetic adjunct in hepatectomy: a systematic review

Hui R. W. H.¹, Leung C. M.²

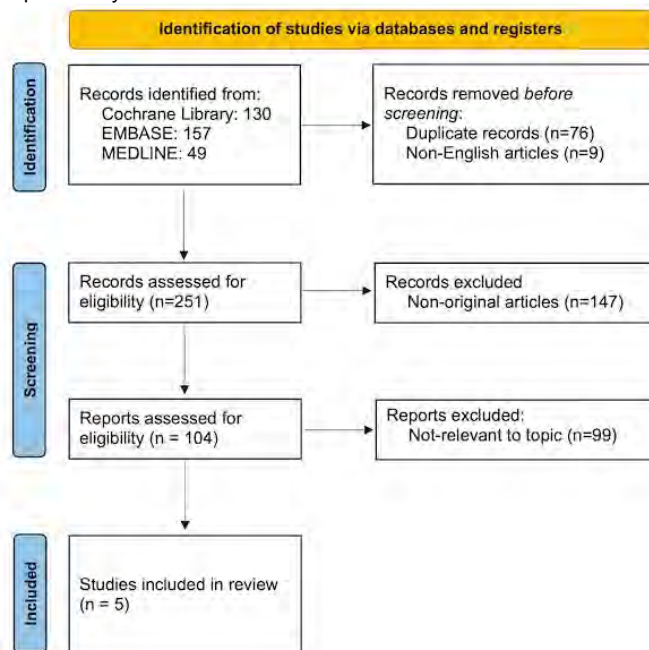
¹Queen Mary Hospital - Hong Kong (Hong Kong SAR China), ²Queen Mary Hospital - Hong Kong (Hong Kong SAR China)

Background and Goal of Study: Intraoperative bleeding and ischaemia-reperfusion injury are key challenges in hepatectomy. Emerging evidence suggests that dexmedetomidine, a highly selective alpha-2 agonist, has potential effects in reducing bleeding and ischaemia-reperfusion injury. Dexmedetomidine has hence been explored as an anaesthetic adjunct for hepatectomy. The primary objectives of this systematic review are to determine the hemodynamic and hepatoprotective effects of adjunctive dexmedetomidine in hepatectomy. The secondary objective is to assess post-operative analgesic effects of adjunctive dexmedetomidine in hepatectomy.

Materials and Methods: A systematic literature search was conducted on MEDLINE, EMBASE and the Cochrane Database from inception till 1/7/2021 using the terms “Dexmedetomidine”, “Liver Disease” and “Hepatectomy”. Randomized controlled trials comparing intraoperative adjunctive dexmedetomidine against placebo in adults undergoing hepatectomy were included. Studies were reviewed by two independent reviewers. The Cochrane Risk of Bias tool was used for quality assessment of individual included trials. This review is registered in PROSPERO (CRD42021262928).

Results and Discussion: 336 articles were identified from literature search. 5 articles (comprising of 5 independent trials and 238 patients) were included. When comparing with placebo, adjunctive dexmedetomidine may lead to reduced intraoperative bleeding. Dexmedetomidine may also reduce intraoperative blood pressure and heart rate, improve postoperative liver biochemistry, and improve postoperative analgesia. Four articles had low risk of bias, and one article had high risk of bias. The included number of studies and subjects were small and data was heterogeneous.

Conclusion: The evidence on using adjunctive dexmedetomidine in hepatectomy appears promising, particularly for reducing intraoperative bleeding. Large-scale high-quality trials on dexmedetomidine adjunct in hepatectomy are warranted.



7288

Anesthetic management of a patient with Takotsubo syndrome undergoing hip fracture repair

Diakomi M.¹, Makris A.¹, Tileli M.¹, Potamianou S.¹, Konstantopoulos K.¹
¹Asklepieion Hospital of Voula - Athens (Greece)

Background: Takotsubo syndrome (TTS) is a type of acute reversible left ventricular dysfunction in the form of acute catecholaminergic myocardial stunning in the absence of occlusive coronary artery, with considerable patient morbidity and mortality¹. The optimal anesthetic management of patients with TTS remains unclear. We would like to share our experience with a patient with TTS presenting for hip fracture repair.

Case Report: An 80-year old female complained of dyspnea and retrosternal chest pain after subcapital hip fracture. Her diagnostic workup revealed elevated markers of myocardial necrosis and pathologic findings from transthoracic echocardiogram. Left ventriculography imaging along with an unremarkable coronariography was suggestive of TTS. After the initial control of acute myocardial crisis, the patient was scheduled for hip fracture repair, under spinal anesthesia. Having obtained patient's informed consent, we performed an ultrasound guided fascia iliaca compartment block (FICB) (30 ml ropivacaine 0,5%/8 mg dexamethasone). Twenty minutes after FICB, the patient was placed in the lateral decubitus position and 3ml levobupivacaine 0,5% were injected intrathecally. A bolus dose of dexmedetomidine (DEX) 1 mcg/kg followed by a continuous intravenous infusion at a rate of 0,5mcg/kg/hour was initiated 10 min before lumbar puncture. The infusion was reduced to 0,25 mcg/kg/hour 30 min later due to a drop in systolic blood pressure 40% below baseline, until the end of surgery. No complications occurred in the postoperative period.

Discussion: To our knowledge, there are no reports of intraoperative DEX administration in TTS patients. Our main goal was the control of stress response^{2,3}, performing FICB to facilitate perioperative analgesia and administering DEX, an antiadrenergic agent with sedative and analgesic properties.

References:

1. Dias A et al. Takotsubo syndrome: State-of-the-art review by an expert panel - Part 1. *Cardiovasc Revasc Med.* 2019;20:70-79. 2) Hessel EA 2nd, London MJ. Takotsubo (stress) cardiomyopathy and the anesthesiologist: enough case reports. Let's try to answer some specific questions! *Anesth Analg.* 2010;110:674-679. 3) Liitsis E et al. Takotsubo Cardiomyopathy after Spinal Anesthesia for a Minimally Invasive Urologic Procedure. *Case Rep Anesthesiol.* 2017;2017:8641641

Learning points: Administration of DEX should be considered in the intraoperative management of patients with TTS, improving patient's outcome.

7294

Sugammadex versus neostigmine for recovery of respiratory muscle strength measured by ultrasonography in the immediate postoperative period: a randomised controlled trial

Huang C.¹, Xiao Y.¹, Wang X.¹, Luo W.¹, Gao S.¹, Huang W.¹
¹First Affiliated Hospital of Sun Yat-sen University - Guangzhou (China)

Background and Goal of Study: Although sugammadex is well known for its advantage over neostigmine in reducing the incidence of residual neuromuscular blockade, its superiority in the early recovery of respiratory muscle strength (RMS) remains controversial. Moreover, expiratory muscle, an important component of the respiratory muscle pump that is recruited in low inspiratory muscle capacity, has been largely neglected in prior studies. We tested the hypothesis that sugammadex enhances expiratory and inspiratory muscle strength recovery more completely than neostigmine in the postextubation period.

Materials and Methods: Adult patients undergoing microlaryngeal surgery were randomized to receive sugammadex or neostigmine. The thickening fraction of internal oblique abdominal muscle (TFIO) and diaphragm excursion, respectively reflecting expiratory and inspiratory muscle strength, were measured via ultrasonography at three time points: baseline, return of train-of-four ratio (TOFR) to 0.9, and 30 minutes after postanaesthesia care unit (PACU) arrival. The postoperative changes of RMS from baseline were evaluated.

Results and Discussion: Fifty-eight patients were included. There was a significant difference in the change of TFIO from baseline to TOFR \geq 0.9 between the sugammadex and neostigmine group: mean (SD), 9 \pm 6% vs 16 \pm 9%; difference: -7% (95% CI, -11% to -3%); P=0.002; suggesting sugammadex improving expiratory muscle strength recovery. From baseline to TOFR \geq 0.9 and to PACU 30 min, changes of diaphragm excursion were significantly smaller in patients receiving sugammadex than those receiving neostigmine (P<0.001 and P=0.026, respectively). TFIO and diaphragm excursion returning to baseline levels at TOFR \geq 0.9 were only observed in patients reversed with sugammadex. Even at PACU 30 min, despite TOFR reaching unity, the incidences of TFIO and diaphragm excursion returning to baseline were rather low (<40%) in both groups, indicating that RMS was not fully restored in most patients. No respiratory-related adverse events occurred during PACU.

Conclusion: RMS might still be impaired even after TOFR reaching unity, but sugammadex provides more complete RMS recovery than neostigmine in the postextubation period. This has clinical relevance for patients expected to mobilize shortly after ambulatory surgery that requires deep neuromuscular block and may be critical for high-risk patients for developing pulmonary complications with limited respiratory reserve.

7300

Perioperative anesthetic management for paravertebral hydatid cyst: a case report

Sanchez T. P. F.¹, Pires V.¹, Spencer L.¹, Mariano P.¹
¹Centro Hospitalar Universitário Lisboa Central - Lisboa (Portugal)

Background: Hydatid disease is an infectious disease caused by the larval form of the parasite *Echinococcus granulosus*, mainly affecting developing countries. Organic involvement is predominantly hepatic and pulmonary, with only 3% of reported cases of bone involvement.

Case Report: The case reports a 59-year-old man who was admitted to the emergency department due to severe back pain with three months of evolution. He presented a history of paravertebral hydatid disease, under treatment with albendazol and a physical rehabilitation program, previously submitted to hydatid cyst excision and posterior instrumentation of the dorsal column. A multidisciplinary approach was planned and under general intravenous anesthesia in the right lateral decubitus position, aspiration of the cyst content, instillation of hypertonic serum, discectomy at the level of D7-D8 and D9-D10 and corpectomy of D8 and D9 were carried out. Standard ASA monitoring, invasive blood pressure, BIS®, TOF® and urinary output were established. Orotracheal intubation with a double-lumen tube and protective ventilation were performed. Hemodynamic stability was maintained, with an estimated blood loss of 600mL. No events were registered during intra nor postoperative period and the patient was discharged 8 days after.

Results and Discussion: Perioperative anaesthetic management of patients proposed for hydatid cyst surgery should take into account the multi-organ involvement, location, risk of cyst rupture, and type of procedure proposed. Perioperative anaphylaxis, through IgE-mediated reaction, can present itself through skin changes, hemodynamic instability, bronchospasm, seizures and coma. If thoracic involvement is present, selective bronchial intubation should be performed, in order to avoid complications associated with the release of fluid and solid cystic fragments into the tracheobronchial tree, such as airway obstruction and secondary dissemination. The risk of hypernatremia and serum hyperosmolarity after aspiration of cystic content and instillation of hypertonic serum require serial monitoring of serum sodium levels and neurological manifestations.

Conclusion: Despite being a rare surgical procedure, the anesthetic management of hydatid cyst excision requires careful planning and adequate monitoring, looking upon perioperative safety and a positive outcome.

References:

1. Our clinical experience and follow-up results in hydatid cyst cases: a review of 393 patients from a single center, Mehmet, T et al., *Brazil J of Anesthesiology*, 2020

7307

Perioperative dexmedetomidine infusion for managing thyroid storm in a pediatric hyperthyroid patient for total thyroidectomy: a case report

Infante J.¹, Policarpio J.¹, Jamora V.¹¹University of Santo Tomas Hospital - Manila (Philippines)

Background: We present a pediatric male patient with Grave's disease who had severe allergy to antithyroid drugs thus, undergoing thyroidectomy in non-euthyroid state.

Case Report: This is a case of a 16-year-old male with Grave's disease who developed severe allergic reactions to antithyroid drugs so, thyroidectomy had become the definitive treatment. Five days preoperative high doses of lithium carbonate, propranolol and prednisone abated his thyrotoxicosis but inopportunely did not render him euthyroid. Anesthesia, surgery, hyperthyroid state, age and gender, put this patient at high risk of developing peri-operative thyroid storm. He underwent thyroidectomy with two episodes of impending thyroid storm after intubation and during thyroid dissection but was impeded by Dexmedetomidine infusion, adequate depth of anesthesia and various cooling measures. Dexmedetomidine helped provide smooth emergence, extubation and adequate post-operative analgesia.

Discussion: Children undergoing thyroidectomy while hyperthyroid rarely happens hence, evidence-based strategy for anesthetic management is almost nil which raised our level of strategic planning to address perioperative thyroid storm triggers. Dexmedetomidine, a highly selective α_2 -agonist sedative-anxiolytic, decreases blood pressure and heart rate by inhibiting sympathetic activity through postsynaptic activation of α_2 receptors in the CNS(1). It also has an analgesic property and reduces the hemodynamic responses to tracheal intubation(2). As the patient is in a constant hypermetabolic state, Dexmedetomidine decreases oxygen consumption up to 8% intraoperatively and 17% postoperatively (3).

References:

- Gertler R, Brown HC, Mitchell DH, Silvius EN. Dexmedetomidine: A Novel Sedative-Analgesic Agent. Baylor University Medical Center Proceedings. 2001;14(1):13–21.
- Patel A, Davidson M, Tran MC, et al. Dexmedetomidine infusion for analgesia and prevention of emergence agitation in children with obstructive sleep apnea syndrome undergoing tonsillectomy and adenoidectomy. *Anesth Analg* 2010; 111: 1004-10
- Taittonen MT, Kirvelä OA, Aantaa R, Kanto JH. Effect of clonidine and dexmedetomidine premedication on perioperative oxygen consumption and haemodynamic state. *British Journal of Anaesthesia*. 1997;78(4):400–6

Learning points: To our knowledge, this is the first report of pediatric Grave's disease that underwent thyroidectomy using dexmedetomidine to mitigate impending intraoperative thyroid storm.

7308

Preemptive versus preventive antiemetic treatment in patients undergoing laparoscopic cholecystectomy: a randomized, double blind study

Theodosopoulou P.¹, Staikou C.¹, Fassoulaki A.¹¹Aretaieio Hospital, National and Kapodistrian University of Athens - Athens (Greece)

Background and Goal of Study: The aim of the present study was to evaluate the impact of timing of ondansetron administration on its antiemetic effect when given before induction of anesthesia (preemptively) or intraoperatively (preventively).

Materials and Methods: One hundred and fourteen patients (n=114) scheduled for laparoscopic cholecystectomy were randomly assigned to Group 1 or group 2 to receive intravenously 4 mg of ondansetron 60 minutes before anesthesia induction or 30 minutes before skin closure. Demographic data, preoperative APFEL score, surgery duration, time of fluid and food intake, time of ambulation, incidence of postoperative nausea, vomiting plus retching and the combination, rescue antiemetics, analgesic consumption (secondary outcomes) were compared between the two groups. For parametric and non parametric data analysis the chi-square test was used.

Results and Discussion: Of the 114 patients enrolled in the study 57 were assigned to group 1 and 57 to group 2. Drop outs were 3 in group 1 and 4 in group 2. The two groups were similar regarding demographics, preoperative APFEL score, surgery duration, time of fluid and food intake or ambulation time ($P>0.05$ for all comparisons). The incidence of nausea at 24 hours was 12.28% for group 1 and 15.79% for group 2 ($p=0.58$). The intensity of nausea in both groups 1 and 2 was 0 (0-0) as median (q1-q3) ($p=0.65$). The incidence of vomiting at 24 hours was 5.26% in both groups ($p=1$). Also we found no difference comparing the overall incidence of PONV at 24 hours between the groups (5.26% for group 1 vs 10.53% for group 2, $p=0.29$). Rescue antiemetic consumption was median 0 in both groups ($P=0.88$). Similarly tramadol consumption was similar in groups 1 and 2, median 133 (80-175) and 137 (80-165) respectively ($p=0.86$). Our results failed to demonstrate a superiority of ondansetron given before induction of anesthesia. Timing of 5HT₃ receptors has been previously studied in various types of surgery. Some studies advocate their use by the end of surgery especially for the prevention of late PONV, while others fail to find any significant difference.

Conclusion: Under the present study design preemptive ondansetron administration does not offer any advantages for PONV when compared to the preventive administration.

7318

Prospective Perioperative study Evaluating Routine Coagulation versus Thrombelastography for Liver resections (More Than Three Segments) (PORTAL Trial)

Baskar V.¹, Ambulkar R.², Patkar S.¹, Raghunathan P.¹, Agarwal V.¹, Divatia J.¹¹TATA MEMORIAL HOSPITAL, MUMBAI - MUMBAI (India), ²Tata Memorial Hospital - MUMBAI (India)

Background and Goal of Study: Liver resection surgeries, entail loss of liver parenchyma and dysregulation of the synthesis of coagulation factors, thereby resulting in an imbalance between pro and anticoagulant factors [1]. The primary objective of our study was to assess the serial changes of conventional coagulation tests and Thromboelastography and their correlation during perioperative period in patients undergoing major liver resection (≥ 3 segments) at multiple timepoints.

Materials and Methods: Study Design : Prospective interventional trial. Sample Size: Convenient sample size of 25 patients. Inclusion criteria: 1.25 adults (>18yrs) patients, underwent major hepatic resection ≥ 3 segments. Exclusion criteria: 1. Refusal of consent 2. On therapeutic doses of thromboprophylaxis 3. Abnormal coagulation or platelets 4. Any known coagulation disorders. Time points of sampling: 1. Pre-incision 2. Intraoperative (based at discretion of OT anaesthetists) 3. Postoperative 4. 48 hours 5. 5th Postoperative day

Statistics and Analysis of Variables: Categorical data were reported as counts and percentage. Continuous data were presented as mean [standard error] or medians with 25th and 75th interquartile range. Spearman rank-order correlation was used to study the relationships of coagulation measures [both TEG and conventional tests] at each time points. SPSS 21.0 software was used to analyze the data.

Results and Discussion: In the postoperative period, the median value of PT-INR was found to be elevated in patients in the immediate postoperative period, and postoperative day 2, which normalised on the 5th postoperative day. On contrary to the routine coagulation tests, TEG parameters remained normal throughout the various study points in the perioperative period. Prevention of transfusion of blood products was 16 % during the intraoperative period, 44 % in immediate postoperative period and 40 % on postoperative day 2 where INR was >1.5 and TEG was normal. There was no incidence of deep vein thrombosis, epidural hematoma, and bleeding reported in patients

Conclusion: The results of our study question the current practice of transfusion using the INR as a sole test for guiding transfusion of blood and plasma products, removal of epidural, and delaying the start of thromboprophylaxis after surgery.

Reference: 1. Mallett, S. V., et al. "Alterations in coagulation following major liver resection." *Anaesthesia* 71.6 (2016): 657-668.

7354 Anesthetic Implications in a Patient with diagnosed TPM2 Myopathy

Arslan M.¹, Ahmed R.¹, Mehmood K.¹
¹Tallaght University Hospital - Dublin (Ireland)

Background: TPM2 myopathy is a rare genetic disorder (2: 100000 live births[1]), it presents crucial challenges for anaesthetic management due to potential difficult airway, along with decreased cardiorespiratory reserves leading to hemodynamic instability at induction, Decreased muscle tone/respiratory muscle weakness is potential risk for airway compromise post-op. In addition it can be a risk factor for malignant hyperthermia. Patients with TPM2 require almost 1/3rd of dose of muscle relaxant as compared to control.

Case Report: A 45 year old female known patient of TPM2 presented to the ED of Tertiary hospital in Ireland with Acute abdomen (emergency appendectomy). Her pre-operative assessment revealed potential difficult airway, limited functional class (Mets<4), along with use of BiPaP at home. In addition she had scoliosis, Atrial dysarrhythmias, and hypotonias. Anaesthesia induction was done following preoxygenation for 5 mins. Propofol, opioids and rocuronium were used in decreased doses. Her bagmask ventilation was easy but due to failure to intubate the trachea with McGrath, Fiberoptic intubation was done by consultant anaesthetist using ETT 6.5mmID. Post induction invasive lines (CVP/A-line) were inserted for hemodynamic monitoring. Due to risk of malignant hyperthermia we used propofol-TIVA along with continuous core Temp monitoring and active warming. Following laparoscopic appendectomy, patient was transferred to PACU intubated and ventilated. Patient was extubated after 24 hours monitoring and stabilisation of her vitals in presence of consultant anaesthetist.

Discussion: TPM2 is a rare muscular disorder. Such patients should be managed with optimum pre-op assessment and preparation. To the best of our knowledge, there is no case reported on management of anaesthesia in patient with TPM2 disease. We followed step wise approach to best avoid risk factors for malignant hyperthermia (A murine model of NM has been established, but the association of MH with NM has not yet been studied in this model.2) and post-op complications by continuous monitoring, appropriate weaning.

References:

- Sanoudou D, Beggs AH. Clinical and genetic heterogeneity in nemaline myopathy—a disease of skeletal muscle thin filaments. *Trends Mol Med* 2001;7:362–8
 - Witt CC, Burkart C, Labeit D, McNabb M, Wu Y, Granzier H, Labeit S. Nebulin regulates thin filament length, contractility, and Z-disk structure in vivo *EMBO* 2006;25:3843–55.
- Leanings: Difficult airway, Risk of MH

7364 Reducing the impact of desflurane on our environment

Skinner A.¹, Dabrowicz A.¹, Laver K.¹
¹Kings College Hospital London - London (United Kingdom)

Background and Goal of Study: The National Health Service (NHS) in England is responsible for the emission of approximately 20 million tonnes of CO2 each year. Volatile anaesthetic gases account for 5% of this footprint, equivalent to the emissions of 217,480 cars per year or over 120,000 homes energy usage per year. Desflurane is a particularly impactful volatile agent due to its high atmospheric persistence and having a MAC 3x higher than sevoflurane. The aim of this project was to highlight the direct environmental impact of our practice and hopefully reduce the departmental usage of desflurane.

Materials and Methods: A survey was sent to all anaesthetic staff in the department to establish desflurane usage, people's awareness of its environmental impact and their openness to practice change. A training session was subsequently created to present the survey and provide further education on the environmental impact of volatiles and other areas of 'green anaesthesia'. Following a discussion at a departmental consultant meeting, desflurane vaporisers were removed from the anaesthetic machine and placed in a designated cupboard within the theatre area. This therefore required an active decision process in order to retrieve the vaporiser if desflurane was the volatile of choice.

Results and Discussion: The Pharmacy department has been able to provide data regarding the Anaesthetic department's volatile usage. In 2019, prior to the COVID-19 pandemic, desflurane was used in 26.6% of volatile anaesthetics. This usage has dropped significantly with the current 4-month average for 2021 being 5.5%. This equates to a reduction of 52.7 tonnes of CO2 equivalence per month. More intense storms and floods, frequent heat waves, increasing air pollution and the spread of infectious disease from climate change threaten to undermine years of health gains. The NHS has therefore embarked on an ambitious target to reach net zero carbon emissions it directly controls by 2040. We, as anaesthetists, contribute a significant proportion to the carbon footprint of our health services, especially when utilising volatile agents. We should now be taking the environmental impact into consideration when selecting our anaesthetic agent.

Conclusion: Our collective strategies resulted in a significant reduction in desflurane usage, reducing our carbon footprint by 52.7 tonnes of CO2 equivalence per month.

7367 A machine-learning algorithm as a tool to reduce intraoperative hypotension: a prospective cohort study

de Keijzer I.¹, Vos J. J.¹, Davies S.², Yates D.², Scheeren T.¹
¹University Medical Center Groningen - Groningen (Netherlands), ²York Teaching Hospital - York (United Kingdom)

Background: Intraoperative hypotension (IOH) is associated with adverse postoperative outcomes. We aimed to investigate if a machine-learning algorithm (Hypotension Prediction Index, Edwards Lifesciences, USA) could be used to reduce IOH and change haemodynamic management.

Methods: 150 adult patients who underwent elective major non-cardiac surgery under general anaesthesia with invasive blood pressure monitoring were included in this bi-centre prospective cohort study. In the baseline cohort patients were treated according to routine clinical practice (n=50). Prior to the 2nd training cohort clinicians received a training regarding the risks of hypotension and were asked to keep MAP >65 mmHg (n=50). In the 3rd HPI cohort the HPI was used combined with a treatment protocol (n=50). The time-weighted average (TWA) and surgery time spent in IOH were compared between cohorts with the Kruskal-Wallis test and post-hoc tests were Games-Howell corrected. Haemodynamic management was compared between cohorts by the Chi-square/Fishers exact test and the p-value was Bonferroni corrected.

Results: No differences were found in baseline characteristics between cohorts. TWA and surgery time spent in hypotension were significantly reduced in the HPI cohort compared to the other two cohorts (Table 1). Additionally, the use of inotropes increased in the HPI cohort compared to previous cohorts, while the use of vasopressors remained unchanged (96% vs. 98% vs. 96% (p>.99)).

Table 1. Baseline, training and HPI cohort

	Baseline	Training	HPI	P-value
TWA MAP<65 mmHg (mmHg)	0.15 [0.05-0.41]	0.11 [0.02-0.37]	0.04 [0.00-0.11]	.001#
Surgery time MAP<65 mmHg (%)	3.9 [1.5-8.5]	3.4 [0.7-9.5]	0.9 [0.2-2.4]	<.001*&
Inotrope use (n)	17	19	32	.005#

#\$P<.05 between baseline and HPI or Training and HPI, respectively.*&P<.01 between baseline and HPI or Training and HPI, respectively.

Conclusion: The use of the HPI combined with a treatment algorithm reduced the burden of IOH and increased the use of inotropic agents, while a training and specific instructions to keep MAP above 65 mmHg alone did not result in a IOH reduction. Future studies should assess whether this will consequently lead to a reduction in adverse postoperative outcomes.

Acknowledgements: This study was supported by Edwards Lifesciences.

7376

A Prospective, Randomized, double blinded study on effect of Perioperative Intravenous Lignocaine Infusion on Haemodynamic Responses and postoperative Analgesia in Laparoscopic Cholecystectomy Surgeries

Guja S.¹, Narasinga Rao K.², Chekkapalli S.², Sehgal L.², Pradeep C.², Arunagiri B.²

¹U N MEHTA INSTITUTE OF CARDIOLOGY AND RESEARCH CENTER, AHMEDABAD, GUJARAT, INDIA - Ahmedabad (India),

²APOLLO HOSPITALS - CHENNAI (India)

Background and Goal of Study: During general anaesthesia, intubation and extubation of trachea are often associated with increase in haemodynamic response. Laparoscopic cholecystectomy is a minimal access surgery; postoperatively patients may experience moderate to severe pain. It is well known that lignocaine is useful in attenuating haemodynamic response to intubation and extubation. Previous studies also state that perioperative lignocaine infusion provides postoperative analgesia as well. We hypothesize that perioperative intravenous lignocaine infusion can both attenuate haemodynamic responses to intubation and extubation of trachea and also provide good postoperative analgesia in laparoscopic cholecystectomy surgeries.

Materials and Methods: Double blinded, randomized controlled study was done on a total 120 patients. Sample size calculation was derived based on statistical software G*POWER3.1.9.2. Sample size in each group was calculated using the $n = 2\sigma^2(Z\alpha + Z\beta)^2/\Delta^2$. Where $Z\alpha$ = standard normal variate value (alpha) = 1.96. $Z\beta$ = standard normal variate value (Beta) = 1.28. All data were entered in the Windows Microsoft Excel sheet and an analysis was done with SPSS version 16. Randomisation done by chit-in-a-box method. In this study both patient and investigator were blinded. In group A, 0.9% normal saline was used as placebo for perioperative intravenous infusion. In group B, preservative free 1.5mg/kg 2% lignocaine (Loxicard) diluted with normal saline to 1% given at 10 minutes to induction as bolus, followed by an infusion of 1.5 mg/kg/h. till 1 hour postoperatively.

Results and Discussion: In Group B there was a statistically less rise in heart rate [HR] and mean blood pressure [MBP] during intubation and extubation of trachea compared to group A. In group B there was a statistically significant increase in the mean pain free period postoperatively compared to A. So lignocaine i.v infusion can be considered as multimodal analgesic approach for post operative analgesia and for stable Haemodynamics during perioperative period.

Conclusion: Perioperative intravenous infusion of lignocaine attenuates haemodynamic response during the intubation and extubation of the trachea. In addition, it also increases the mean pain free period postoperatively.

7377

Intraoperative hyperglycaemia during CRS-HIPEC surgery is associated with kidney function impairment. A retrospective cohorts study

Ramis T.¹, Sanahuja Blasco J. M.¹, Fernández-Esmerats A.¹, Martínez-Ocón J.¹, Suñe M.¹, Rivas E.¹

¹Hospital Clínic - Barcelona (Spain)

Background and Goal of Study: Cytoreductive surgery (CRS) combined with hyperthermic intraperitoneal chemotherapy (HIPEC) has shown improved survival in patients with peritoneal carcinomatosis. HIPEC usually induces severe intraoperative hyperglycaemia. Intraoperative hyperglycaemia has been associated with a higher incidence of postoperative acute kidney injury (AKI). We tested whether higher levels of intraoperative glucose are associated with higher levels of creatinine (cr) at discharge, and at 6 months of follow-up, and a higher incidence of postoperative AKI in adult HIPEC patients.

Materials and Methods: After IRB approval and informed consent, we prospectively included patients undergoing CRS-HIPEC from 3/19 to 5/21. Those subjected to urinary tract resection, or exposed to cisplatin were excluded. Our exposure was peak intraoperative glucose. The outcomes were peak cr levels, cr at discharge and at 6 months, and incidence of AKI according to KDIGO classification. We registered demographic and clinical characteristics, cr levels (baseline, admission peak, discharge, and at 6m), ICU and hospital LOS, and 3m survival. Hyperglycaemia was managed under the anaesthesiologists' criteria. Non-parametric tests were used to compare the groups.

Results and Discussion: We analysed 55 patients (36% males, aged 61 (SD 12)). We found patients who present hyperglycaemia (blood glucose > 180mg/dl) had higher levels of cr at discharge and 6 months after surgery (Table 1). A positive correlation was found between peak intraoperative glucose and in-hospital peak cr (Rho 0.291), and at 6m (Rho 0.329, p < 0.05 each). 4 AKI cases were detected, all in hyperglycaemic patients. Peak cr levels also correlated to both hospital (Rho 0.402) and ICU (Rho 0.299) length of stay (p < 0.05 each).

Conclusions: In patients undergoing CRS-HIPEC, intraoperative hyperglycaemia was associated with impaired kidney function at discharge and at 6 months after surgery. Peak creatinine levels correlated to hospital and ICU length of stay. These findings might support an aggressive management of intraoperative hyperglycaemia in CRS-HIPEC patients to reduce postoperative renal dysfunction.

	No hyperglycaemia	Hyperglycaemia	p
Discharge Cr (med[IQR])mg/dl	0.48[0.56-0.77]	0.62[0.54-0.74]	0.006
6m Cr (med[IQR])mg/dl	0.59[0.45-0.67]	0.73[0.66-0.83]	0.011

7391

Prevalence of cholinesterase deficiency in the general population. Is it really so infrequent? A unicentric observational study with 11258 samples.

Vilchez Monge A. L.¹, Tobar Izquierdo M.¹, Tijero Paramo M. T.¹, Rojas Giraldo R.¹, De Vicente Martin M.¹, De La Quintana Jimenez B.¹

¹Hospital Universitario Santa Cristina - Madrid (Spain)

Background and Goal of Study: Individuals with cholinesterase deficiency appear asymptomatic until exposed to some neuromuscular blocking agents, presenting with an unexpected persistent respiratory paralysis which may require a very prolonged mechanical ventilation. Prevalence of cholinesterase deficiency in the general population is unknown since reports are mainly based on genetic studies after the occurrence of the clinical complication. Considering the clinical relevance of cholinesterase deficiency in anaesthetic management, and the lack of evidence-based epidemiological data, we aimed to determine the prevalence of cholinesterase deficiency (butyrylcholinesterase or pseudocholinesterase) in a population undergoing surgery in Madrid, Spain.

Materials and Methods: After approval by the IRB, we conducted a retrospective analysis of all patients undergoing surgery with a

preoperative cholinesterase determination between January 2017 and December 2019 in the Hospital Universitario Santa Cristina, Madrid, Spain. The surgical population was representative of the general population in Madrid. ASA IV were excluded. We classified patients according to the reference limits established by the manufacturer (Alinity c Cholinesterase, Abbott Laboratories; men, 4389-10928 U/L; women, 2879-12669 U/L).

Results and Discussion: A total of 11277 determinations were recorded. Nineteen determinations were excluded due to unknown sex, so finally 11258 were analyzed. Overall, 20 patients (0.18%) showed cholinesterase deficiency. Men presented higher prevalence of low cholinesterase compared to women (0.34% vs 0.07%; $p=0.001$). Prevalence of cholinesterase deficiency was six-fold higher than the reported incidence according to previous studies (0.18% vs 0.03%). 50% of patients with cholinesterase deficiency were candidates for ambulatory surgery (anal fistula/fissure, umbilical/inguinal hernia, and hydrocele). Seven (35%) patients with cholinesterase deficiency had underlying hepatopathy, being this fact unknown in two (28.6%) of these patients by the time of cholinesterase determination, with a later confirmatory diagnosis.

Conclusions: Our results suggest that there is a 6-fold higher prevalence of cholinesterase deficiency in our population compared to previous reports. Further epidemiological studies are warranted since current guidelines recommend discontinuation of perioperative cholinesterase determination.

7402

Feasibility and safety of general anaesthesia versus sedation in endoscopic submucosal dissection: A systematic review and meta-analysis

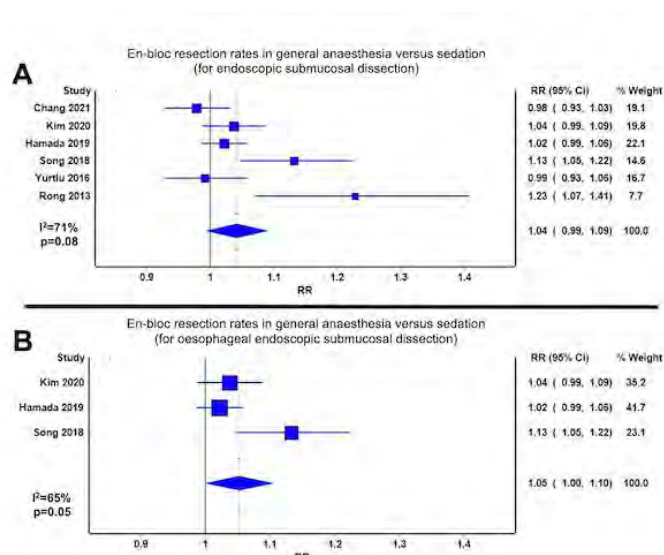
Hui R. W. H.¹, Leung C. M.¹
¹Queen Mary Hospital - Hong Kong (Hong Kong SAR China)

Background: Endoscopic submucosal dissection (ESD) is performed for resection of early upper gastrointestinal lesions. Sedation is usually utilised in ESD, yet general anaesthesia (GA) has also been explored. This meta-analysis aims to compare the en-bloc resection rate and procedural times in GA versus sedation in ESD. Secondary objectives are to compare the complication rates of GA versus sedation.

Methods: A systematic literature review was conducted on Cochrane Database, EMBASE and MEDLINE with the terms “General Anaesthesia”, “Sedation” and “Endoscopic submucosal dissection”. Original studies comparing GA versus sedation in ESD were included. Two authors independently reviewed the studies. The Cochrane Risk of Bias in Non-randomized Studies of Interventions assessment tool was used.

Results: 176 articles were identified from literature search, and 7 articles were included in meta-analysis (Involving 518 patients in GA group and 495 in sedation group). When comparing GA versus sedation, no significant differences were noted in en-bloc resection rates (RR 1.04; 95%CI 0.99-1.09; $I^2=71\%$; $p=0.08$; Figure 1A), procedural time (Mean difference 3.47 minutes; 95% CI -19.42-26.35; $I^2=97\%$; $p=0.77$), incidence of perforation (RR 0.62; 95% CI 0.21-1.82; $I^2=52\%$; $p=0.06$) and incidence of bleeding (RR 0.75; 95% CI 0.28-2.01; $I^2=0\%$; $p=0.48$). When stratified by ESD subtype, GA was associated with higher rate of en-bloc resection in oesophageal ESD (RR 1.05; 95% CI 1.00-1.10; $I^2=65\%$; $p=0.05$; Figure 1B). No significant differences in procedural time, perforation incidence and bleeding incidence were noted between GA and sedation in oesophageal ESD (all $p>0.05$). In gastric ESD, no significant differences in en-bloc resection rate, procedural time, perforation incidence and bleeding incidence were noted between GA and sedation (all $p>0.05$). Risk of bias was moderate in 3 studies and serious in 4 studies.

Conclusion: GA, compared with sedation, was associated with higher en-bloc resection rate in oesophageal ESD. No differences were noted in incidences of perforation and bleeding between GA and sedation. High-quality trials comparing GA versus sedation in ESD are warranted.



7410

Gastric insufflation evaluation by ultrasound during high-flow nasal oxygen (HFNO) for general anesthesia induction

George A.¹, Hendrikx E.¹, Deflandre E.², Javillier B.²
¹CHU Sart Tilman - Liege (Belgium), ²Clinique Saint Luc - Bouge (Belgium)

Background and Goal of Study: Through its ability to extend safe apnoea time, HFNO (High-Flow Nasal Oxygen) can increase the duration without ventilation during airway management. Its use during Rapid Sequence Induction (RSI) could help for difficult airway management. Elisabeth McLellan et al., showed that HFNO does not increase the gastric secretion during spontaneous ventilation. This study aimed to prove that it does not induce gastric insufflation during anesthesia induction.

Materials and Methods: After IRB agreement and written patient consent, we prospectively included 40 patients. We excluded from the study, patients < 18 years, pregnant women and one with history of gastric surgery, major facials, or oropharyngeal pathology. Patient was placed in supine position. A first gastric antrum echography (T0) was realized. The AnteroPosterior diameter (AP) and Cephalo-Caudal diameter (CC) were measured. The antral Cross-Sectional Area (CSA) was calculated from the formula: $(AP \times CC) \times \pi / 4$. HFNO was introduced with a closed mouth at 40 L/min and an oxygen concentration of 100 %. After 5 minutes of preoxygenation, a second echography (T1) was done. Induction of general anesthesia started right after. The flow of HFNO was increased to 70 L/Min and a 3 min of apneic oxygenation respected. A last echography was then realized (T2). All echographies were conducted by the same operator.

Results and Discussion: 40 patients were enrolled (13 W, 27 M; mean [SD] age: 57 [14.234]). For the overall cohort, the mean [SD] antral CSA was not significantly modified by preoxygenation (T1) 440.35 [148.19] versus reference values (T0) 401.19 [179.63] ($P = 0.171$). The mean [SD] antral CSA was similar with apneic oxygenation (T2) 403.31 [164.36] versus reference values (T0) 401.19 [179.63] ($P = 0.996$). There was no significant difference between preoxygenation (T1) 440.35 [148.19] and apneic oxygenation (T2) 403.31 [164.36] ($P = 0.135$).

Conclusion: HFNO can be used during RSI because there is no significant gastric insufflation neither during the preoxygenation nor during apneic oxygenation. Nevertheless, it is known that antral CSA measure correlates most strongly with the gastric volume in the right lateral decubitus position (RLD). However, as we performed this study during induction of general anesthesia, we had to perform all measures in supine position. A study designed in RLD could be helpful to confirm our results.

7425

Hepatic hydatid cyst excision via robotic surgery – A case report

Da Silva Pereira F. A.¹, Lares Poeira R.¹

¹Centro Hospitalar Universitário Lisboa Central, Hos - Lisboa (Portugal)

Background: Robotic assisted surgery is becoming more frequent and being used in a larger variety of procedures. The first case described of robotic assisted hydatid cyst excision was described in 2017 but no report regarding anesthetic management was found. We herein report the successful excision of a hepatic hydatid cyst utilizing the DaVinci system and its anesthetic management

Case Report: A 58 year old woman, ASA III, underwent robotic assisted excision of a hydatid hepatic cyst under balanced general anesthesia. An arterial cannula and central venous line were placed. Restrictive fluid management was undertaken. Portal pedicle clamping, lasting 15 minutes, was needed for the hepatic resection. Successful perichistectomy of hepatic hydatid cyst in segment II/III was performed. However, it ruptured whilst already in the bag, due to its high volume and difficulty in the robotic handling of the excised mass. Prophylactic administration of hydrocortisone 100mg was given. Extravasation from the bag seemed unlikely so no protoscolicidal substance was used. The patient remained hemodynamically stable. The patient was extubated at the end of surgery, lasting 210 minutes with estimated blood loss of 100mL. Analgesia intra-operatively was performed with fentanil (total dose 250 mcg), paracetamol 1g, metamizole 2g, tramadol 200mg and parecoxib 40mg. The patient remained 24h in the Intensive Care Unit and was discharged home on post-operative day 3, after an uneventful post-operative course.

Discussion: Hepatic hydatid cyst robotic resection is a viable surgical alternative. The anesthetic management must take into consideration the greater possibility of hemodynamic instability due to the risk of hemorrhage in addition to anaphylaxis due to cyst rupture. Anaphylaxis should be handled with protocolized treatment with adrenaline. World Health Organization states that protoscolicidal substances (ex:20% hypertonic saline left for 15 minutes) may be used in case of spillage but their effect are questionable due to their possible toxicity. We describe the anesthetic management of a successful resection with hydatid cyst rupture with no perioperative complication

Learning Points: Robotic assisted hydatid cyst resection is a viable surgical option. Cyst rupture is a possible complication of the technique.

7432

Analgesia Nociception Index to verify an epidural block in a patient addicted to opioids. Case Report

Correa Barrera J. J.¹, Ramos Luengo A.¹, Orozco Vinasco A. C.¹, Gómez Del Pulgar Vázquez B.¹, Sánchez Zamora P.¹, Sánchez Solano S.¹

¹Hospital Universitario Severo Ochoa - Leganes (Spain)

Background: The Analgesia Nociception Index (ANI) allows to continuously measure the activity of the autonomic nervous system by analyzing its parasympathetic component through respiratory sinus arrhythmia. ANI uses rapid variations in heart rate that each respiratory cycle induces to quantify parasympathetic tone.

Case Report: A 42-year-old male, treated with methadone for addiction to opioids. He was admitted for left radical nephrectomy under general anesthesia combined with L1-L2 epidural catheter. Before the surgical incision, bolus of 8 ml of 1.5% lignocaine is administered through the epidural catheter and continuous perfusion. After the incision, a high hemodynamic response appeared without response to repeated doses of fentanyl, urapidil and epidural lignocaine boluses. ANI was used and determined an initial value of 96, with a drop to 22 after 60 minutes, returning to 98 after epidural bolus administration. The correct placement of the catheter was suggested given the relationship between the ANI value and the half-life of lignocaine.

Discussion: The ANI is a simple, reliable and continuous index of interpretation, which establishes a scale from 0 to 100, values below 30, indicative of insufficient analgesic management, and those over 70, would show a possible excess of analgesic drugs. In central blocks

value tends to 100 due to sympathetic inhibition. Initially, its conditions of use implied mechanical ventilation under general anesthesia, but some studies about postoperative use of ANI resulted in good correlation with subjective measures of pain. ANI could predict hemodynamic reactivity, works better than hemodynamic variations to predict pain, can be useful to adjust opioid titration, to predict the origin of a hemodynamic event, and in the verification of peripheral regional blocks in patients undergoing general anesthesia.

References:

1. Boselli, E et al. Prediction of immediate postoperative pain using the analgesia/nociception index: a prospective observational study. British journal of anaesthesia.

Learning points: ANI allows continuous pain measurement and can be useful in pain monitoring in complex patients with central or peripheral blocks, undergoing general anesthesia.-ANI can optimize and individualize analgesia, facilitating the use of closed loop systems. Postoperative subjective pain shows a good correlation with the ANI value.-The ANI limitations are the pathologies and medications that interfere with the parasympathetic tone.

7434

Continuous responsible improvement of safe surgery checklist compliance by repetitive data analysis and communication of results

De Groof P.¹, Vanhoeylelandt E.¹, Pannier E.¹, Pauwels J.¹, Van Biesen S.¹, Swinnen W.¹

¹St Blasius Dendermonde - Dendermonde (Belgium)

Background and Goal of Study: WHO introduced the Safe Surgery Checklist (SSC) in 2009 to improve safety for patients undergoing surgery and anesthesia. More than 10 years later, compliance rarely exceeds 60%. Previous study work regarding the use of the SSC in our hospital showed compliance up to 85%. Nurses indicated that the main reason for incomplete compliance was decreased execution of Sign Out by the circulating nurses, due to time pressure and distraction at the end of surgery. Suggestions for improvement included regular data reporting and self-control. The goal of this follow-up study was to further improve compliance focusing on correct use of Time Out and Sign Out by the surgical teams.

Methods: We analyzed closed record data of SSC use during the last two weeks of each month of June 2019 – June 2020. We included every surgery under general and locoregional anesthesia, or deep sedation in the Surgical Day Care Centre (SDC) of az Sint-Blasius, Dendermonde, Belgium (4 ORs). April 2020 was excluded, due to inactivity during the COVID-19 pandemic. To enhance compliance, monthly results were presented to surgeons, anesthesiologists and OR nurses, by mail and posters. Data were compared to baseline data of February 2019.

Statistical analysis used Cochran-Armitage trend test. Results with $p < 0.05$ were considered significant.

Results: Results are presented in figure1. 2433 SSC's were analyzed. 2222 SSC's (91,3%) were completed, compared to 81,6% at baseline ($p = 0.001$). Compliance with Sign In by surgeons (96.6 to 97.3%, $p = 0.874$) and anesthesiologists (97.2 to 98.4, $p = 803$) was similar. The greatest progress occurred in Time Out (91.6 to 97.3%, $p = 0.007$) and Sign Out (87.6 to 95.3%, $p < 0.0001$).

Conclusion: Using intensive and repetitive communication, overall compliance with SSC requirements improved significantly, in particular with Time Out and Sign Out. The augmented awareness resulted in peer control, in which health care providers stimulated each other to improve compliance. Nevertheless, only anesthesiologists reached the desired > 98% level of compliance, leaving room for further process improvement.

7435

Challenges in the anaesthetic management of desminopathy – a case report

H. Maio M. B.¹, Gouveia J. P.¹, Trindade H.¹
¹Hospital da Luz - Lisboa (Portugal)

Background: Desminopathy is a subgroup of rare genetic neuromuscular conditions generally classified into myofibrillar myopathies (MFM). It affects cardiac, skeletal and smooth muscle cells with a great variability of presentation. There is limited published data on the anaesthetic implications of MFM, with the first clinical report referring to a teenage boy with severe symptoms and multiple anaesthetic encounters [1].

Case Report: The authors describe the rare case of a 73-year-old male patient with severe clinical manifestations of desminopathy undergoing major surgery. He was first diagnosed in 2016 following clinical progression of chronic respiratory insufficiency, distal muscular weakness, bulbar disfunction and heart conduction abnormalities. He was hospitalized for obstructive jaundice in July 2021 and subsequently scheduled for a cephalic duodenopancreatectomy. He was included in an Enhanced Recovery After Surgery program and the procedure was performed under an opioid-free total intravenous anesthesia combined with thoracic epidural analgesia. Anesthesia and surgery were uneventful and the patient was discharged in postoperative day 7.

Discussion: The knowledge of the molecular pathogenesis of desminopathies leading to pathological protein formation and progressive muscle damage has grown in the last few decades[2]. Nevertheless, its anaesthetic implications have not yet been fully reviewed. This case report prompts a discussion on the optimal airway and ventilation management of these patients, use of muscle relaxants and postoperative analgesia for a successful recovery after major surgery.

References:

1. Latham G et al. Anesthetic considerations in myofibrillar myopathy. *Paediatr Anaesth.* 2015;25(3):231–8.
2. Al C et. Desminopathies: Pathology and mechanisms. *Acta Neuropathol.* 2013;125(1):47–75.

Learning points: There is limited published data regarding anaesthetic implications of desminopathies. This case report describes an adult with clinical significant disease who underwent major abdominal surgery under an opioid-free total intravenous anesthesia combined with thoracic epidural analgesia, which was uneventful. This report and discussion could serve as additional support for the anaesthetic management of patients with this rare condition.

7446

The Effect of Anesthetic Agents Used in Liver Transplant Donor Patients on Graft Results

Saracoglu A.¹, Tanirgan Çabakli G.², Kelleci Y.¹, Bilgili B.¹, Yegen C.³, Umuroglu T.¹

¹Marmara Uni. Pendik Training and Education Hospital Anesthesiology and Reanimation - Istanbul (Turkey), ²Marmara University Pendik Training And R - Istanbul (Turkey), ³Marmara Uni. Pendik Training and Education Hospital General Surgery - Istanbul (Turkey)

Background and Goal of Study: During the liver transplantation, the ischemia-reperfusion injury that occurs in both the donor and the recipient and the hemodynamic changes following this, seriously affect the graft, even sometimes they can cause hepatocyte damage. It is known that inhalation anesthetics can cause ischemic preconditioning that protects from ischemia-reperfusion injury, but its effect on graft dysfunction caused by post-reperfusion syndrome has not yet been clarified. In our study, it was aimed to reveal the effects of Desflurane and Sevoflurane used during liver transplantation on graft survival.

Materials and Methods: This retrospective study included 60 donor and recipient patients who underwent liver transplantation between 2015 and 2021, following ethics committee approval (ethics committee no: 09.2021.1004/03.09.2021). After standard anesthesia induction, the patients were divided into two groups as anesthesia maintenance with Desflurane (Group 1, n=30) and Sevoflurane (Group 2, n=30). Patients' age, gender, body mass index, smoking, comorbidities, presence of renal disease, total liver volume, graft volume, remaining liver volume, total

ischemia time, duration of anesthesia and surgery, graft survival, length of hospital stay, diastolic blood pressure and systolic blood pressure at the start and end of operation, aspartate aminotransferase (AST), alanine aminotransferase (ALT), international normalized ratio (INR), albumin, total bilirubin, blood urea nitrogen, creatinine, platelet count, and hemoglobin at postoperative days 1, 7, and 30 was recorded.

Results and Discussion: No statistically significant difference was found in all data analyzed in both groups in donor patients. Demographic data and length of hospital stay of the recipient patients were similar ($p>0.05$). Intraoperative urine output (Group 1: 1909.52 ± 1269.90 , Group 2: 918.75 ± 618.14), postoperative 7th day ALT and 6th month total bilirubin values of the recipient patients in the desflurane group were significantly higher than the sevoflurane group ($p<0.01$).

Conclusion: Although our study revealed that preconditioning with sevoflurane during liver transplantation may have more positive effects on early hepatic and renal functions than desflurane, it was thought that further prospective randomized studies are needed.

7448

Effect of the evaluation of perfusion with Infrared Fluorescent Angiography on flap survival in head and neck free flap reconstruction

Saracoglu A.¹, Tanirgan Çabakli G.², Cakmak G.¹, Erdem I.³, Umuroglu T.¹, Sacak B.³

¹Marmara Uni. Pendik Training and Education Hospital Anesthesiology and Reanimation - Istanbul (Turkey), ²Marmara University Pendik Training And R - Istanbul (Turkey), ³Marmara Uni. Pendik Training and Education Hospital Plastic and Reconstructive Surgery - Istanbul (Turkey)

Background and Goal of Study: Intraoperative fluid management is one of the most important factors affecting optimal perfusion in the microcirculatory area in patients undergoing flap surgery. Insufficient fluid administration in the intraoperative period may cause flap complications and organ dysfunctions, while volume load may lead to complications such as edema in the denervated flap tissue, opening of the sutures or fat necrosis. Infrared Fluorescent Angiography Perfusion Evaluation Device (SPY) is one of the noninvasive techniques which provides monitoring and scoring of the perfusion distribution in the flap area. In this retrospective study, it was aimed to evaluate the effect of fluid resuscitation on the flap quality and patient outcomes in head and neck free flap transfer surgery by evaluating the change in SPY scores.

Materials and Methods: Following the approval of the local ethics committee, 39 patients ASA I – II, aged 18-60, who underwent simultaneous head and neck free flap reconstruction between 2015-2020 were included in the study. The patients' blood pressure, body temperature, hemoglobin, pH, lactate values at baseline and at the end of the operation, SPY scores, intraoperative fluid and transfusion amount, bleeding and urine output, mechanical ventilation, anesthesia and surgery duration, duration and amount of drain, length of stay in hospital and intensive care unit, flap infection, detachment, necrosis and loss and reexploration were recorded.

Results and Discussion: A positive correlation was found between the difference between SPYfirst-SPYlast values and the length of stay in the hospital and intensive care unit, and the duration of the drain. There was a positive correlation between the length of stay in the hospital and intensive care unit and the duration of the drain, the amount of the drain, the duration of anesthesia and the duration of surgery. In patients with flap infection, the difference between SPYfirst-SPYlast values, duration of anesthesia and duration of surgery was significantly higher. The amount of crystalloid and bleeding, duration of anesthesia and surgery were significantly higher in mechanically ventilated patients ($p<0.05$).

Conclusion: It has been concluded that SPY-guided fluid management can be beneficial in early diagnosis of inadequate perfusion so the complications like increased hospital and intensive care stays, mechanical ventilation time, drainage amount and flap infection can be reduced.

7454

Anesthesia for hepatobiliary robotic surgery - experience from a Spanish tertiary academic centre

Lopez Garcia I.¹, Terreu Serrano M.¹, Bartakke A.¹, Muñoz Romero J. L.¹, Pérez Navero M. P.¹

¹REINA SOFIA CORDOBA - Córdoba (Spain)

Background and Goal of Study: In recent years, the number of robot-assisted surgeries has increased significantly including hepatobiliary surgical procedures. However, relatively few publications dealing with anesthetic considerations exist. Our aim is to report our early experience of anesthetic management and perioperative care in robotic liver resection.

Materials and Methods: We reviewed patients who underwent robotic hepatobiliary surgery from June 2019 to December 2020. Demographic and comorbidities data were collected. Anesthetic data recorded included anesthetic technique, the need for vasoactive drugs, use of antifibrinolytic agents, fluid therapy and blood transfusion. Early (< 24 hours) and late (> 24 hours-30 days) complications were also reviewed.

Results and Discussion: A total of 41 robotic-assisted procedures were performed including 20 males and 21 females. Mean age was 60 (range 26-83). Most common indication was hepatocellular carcinoma (36.6%) followed by benign conditions (26.8%), metastasis (19.5%) and cholangiocarcinoma (17.1%). Most procedures were minor resections (90.3%). All of them were performed under general anesthesia. Volatile agents (80.5%) were preferred for maintenance while total intravenous anesthesia (TIVA) was employed in 19.5% of patients. Patients were ventilated following a lung-protective ventilation strategy. During procedures, 48.8% of patients required vasoactive infusions; either norepinephrine (34.1%) or phenylephrine (14.6%). Conversely, 12.2% of patients were administered nitroglycerine infusion. Regarding fluid therapy, restrictive and high stroke volume variation approach was employed during the dissection and transection phases. After resection, euvoemia was achieved by goal directed fluid therapy based on arterial pressure waveform analysis. Blood products transfusion was required in 6 patients (14.6%). A single dose of 1 g tranexamic acid was administered in 19 patients (46.3%). Overall, perioperative complications occurred in 10 patients (24.4%). Only one complication was reported within the first 24 hours. In contrast, 7 patients (17.1%) suffered late complications. Mortality rate reported during the first 30 days of surgery was 2.4%.

Conclusion: Our results suggest that perioperative anesthesia should be considered and planned in advance to improve outcomes and postoperative care in robotic hepatobiliary surgery as there are limited studies available.

7465

Spinal cord injury – what should we do?

Batista S.¹, Duarte F.², Rodrigues I.³, Ormonde L.³

¹Hospital Beatriz Ângelo - Loures (Portugal), ²Hospital Garcia de Orta - Almada (Portugal), ³Centro Hospitalar Lisboa Norte - Lisboa (Portugal)

Background: Chronic spinal cord lesions cause important pathophysiological changes. These patients often require anesthesia for urologic, orthopedic, and plastic surgical procedures. The most important perioperative concerns are the high risk of autonomic dysreflexia (AD), bradycardia, hypotension, respiratory inadequacy, and muscle spasms. The anesthesiologist must tread a fine line between an adequate level of anesthesia and minimal disruption of a fragile physiological equilibrium. Spinal, loco-regional or general anaesthesia with sufficient depth are thought to be effective.

Case Report: A 37-year-old man, ASA III, was scheduled for a debridement of inguinal, perineal, ischial, iliac, and sacral ulcers. He was also undergoing to left leg disarticulation to cover ischiatic, inguinal and perineal ulcers with thigh flaps. He was paraplegic for the last 10 year and has T6-T7 spinal cord injury with spastic paraparesis ASIA A. No abnormalities were found in the pre-operative tests. The patient was managed by a total intravenous general anaesthesia (TIVA) with orotracheal intubation. During the twenty-one hours of anaesthesia maintenance, he remains hemodynamically stable with only one episode of severe bradycardia and hypotension, reverted using atropine.

Discussion: An adequate anaesthesia should be performed in chronic spinal lesions injury patients. They have a lower than usual blood volume and a reduced lean tissue mass, which implies a smaller volume of distribution for intravenous anaesthetic agents. This explains the greater observed sensitivity of these patients to intravenous induction agents. Spinal anaesthesia has been recommended due to the prevention of AD and some hazards of general anaesthesia. However, it is difficult to determine the correct block level and the effects of local anaesthetic in these patients.

References: P.R., Hambly; B. Martin; Anaesthesia for chronic spinal cord lesions; Anaesthesia, 1998, 53, pages 273–289

Learning points: Due to the increasing number of patients with spinal cord lesions present for surgery, the understanding of most common changes is crucial for a safe peri-operative care. An adequate depth in general anaesthesia and an adequate level of spinal anaesthesia are effective at controlling spasms and AD. However, hypotension and respiratory dysfunction are important concerns we must be attention of.

7468

Anesthetic management for total thyroidectomy in patient with amiodarone-induced thyrotoxicosis prior to heart transplantation

Silva A.¹, Pina F.¹

¹Centro Hospitalar Universitário de São João - Porto (Portugal)

Background: Amiodarone is an effective antiarrhythmic drug widely used. Nevertheless, some patients manifest Amiodarone Induced Thyrotoxicosis (AIT) and a total thyroidectomy may be required¹. We report a case of a patient with severe AIT associated to important cardiac failure proposed for heart transplant.

Case Report: A 53-year-old man with a history of idiopathic dilated cardiomyopathy associated to severe biventricular dysfunction and mixed form of AIT, was admitted for total thyroidectomy prior to heart transplantation. His medical history revealed a non ischaemic cardiomyopathy since 2001 and AIT diagnosed, in 2020, after starting amiodarone therapy. Previous surgical history included, a bilateral hip arthroplasty, complicated with paralysis of the left hemilarynx, and a mitral and tricuspid valvuloplasty, associated with permanent postoperative atrial fibrillation. His most recent holter, showed atrial fibrillation rhythm associated with 437 VES/h and various nonsustained ventricular tachycardias. Preoperative echocardiogram, showed an estimated ejection fraction of 40% with asynchronous contractility. He was admitted in hospital 5 days previously to surgery for medical optimization. His hyperthyroidism was normalized and his IDC reprogrammed for VF zone 214bpm and VT zone >176bpm. General balanced anaesthesia with invasive monitoring was chosen. Orotracheal intubation with direct laryngoscopy was uneventful. During the procedure any hemodynamic or cardiac event was documented. The patient was extubated and transported to a level III unit after surgery.

Discussion: AIT therapy is difficult, medical treatment should be started in the first instance and surgery considered for patients with resistant severe symptoms². In this case, a total thyroidectomy was performed safely, under general anaesthesia, despite pre-existing cardiac condition. At hospital discharge same degree of previous hoarseness was recognized.

References:

1.SCHUBERT, Louis; BRICAIRE, Léopoldine; GROUSSIN, Lionel. Amiodarone-induced thyrotoxicosis. In: Annales d'endocrinologie. Elsevier Masson, 2021. p. 163-166

2.YLLI, Dorina; WARTOFSKY, Leonard; BURMAN, Kenneth D. Evaluation and treatment of amiodarone-induced thyroid disorders. The Journal of Clinical Endocrinology & Metabolism, 2021, 106.1: 226-236

Learning points: AIT therapy in the patient with end stage cardiomyopathy can be challenger. A multidisciplinary approach allows successful treatment.

7473
Ventilation and hemodynamic changes during robotic-assisted pelvic surgery

Zdorik N.¹
¹Bashkir State Medical University - Ufa (Russia)

Introduction: Robotic pelvic surgery requires the use combination of pneumoperitoneum with carbon dioxide insufflation and a steep (>300) Trendelenburg position (sTrP). This affects intraoperative respiratory mechanics and central hemodynamics that may cause postoperative complications.

Aim: To assess the effects of type of anesthesia on respiratory mechanics and central hemodynamics during robotic-assisted pelvic surgery in patients with normal body mass index.

Material and methods: ninety-three patients who were underwent radical prostatectomy or hysterectomy with or not salpingo-oophorectomy and lymphadenectomy were included in groups of inhalational anesthesia with sevoflurane or desflurane or total intravenous anesthesia with propofol. Peak airway pressure, plateau pressure, dynamic respiratory compliance, respiratory resistance, mean blood pressure, heart rate, cardiac index, and systemic vascular resistance were compared between the groups of patients after induction of anesthesia and tracheal intubation (T1); after CO2 insufflation (T2); after sTrP positioning (T3); 60 min after 25 mm Hg pneumoperitoneum in 300 sTrP (T4); and at end of operation (T5). Comparisons between the groups of patients were made using ANOVA univariate variance analysis with Bonferoni correction.

Results: Univariate analysis of variance revealed a statistically significant decrease of peak airway pressure and plateau pressure, with an increase of dynamic respiratory compliance in the group of inhalation anesthesia (T2-T4; p<0.01; p<0.01; and p<0.05, respectively). Comparison of the parameters of central hemodynamics between the two groups of patients showed comparable values, except for the time point T2, when mean blood pressure, heart rate, and systemic vascular resistance were statistically significantly lower in the TIVA group than in the inhalation anesthesia group (p<0.01; p<0.05; and p<0.05, respectively). There were no cases of serious postoperative cardiovascular or respiratory complications.

Conclusion: Inhalational anesthesia not only reduces airway pressure, but also increases dynamic respiratory compliance in patients during robotic-assisted pelvic surgery with pneumoperitoneum and steep Trendelenburg position without any adverse respiratory and hemodynamic effects.

Key words: robotic-assisted pelvic surgery; respiratory mechanic; central hemodynamics; general anesthesia

7480
The high incidence of postoperative fatigue after gynaecological surgery (Return-II study)

Ge F.¹, Langford A.², Hong R.², Wu A.¹
¹Eastern Health - Melbourne (Australia), ²Monash University - Melbourne (Australia)

Following surgery, postoperative fatigue (POF) is a very common cause of functional interference and loss of productivity (1,2), especially after major procedures that require extended recovery in hospital. Despite this, it is grossly underrecognised, with insufficient research examining POF as a surgical outcome (1,2). We conducted a longitudinal study, recruiting women who underwent gynaecological surgery under general anaesthesia at Eastern Health in Victoria, Australia. We obtained consent from eligible patients before each telephone interview at 1, 2 and 6 weeks postoperatively, during which we administered the same questionnaire, adapted from the standardised and validated Brief Fatigue Inventory (3). We gathered data about the presence of POF, and its severity on an 11-point Likert scale. We classified severity into 'none-to-mild' if the score was 0 to 3, 'moderate' if 4 to 6, and 'severe' if 7 to 10. Of 461 eligible women, data from 225 were included. Overall, 63%, 32% and 25% of participants reported POF at 1, 2 and 6 weeks after surgery, respectively. Incidences were positively related to the extent of the surgery and declined over time. A similar pattern was demonstrated in the proportions of patients whose POF was moderate or severe. Interestingly, among those who reported POF, the overwhelming majority experienced moderate or severe POF regardless of the extent of the surgery or the time since the surgery (see Table 1). Concerningly, over 20% of women were still experiencing moderate or severe POF at the 6-week mark, including after minor surgery.

References:

1. Zargar-Shoshtari K, Hill AG. Postoperative fatigue: a review. *World J Surg.* 2009; 33(4):738-745.
2. Rubin GJ, Hardy R, Hotopf M. A systematic review and meta-analysis of the incidence and severity of postoperative fatigue. *J Psychosom Res.* 2004 Sep; 57(3):317-326.
3. Mendoza TR, Wang XS, Cleeland CS, Morrissey M, Johnson BA, Wendt JK, Huber SL. The rapid assessment of fatigue severity in cancer patients: use of the Brief Fatigue Inventory. *Cancer.* 1999; 85(5):1186-1196.

Table 1. Prevalence of postoperative fatigue up to 6 weeks following minor, intermediate and major surgery.

Variables		Total (n=225)	Surgery Category		
			Major (n=37)	Intermediate (n=109)	Minor (n=63)
Age, years (Mean ± SD)		42 (12.3)	48 (10.6)	40 (12.4)	42 (12.1)
Postoperative Week-1 (%)	POF prevalence [*]	63	81	63	52
	Mod-Severe POF (%) [#]	60 (95)	78 (97)	59 (94)	49 (94)
Postoperative Week-2 (%)	POF prevalence [*]	32	50	30	26
	Mod-Severe POF (%) [#]	30 (92)	46 (93)	26 (89)	25 (100)
Postoperative Week-6 (%)	POF prevalence [*]	25	35	22	23
	Mod-Severe POF (%) [#]	24 (94)	35 (100)	20 (88)	23 (100)

^{*} POF (postoperative fatigue) prevalence was calculated by the number of participants who reported POF divided by all the respondents at the timepoint.

[#] Mod-Severe (moderate to severe) POF was calculated by the number of participants who reported moderate or severe POF divided by all the respondents at the timepoint (divided by those who experienced POF).

7507

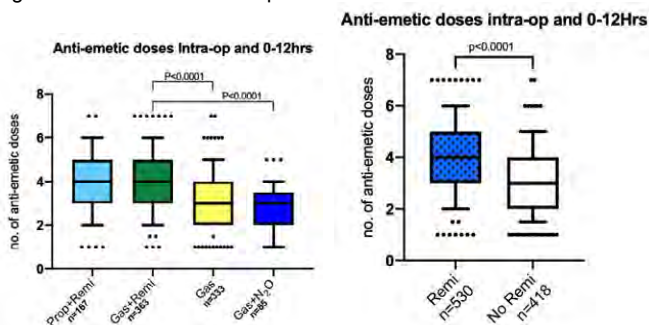
Remifentanyl-based anaesthetic techniques in bariatric surgery are associated with increased anti-emetic usage

Amin K.¹, Cohen M.¹, Oakey M.¹, Margaron M.¹
¹St Richard's Hospital - Chichester (United Kingdom)

Background and Goal of Study: Previous case series in bariatric surgery have suggested total intravenous anaesthesia (TIVA) with propofol reduces the incidence of perioperative nausea and vomiting (PONV)¹. Slow awakening from Propofol techniques has led to its combination with Remifentanyl, but concerns around Remifentanyl in the obese and the need for rescue opioid analgesia and anti-emetics remain. Here we report the impact of intra-operative technique on the use of post-operative anti-emetics.

Materials and Methods: Patients were grouped by type of maintenance anaesthesia, obtained from manual review of anaesthetic charts. Total anti-emetic doses administered, both intra-op and in the first 12 hrs post-op, were used as a marker of PONV. A single dose was defined as any of: Ondansetron 4mg, Dexamethasone 3.3mg, Cyclizine 50mg, Prochlorperazine 12.5mg or Metoclopramide 10mg. Kruskal-Wallis test with Dunn's multiple comparison was used to test for statistical significance.

Results and Discussion: Complete data was available for 948 cases, 78% were female, median age was 45 years. All procedures were laparoscopic. Anaesthesia was classed as; 1 Propofol/Remi, 2 Gas/Remi, 3 Gas/Air, 4 Gas/N2O. The spread of anti-emetic doses administered against maintenance technique are shown below.



Conclusion: Patients receiving Remifentanyl-based maintenance techniques were administered a significantly higher number of anti-emetic doses during and within the first 12 hours of surgery. Whether this is incidental, or related to a genuine increased incidence of PONV remains unclear. Higher dose rescue IV opioid requirement in the remifentanyl group is a plausible explanation.

References:

1.Ziemann-Gimmel, et. al (2013). Multimodal analgesia reduces narcotic requirements and antiemetic rescue medication in laparoscopic Roux-en-Y gastric bypass surgery. SOARD, 9(6), 975-980.

7515

Propofol versus etomidate for Electroconvulsive Therapy; a systematic review

Ward - van der Stam V.¹, Hermanides J.¹
¹Amsterdam UMC, location AMC - Amsterdam (Netherlands)

Background and Goal of Study: Therapy Resistant Depression (TRD) is affecting millions of adults worldwide. Electroconvulsive Therapy (ECT) has become the treatment of choice for TRD. Anesthetic agents have anti-convulsant properties and therefore influence seizure variables of ECT. For year it has been advocated that etomidate results in longer seizure duration than most anesthetics and therefore results in better treatment outcome. However etomidate has side-effects, during and after ECT. These include postoperative nausea and vomiting (PONV) and cardiovascular side effects, due to inadequate suppression of the cardiovascular reactions to ECT. Propofol has a lower incidence of PONV and leads to more suppression of the cardiovascular reaction to ECT and therefore probably reduces incidence of severe cardiac adverse events. In this systematic review we aimed to provide an overview of trials

comparing propofol with etomidate for ECT and its effect on depression, hemodynamic side effects an PONV.

Materials and Methods: We performed a literature search MEDLINE from 1948 to February 2021. We included randomized controlled trials comparing etomidate and propofol for ECT. As primary outcome we defined between group differences in effect on depression, as defined by the authors. As secondary outcome measures, we assessed between group differences in hemodynamic variables during and after ECT and PONV. Owing to the expected heterogeneity of interventions, comparators, settings and outcomes, we did not plan a meta-analysis of outcomes.

Results and Discussion: We included 10 papers in our systematic review (table 1). We found no evidence for a difference in effect of propofol over etomidate during ECT on depression. However we did find evidence for superiority of propofol over etomidate with regard to PONV and hemodynamic response to ECT. Our results are limited by the quality of the studies, heterogeneity of patients included and the small number of published randomized controlled trials.

Conclusions: There is a lack of evidence of superiority of etomidate over propofol for ECT on depression. However there is evidence of superiority of propofol with regard to hemodynamic response to ECT and PONV.

7517

Incidence of fatal intracardiac thrombosis during liver transplantation

Heukels M. A.¹, Vos J. J.¹, Zeillemaker-Hoekstra M.¹, Reyntjens K.¹, Porte R.¹
¹UMCG - Universitair Medisch Centrum Groningen - Groningen (Netherlands)

Background and Goal of Study: End stage liver disease is associated with coagulation disorders. During orthotopic liver transplantation (LT) prothrombotic events can lead to hypercoagulability causing cloth formation. Intracardiac thrombosis (ICT) is a rare but potentially fatal complication occurring during LT with a reported mortality rate of 45.5%¹. It usually occurs minutes after reperfusion leading to hemodynamic instability and need for resuscitation. It can be objectively diagnosed with transesophageal echography (TEE). The reported incidence ranges from 1,2-6.25%². Our aim is to evaluate the incidence of fatal intracardiac thrombosis during LT in our hospital.

Materials and Methods: All consecutive adult LT over a 10 year period (2010-2020) performed in a university teaching hospital were included. Data was collected retrospectively. The follow up period was a minimum of 1 year. Files of patients deceased within one year after surgery were screened for events that could indicate intracardiac thrombosis perioperatively.

Results: During the 10 year study period 391 LT were conducted. The mean age was 54 years. The median survival was 2.17 years. Thirty patients died within one year of LT (7.6%). Of these patients 5 (1.27%) were in need of resuscitation perioperatively. One patient was resuscitated twice perioperatively and ICT was confirmed by TEE. Two patients developed acute right heart failure. One patient died of hypovolemic shock. One patient was resuscitated after reperfusion but return of circulation was not regained. TEE or obduction was not performed on this patient.

Discussion: One (0.25%) patient had confirmed ICT. Comparing our results to previously reported incidence ICT could be an underdiagnosed disease as it is strictly dependent on the use of TEE. Only since recent years TEE has been recognized as a useful diagnostic tool in the perioperative setting. In our hospital TEE is not yet standard care during LT.

Conclusion: The incidence of fatal ICT in our hospital is 0.25%. The use of TEE perioperatively and especially during resuscitation could contribute to earlier detection and treatment of ICT.

References:

1. Goose MK et al. Risk Factors for Intracardiac Thrombus During Liver Transplantation. Liver Transpl. 2019(25):1682-1689
 2. Peiris P, Pai SL, Aniskevich S 3rd, et al. Intracardiac thrombosis during liver transplant: A 17-year single-institution study. Liver Transpl. 2015; 21;1280-1285

7534 QRS alterations related to postoperative pain

Pinto M.¹, Cunha E.¹, Vico M.¹, Pereira C. S.¹, Sebastião R.²
¹Centro Hospitalar Tondela-Viseu - Viseu (Portugal), ²Institute of Electronics and Informatics Engineering of Aveiro & Departamento de Eletrónica, Telecomunicações e Informática, Universidade de Aveiro - Aveiro (Portugal)

Background and Goal of Study: The postoperative experience is modulated by several factors and the postoperative pain seems to induce a broad heightened sympathetic branch activation of the Autonomic Nervous System. In this study, we evaluate the influences of different scenarios in postoperative experience and the alterations on electrocardiogram (ECG) measures according to postoperative reported pain.

Materials and Methods: Twenty adults participants, with ages of 60 ± 21 y.o., undergoing elective surgery at Centro Hospitalar Tondela-Viseu (Portugal), were recruited on a volunteer basis after written informed consent. ECG was continuously monitored, and self-reported pain was also assessed. Age, gender, type of surgery, anaesthesia, recovery length, and internment duration, were also collected. The surgeries were categorized as abdominal or neck&torax (13 and 7 patients), and the type of anaesthesia was balanced general anaesthesia (BGA) or combined (14 and 6 patients). The surgeries had a length of 122±45min. and recovery length was 192±68 min., with the internment of 7±6 days. Data were analysed using the IBM SPSS (v27) software, using the Mann-Whitney and the Kruskal-Wallis tests to evaluate differences among groups.

Results and Discussion: From this data, the recovery length was not statistically different across surgeries ($p=.643$) neither among the type of anaesthesia ($p=.353$). Results also showed a statistically significant difference in the number of days of internment across the type of surgery ($p=.037$). It was also analysed if age influences the internment duration, showing a statistically significant difference in the number of days of internment between age groups ($p=.006$). Concerning the ECG measures (heart rate, QRS complex and peaks amplitude) and the reported pain ("no or low pain" or "moderate or severe pain"), it was found that the QRS duration (median value of the 5 min. before the pain evaluation) was significantly different among the scores of pain ($p=.046$).

Conclusion: From the collected data and the performed analysis, one may sustain that the recovery length was not influenced by the types of surgery or anaesthesia and that internment duration depended on the type of surgery and age. Regarding the reported pain scores, only the QRS complex was shown to be different across the groups. Results strongly encourage the collection of more data to explore the interaction with other variables.

7547 Bilateral vocal cord paralysis after anterior cervical spine surgery: a case report

Silva Barros M.¹, Silva A.¹, Rego J.¹, Moura F.¹
¹ Centro Hospitalar do Tâmega e Sousa, E.P.E. - Penafiel (Portugal)

Background: The most severe otolaryngological complication after anterior cervical spine surgery is vocal fold paralysis. We report a case of a patient who developed bilateral vocal fold paralysis after this surgery[1].

Case Report: A 82-year-old woman, ASA III, presented to hospital with head and neck trauma after a fall. Radiologic studies showed a C7 fracture, and she was submitted to a C7 corpectomy and C6-D1 arthrodesis via right anterior approach under balanced general anaesthesia. Orotracheal intubation was performed by videolaryngoscopy with manual in-line stabilization of the neck. The intubation was uneventful and the cuff pressure was checked. ASA standard II monitoring with neuromuscular monitoring and bispectral index was used during the procedure which lasted 4 hours. During the emergence phase, the neuromuscular block was reversed with sugamadex and extubation was performed in the operating room, uneventfully. In post-anaesthesia care unit, she developed a stridor, dysphonia and choking. The nasopharyngolaryngoscopy revealed a bilateral paralysis of the vocal cords and a glottic opening measuring 4 mm. Hydrocortisone 100mg 8/8h was instituted. On the 3rd day, she presented only dysphonia and swelling of the arytenoids.

Discussion: Right recurrent laryngeal nerve palsy can be explained

considering the right-sided approach and prolonged surgery. One of the hypotheses that justifies the paralysis of the left vocal cord is the injury to the left recurrent laryngeal nerve after progressive spread of the retractor during exposure of the spine at the C7-T1 level. It is essential that surgeons ensure that the left-sided retractor teeth are placed into the muscles and not in the esophagus and tension on the retractors should be released intermittently [2, 3].

References:

1. Tan, T.P., et al., Vocal cord palsy after anterior cervical spine surgery: a qualitative systematic review. *The Spine Journal*, 2014. 14(7): p. 1332-1342.
2. Nikandish, R., et al., Bilateral Vocal Cord Paralysis after Anterior Cervical Discectomy Following Cervical Spine Injury: A Case Report. *Bulletin of emergency and trauma*, 2013. 1(1): p. 43-45.
3. Yerneni, K., et al., Delayed Recurrent Laryngeal Nerve Palsy Following Anterior Cervical Discectomy and Fusion. *World Neurosurg*, 2019. 122: p. 380-383.

Learning points: These complications should be known to the entire team. It is important to establish protocols to minimize the possibility of injury and how to act when it occurs.

7559 Soft palate perforation and glidescope videolaryngoscope: case report

Garrigós N.¹, Sánchez C.¹, Onrubia X.¹, Pastor A.¹, Lloret A. V.¹
¹Hospital Universitario Doctor Peset - Valencia (Spain)

Background: Currently, new guidelines on difficult airway management consider the use of video laryngoscopes as first choice in some situations [1]. The Glidescope® is a video laryngoscope that facilitates intubations in airways with anatomical abnormalities or when cervical mobility is limited. Although it is a relatively safe technique, it requires training since it could have some complications [2].

Case Report: A 71-year-old male patient, ASA III with obstructive sleep apnea (OSA) history underwent kidney transplantation. In preoperative airway exam: Mallampati grade III, thyromental distance (TMD) < 6.5cm and limited cervical mobility, so tracheal intubation (TI) was performed with Glidescope® videolaryngoscope. During the TI, endotracheal tube (ETT) was inserted with slight resistance and blood content was observed in the oral cavity. Glidescope® was reintroduced, observing ETT through soft palate so it was changed without incident. The patient was treated with antibiotic therapy and followed for several weeks until the ulcer in soft palate was completely healed.

Discussion: One of the most important factors in a successful TI using video laryngoscopes is operator experience. Glidescope® manufacturer recommends four consecutive steps as follow: MOUTH-SCREEN-MOUTH-SCREEN [3]. First, look at patient's mouth to introduce the blade. Next, look at screen to identify different anatomical structures and the scope is manipulated to obtain the best glottic view. Consecutively, look at patient's mouth to insert the ETT and finally look at the screen to check the glottic passage of the ETT into the trachea. Finally, blade is removed observing no oropharynx structures damage.

References:

1. Ahmad I, et al. *Anaesthesia*. 2020;75(4):509–28.
2. Doyle DJ. *Open Anesthesiol J*. 2017;11(1):48–67.
3. Amundson AW, et al. *Can J Anaesth*. 2013;60(2):210–1.

Learning points: 1. Video laryngoscopes facilitate intubation in difficult airways, although it is necessarily having experience; 2. The four-step technique is the method to follow when using Glidescope® to ensure correct TI; 3. Palate perforation is rare but a potentially serious complication derived from the use of Glidescope® that must be known.

7563 Trends in the use of neuromuscular blocking agents, reversal agents and neuromuscular transmission monitoring: a single center retrospective cohort study

Krijtenburg P.¹, De Boer A.¹, Bash L. D.², Scheffer G. J.¹, Keijzer C.¹, Warlé M. C.¹
¹Radboud university medical center - Nijmegen (Netherlands), ²Merck & Co., Inc. - Kenilworth (United States)

Background: Residual neuromuscular blockade (rNMB) remains a persistent and preventable problem with serious possible risks. This study aims to describe and assess patterns in the use of neuromuscular blocking agents (NMBA), neuromuscular transmission (NMT) monitoring and factors associated with the use of sugammadex.

Methods: A retrospective, observational cohort study was performed, based on the Electronic Medical Record of a large teaching hospital in the Netherlands. An integrated NMT monitoring module with automatic registration was gradually introduced in 2017. For this study we randomly selected 22,000 cases from all surgeries between January 2015 and December 2019 (for analysis split in time-periods 2015-2017 and 2018-2019) with endotracheal intubation with the use of a NMBA. 14,592 cases fulfilled all the inclusion criteria for complete analyses.

Results: In both time-periods relative NMBA usage stayed the same: rocuronium (86%), suxamethonium (13%) and mivacurium or cisatracurium (1%). For rocuronium spontaneous reversal decreased from 86% to 81%, sugammadex reversal increased from 12% to 18% with a slightly lower average dose. There was a decline in patients most at risk for rNMB: extubated in the operating room (OR) with no documented NMT monitoring or sugammadex from 46% to 31%. The percentage of all patients extubated in the OR, without a documented Train-Of-Four ratio > 0.9 decreased from 77% to 56%. Multivariate logistic regression analysis identified characteristics independently associated with the use of sugammadex (see table 1. for odds ratios with 95% CI and P values) including BMI >30, ASA class 3 or 4, age > 60 years, duration of surgery < 120 minutes, emergency status -, laparoscopic - and open abdominal/thoracic surgery, NMT monitoring used, inhalational anesthetics used and the total dose of rocuronium.

Conclusion: Our data show that the implementation of NMT monitoring with automatic registration coincides with a gradual increase in the (documented) use of NMT monitoring and an increased use of sugammadex in a lower dose. Nevertheless, a significant percentage of patients remain at potential risk of rNMB (31-56%).

Table 1.

Characteristics	Odds Ratio (95% CI)	OR Ratio	95% CI	P
Sex (F)		.977	.880 - 1.084	.658
Age ≥ 60 years (vs. 18-59)		1.372	1.233 - 1.527	.000
BMI ≥ 30 (vs. BMI < 30)		1.409	1.243 - 1.598	.000
ASA class 3-4 (vs. 1-2)		1.196	1.065 - 1.343	.002
Renal failure		1.173	.966 - 1.425	.108
Duration of surgery < 120 min		3.006	2.671 - 3.383	.000
Emergency surgery		1.827	1.598 - 2.089	.000
Open abdominal/thoracic surgery		1.563	1.375 - 1.777	.000
Laparoscopic surgery		2.007	1.710 - 2.356	.000
NMT monitoring used		5.305	4.632 - 6.076	.000
Total dose Rocuronium (mg/kg ABW)		1.993	1.763 - 2.253	.000
Inhalational anesthetic used		.883	.785 - .992	.037
Magnesium chloride co-administration		.779	.600 - 1.012	.062
Time period 2018-2019 (vs 2015-2017)		1.337	1.196 - 1.496	.000

7570 Pneumorrhachis after thoracic epidural – case report

Laranjo M.¹, Gomes L.¹, Gonçalves L.¹, Alves A. R.¹, Muendane P.¹, Valente E.¹
¹Centro Hospitalar de Leiria - Leiria (Portugal)

Background: For epidural anesthesia, the epidural space is identified using the loss of resistance technique (LOR), which can be performed with saline or air. Pneumorrhachis (ie, air within the intradural or extradural compartment of the spinal canal) is a rare event that can result from neuroaxial anesthesia [1-2]. It is usually asymptomatic, detected in imaging [2].

Case Report: A 62-year-old man with non-endoscopically resectable neoplasm of Vater's papilla underwent cephalic pancreaticoduodenectomy under combined anesthesia (general and epidural). The epidural space was identified using air and an epidural catheter was placed at the T8-T9 level (2 attempts). Surgery was uneventful. The day after surgery, computed tomography (CT) showed tissue emphysema in the thoracolumbar region and a small intramedullary gaseous focus. As it was asymptomatic, the patient was extubated. Further imaging showed no intramedullary air and neurological examinations post-extubation showed no complications.

Discussion: This case presents a rare complication when performing LOR using air. It was asymptomatic, a common outcome for epidural pneumorrhachis events, which tend to reabsorb spontaneously [1]. However, these can become symptomatic, leading to discomfort, pain, neurological deficits and tension pneumocephalus [3]. As this is a rare complication with multifactorial pathogenesis, treatment is symptomatic. The use of air or saline techniques is usually up to the anesthesiologist. The literature is diverse, with some authors concluding there is no difference in efficacy and safety between the 2 techniques [3], while others refer a higher proportion of complications using air.

References:

1. Shaikh N, et al. Pneumorrhachis and pneumothorax after epidural analgesia: A case report and review. *Qatar Med J.* 2021;2021:01;
2. Saberski LR, et al. Identification of the epidural space: is loss of resistance to air a safe technique? A review of the complications related to the use of air. *Reg Anesth.* 1997;22:3-15;
3. Antibas PL et al, El Dib R. Air versus saline in the loss of resistance technique for identification of the epidural space. *Cochrane Database Syst Rev.* 2014;7:CD008938.

Learning points: Pneumorrhachis is a rare complication of neuraxial anesthesia associated with LOR using air. Treatment is mainly symptomatic and neurologic examinations should be done to access neurologic function and potentially serious complications.

7583 Anaesthetic Management of Endoscopic Ultrasound-guided Ethanol Injection for Pancreatic Insulinoma

Laranjo M.¹, Gomes L.¹, Gonçalves D.¹, Valente E.¹
¹Centro Hospitalar de Leiria - Leiria (Portugal)

Background: Insulinoma is a rare pancreatic neuroendocrine tumor (1,2). It is characterized by inappropriate and excessive insulin secretion, which results in hypoglycaemic episodes (1,2). Surgical excision of the tumour is the definitive treatment. In patients not suitable for surgical treatment, medical management include use of diazoxide and, recently, EUS-guided ethanol ablation (3). The anesthetic management of this conditions is uncommon and challenging due to fluctuations in blood glucose levels and hydroelectrolytic disturbances during tumour handling and post-procedure.

Case Report: We report a case of a 74 year old female diagnosed with a insulinoma of 2 cm in the pancreatic isthmus, who had history of recurrent hypoglycemic attacks. Non-surgical treatment with alcohol ablation of the tumor by endoscopy ultrasound was chose. Since this was a patient with difficult airway stigmas proposed for a prolonged procedure it was decided to perform the procedure under total intravenous anesthesia with propofol target controlled infusion. An arterial line was introduced for serial blood gas analysis. A 5% dextrose solution at 2 ml/kg/h was administered during the procedure. Periodic monitoring (10-10 min) of blood glucose was maintained through the patient's implanted glucose

sensor and normoglycemia was achieved. PONV prophylaxis with ondansetron.

Discussion: The main concern about the anaesthetic management of this clinical entity is to prevent hypoglycaemia until tumour resection and the control of rebound hyperglycaemia soon after resection (2). EUS-guided ethanol ablation, despite being a minimally invasive approach, is an equally challenging and potentially discomfort-inducing, time-consuming, and meticulous procedure. The planning of the entire perioperative period is essential for the procedure success.

References:

1. Benalcázar D, et al. Manejo anestésico del insulinoma. Presentación de un caso. *Medisur* [Internet]. 2016 Ago [cited 2021 Sep 09]; 14(4):464-468;
2. Goswami J, et al. Insulinoma and anaesthetic implications. *Indian J Anaesth.* 2012 Mar;56(2):117-22;3-Vaidakis D, et al. Pancreatic insulinoma: current issues and trends. *Hepatobiliary Pancreat Dis Int.* 2010 Jun;9(3):234-41

Learning points: The anesthetic management of this condition requires strict control of blood glucose and electrolyte changes. The use of intravenous anaesthesia with endotracheal intubation led to a successful procedure in a patient with a predictable difficult airway.

7592

Validation of the qNox Nociception Index for monitoring reponsiveness of isolated forearm technique during endotracheal intubation

Punjasawadwong Y.¹, Pitaknorasate N.¹

¹*Chiang Mai University Hospital - Chiang Mai (Thailand)*

Background and Goal of Study: Limb movement in the isolated forearm technique (IFT) can represent somatic responses to noxious stimuli during laryngoscopy for intubation. Recently, QNox (CONOX Monitor), a 0-99 dimensionless score based on the analysis of EEG data has been introduced as a nociception monitoring. The goal of this study is to validate the qNox Nociception index in monitoring noci/antinociception during intubation by using responsiveness of IFT as a gold standard.

Materials and Methods: A total of 31 patients scheduled for non-emergency surgery under general anesthesia with sevoflurane, fentanyl, and cis-atracurium were included in the study. The anesthesia was induced with fentanyl and propofol with/without sevoflurane. Endotracheal intubation was facilitated by cis-atracurium. The IFT scale proposed by Pandit was used to assess the IFT responses before, during and after intubation. QNOX (qCON 2000 monitor, Quantum Medical) was measured minutely before, during, and after intubation. Appropriate statistical analyses were used to determine ROC, sensitivity, and specificity of qNox score to predict IFT level at 2 or above.

Results and Discussion: From the analyses, overall IFT responses to noxious stimuli occurred in 17/31 (54.8%) patients. The qNox score in responsive patients was statistically significant higher than that in non-responsive patients with medians (Q1, Q3) of 72 (55,72) and 35 (31,51.75), respectively. The area under the receiver operating curve of qNox score (95% CI) to predict the responsiveness was .876 (.745, 1.008). The sensitivity and specificity to predict the noxious response at the cutoff point of 46 were 82.4% and 71.4%, respectively.

Conclusion: The high incidence of motor responses in the isolated arm indicates inadequate analgesia to blunt the reflex responses during laryngoscopy and intubation. The qNox score may be useful to predict or monitor analgesic component of anesthesia. Further studies are still required to validate the qNox score in other clinical setting.

References:

1. Pandit JJ, Russell IF, Wang M. Interpretations of responses using the isolated forearm technique in general anesthesia: a debate *British Journal of Anesthesia* 2015; 115(Suppl): i32– 45.
2. Jensen EW, Valencia JF, López A. Et. Al. Monitoring hypnotic effect and nociception with two EEG-derived indices, qCON and qNOX, during general anaesthesia. *Acta Anaesthesiol Scand.* 2014;58:933-41.

7595

Giant ovarian tumor (35 Kg) in the aftermath of a Pandemic: anesthetic challenge

Pacheco Pereira S.¹, Dinis I.¹, Neves C.¹, Vico M.¹, Figueiral M.¹, Assunção J. P.¹

¹*Centro Hospitalar Tondela Viseu - Viseu (Portugal)*

Background: Before the Pandemic, giant ovarian tumor was a very rare condition. The anesthetic management of these patients is challenging as there is a greater risk of perioperative complications, the major ones being pulmonary complications (re-expansion pulmonary edema) and hemodynamic collapse.

Case Report: A 59y woman with anemia and coronary heart disease, was scheduled for exploratory laparotomy to remove a giant abdominal mass (diameter 43 cm). Last transthoracic echocardiography with a normal ejection fraction (56%). Her functional capacity was >4 METs. Balanced general anesthesia was conducted with a rapid sequence induction and maintenance with sevoflurane. After endotracheal intubation, volume-controlled ventilation was setted with low tidal volumes, high respiratory rate (15-18) and no positive end-expiratory pressure [PEEP]. During surgery, peak inspiratory pressure dropped from 30 to 14 cmH₂O and urine output increased from 100 to 800 mL/h. Intraoperative mean arterial blood pressure and heart rate kept among 70–90 mmHg and 50-70 bpm, respectively. No major perioperative complications were observed.

Discussion: Despite the hemodynamic and respiratory changes related with mechanical ventilation, this approach was crucial to secure airway and avoid pulmonary complications. A ventilation mode with low tidal volume ventilation without PEEP was safe and effective. During surgery, significant Ppeak changes were observed, and hemodynamic adjustments occurred. Perioperative pulmonary complications were avoided.

References:

1. Akazawa, M; et al. Management of a Giant Ovarian Tumor More Than 30kg: A Case Report and Review of the Literature. *J. of Gynecologic Surgery.* 2018; 34(5), 243–247.
2. Hemmes SN, et al. High versus low positive end-expiratory pressure during general anaesthesia for open abdominal surgery (PROVHILO trial): a multicentre randomised controlled trial. *Lancet.* 2014 Aug;384(9942) 495-503.

Learning points: We report the anesthesia of a patient with a giant ovarian tumor, which before pandemic was a very rare condition. Hybrid ventilatory mode prevented respiratory and hemodynamic failure and resulted in safe anesthetic management.

7619

Perioperative anesthetic considerations for Fabry disease during emergency surgery

Ricart Hernandez A.¹, Pla Escrivà G.¹, Gascó Serna I.¹, Rodríguez Maurell C.¹, Lloret I Villas B.¹, Baca Pose B.¹

¹*Hospital Universitari Dr Josep Trueta - Girona (Spain)*

Background: Fabry disease is a rare lysosomal storage disease of X-linked recessive inheritance. Due to mutations in the GLA gene (Xq22.1), patients show a partial or complete deficiency α-galactosidase A and sphingolipids accumulate in various tissues. It may be complicated by cardiac ischemic disease, neurological disorder and renal failure(1).

Case Report: A 22-year-old man with Fabry disease who was being regularly controlled in our hospital without showing any organ dysfunction, consulted after 3 days of suffering from abdominal pain and intestinal obstruction. The blood test showed elevated septic parameters. An abdominal echography was performed and he was diagnosed with phlegmonous appendicitis. He was operated under general anesthesia. A rapid sequence induction with fentanyl, propofol and rocuronium was performed. They were placed a radial catheter to have strict blood pressure control and a central venous catheter to infuse vasoactive drugs. Anesthesia was maintained with sevoflurane and fentanyl boli. Dexamethasone and ondansetron were administered for preventing postoperative nausea and vomiting. Monitored neuromuscular blockade was reversed with sugammadex. During surgery no incidences were reported and the patient was transferred to the postsurgical critical unit.

Two more days were needed in the critical unit until sepsis was solved and no more vasoactive drugs were needed. Pain was managed with paracetamol, metamizole and morphine. No myocardial dysfunction or impaired renal function were reported.

Discussion: Guidelines with high level of evidence of anesthetic management of Fabry disease were not found in literature. However, it is recommended that induction of anesthesia should be performed with consideration of patient-specific risk factors and with attention to cardiopulmonary involvement and that postoperative pain management may be challenging. In our case, there were no complications, apart from the septic shock, possibly because it was not an advanced stage of the disease. Pain was managed without incidences.

References:

1. Gaik C et al. Anaesthesia recommendations for Fabry disease. *Anesthesiologie und Intensivmedizin*. 2019; 61.

Learning points: The main problem with Fabry disease comes with renal and cardiac organic impairment. During perioperative care close monitoring should be done so a correct systemic perfusion is guaranteed and no organ dysfunction appears, particularly with special reference to lung, heart, brain and kidneys.

7620

Using fronto-occipital electroencephalogram (EEG)-differences as gauged by “Reduced alpha-beta-power”-algorithm to assess hypnotic states during general anaesthesia (GA), a retrospective study

Fehrlin E.¹, Hight D.¹, Kaiser H.¹, Zubler F.¹, Huber M.¹, Lersch F.¹
¹*Inselspital, University Hospital Bern - Bern (Switzerland)*

Background and Goal of Study: Current practice for monitoring the hypnotic component of anaesthesia relies, other than clinical patient's response to noxious stimuli, on processed EEG- devices. During GA, various specific EEG changes have been observed, such as a shift of the alpha band (7.7-12.5 Hz) from the occipital to the frontal area, defined as alpha-anteriorization. The sole use of frontal electrodes in neuromonitoring during GA provides an oversimplified view of the cerebral network interactions. A priori we proposed that a comparison of frontal and posterior alpha and beta (>12 Hz) during GA activity could improve the quality of neuromonitoring during anaesthesia.

Materials and Methods: Intraoperative EEG data recorded with the Narcotrend monitor using a frontal and occipital lead (2 electrodes referenced to the right mastoid) during GA in the ophthalmic surgery department of the University Hospital Bern were retrospectively analysed. The Reduced Power Alpha Beta (RPAB) index, designed to evaluate EEG-differences between hemispheres was applied to this fronto-occipital montage (FO-RPAB). The FO-RPAB was analysed for different periods of wake, GA maintenance, emergence as well as before and after the administration of a ketamine bolus. FO-RPAB was additionally compared with the Spectral Edge Frequency 95 (SEF 95) of the frontal and occipital channels.

Results and Discussion: A significant shift of the FO-RPAB to the frontal regions was observed in all 32 patients after induction of GA ($p < 0.001$). The combined alpha and beta power remained low in the occipital channel during GA and was again reduced in the frontal channel after emergence. The administration of ketamine, used as an analgesic during GA, did not lead to a change of FO-RPAB, while a significant rise in the SEF 95 in the occipital channel was observed during 10 minute period after the ketamine administration.

Conclusion: The concept of incorporating occipital electrodes for monitoring the hypnotic state seems promising. RPAB as processed index seems to indicate reliable GA in patients with healthy frontal alpha activity unperturbed by rising SEF 95 after ketamine. To establish RPAB as a reliable index reflecting physiological fronto-occipital activity-differences during GA beckons further research. Especially application of the method of sleep and sedation is needed to evaluate the representation of “depth-of-unconsciousness”-aspects of fronto-occipital polarisation.

7623

Perioperative stroke: A clinical case

Dinis M. R. B.¹, Paramés K.¹, Ferreira M.¹
¹*Centro Hospitalar Lisboa Norte - Lisbon (Portugal)*

Background: Perioperative stroke is defined as any embolic, thrombotic, or hemorrhagic cerebrovascular event with motor, sensory, or cognitive dysfunction lasting at least 24 hours, occurring intraoperatively or within 30 days after surgery. Most of these events are ischemic rather than hemorrhagic and its incidence is low (between 0.1% and 1.0%) in noncardiac/nonneurological surgery. Advancing age, prior stroke and vascular emergency surgery are identified, among others, as key risk factors for perioperative stroke. Half of these events occur in the first 24h after surgery, nonetheless its identification is challenging and the determination of the exact onset of symptoms cannot be established most of the times. Generally, this difficulty is due to prolonged intubation, effects from anesthesia and the use of opioids and psychoactive medications.

Materials and Methods: We present a 69-year-old patient, with known history of mild SARS-CoV-2 infection in the previous 2 weeks, presented to the emergency department with altered mental status for the last 48 hours and signs and symptoms of acute left upper extremity ischemia. The diagnosis of a subacute vertebrobasilar stroke and left subclavian artery occlusion was made. Surgical thrombectomy and subclavian artery stenting were performed with successful limb reperfusion. After 6 hours a new episode of acute upper left limb ischemia was detected and new intervention for reperfusion was needed. Spontaneously breathing technique with a laryngeal mask airway and sevoflurane was performed. Once the procedure was resumed, changes in the respiratory pattern were suddenly noted and a conjugate eye deviation to the right was identified. Orotracheal intubation was performed and ventilatory support was provided. The stroke fast-track protocol was activated and a new vertebrobasilar ischemic stroke was diagnosed. Endovascular thrombectomy was performed with no clinical improvements and the patient passed away 2 days later.

Conclusion: The rapid response provided did not change this patient's poor prognosis, as the 30-day mortality rates in patients who experience a perioperative stroke range between 21% and 26%, but it highlighted the worth of opting for a sedation and analgesia technique rather than a general anesthesia in this particular case. It allowed a prompt identification of patient's altered neurological status and ventilation pattern, therefore an immediate activation of the appropriate protocol.

7634

Septic pulmonary embolism as a complication after a total hip arthroplasty revision. Case report

Gholamian Ovejero S.¹, Martos Gisbert N.¹, Orozco Vinasco A. C.¹, Vicente Orgaz M.¹, González Velasco R.¹, Mejía Arnaud R. A.¹
¹*Hospital Universitario Severo Ochoa - Madrid (Spain)*

Background: Septic pulmonary embolism (SPE) is a rare but serious illness, characterised by pulmonary infiltrates caused by an extrapulmonary infectious focus. Evidence suggests association to soft tissue infection in the limbs¹. SPE associated to perioperative infections can be difficult to diagnosis and may lead to a worse outcome.

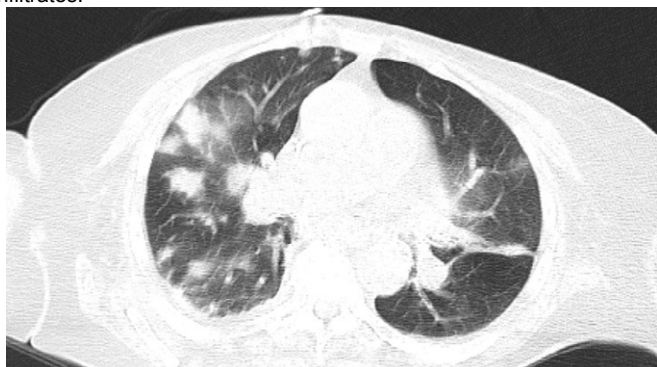
Case Report: An 87-year old woman with history of hypertension, obesity, atrial fibrillation and bilateral total hip arthroplasty, was admitted for revision of right hip prosthesis. During postoperative period, she developed a multifactorial shock (haemorrhagic and septic). US detected an infected hematoma and therefore empiric antibiotic therapy was initiated (piperacillin-tazobactam, later changed to meropenem and linezolid). The patient worsened. Doppler- US showed internal saphenous thrombophlebitis, so therapeutic anticoagulation was started. Echocardiography excluded endocarditis. Chest CT-scan revealed multiple bilateral cavitated nodules. Anidulafungin was added. Cultures were negative. Unfortunately, the patient developed a multi-organ failure and perished.

Discussion: Organisms migration from an infectious focus into the venous system causes SPE. It consists in vascular damage, thrombosis and embolization into the pulmonary circulation¹. Common microorganisms are gram-positive cocci (especially staphylococcus

aureus), Candida and enteric organisms. Clinical features vary from unspecific symptoms to septic shock. Chest radiology has low sensibility. Gold standard is chest CT scan, which shows peripheral nodules, cavities and pleural effusion. Echocardiogram rules out endocarditis and cultures play a pivotal role. Treatment includes empiric antibiotic therapy for 4-6 weeks, removing infected devices and considering surgical intervention to drain purulent collections. Anticoagulation remains controversial, but some studies have reported it might be beneficial¹.

References:¹Goswami U et al. Associations and outcomes of septic pulmonary embolism. *Open Respir Med J*. 2014 Jul 24;8:28-33.

Learning points: SPE should be suspected in a patient with clinical worsening and a soft tissue infectious focus alongside new pulmonary infiltrates.



7638

Evaluation of an enhanced cloud-based muscle action potential detection algorithm used by an electromyography-based neuromuscular monitor

Norby E.¹, Nordin J.¹, Jacobson A.¹, Brull S. J.²

¹Senzime AB - Uppsala (Sweden), ²Mayo Clinic in Florida - Jacksonville (United States)

Background and Goal of Study: Neuromuscular monitoring involves stimulation of a peripheral nerve and detection, recording, analysis and display of electromyographic (EMG) evoked muscle responses. Measurement of evoked EMG involves detection of peak (negative) and trough (positive) amplitudes. The total (peak-to-trough) amplitude is calculated, and the amplitudes of four consecutively delivered current stimuli at 2 Hz constitute a train-of-four (TOF) stimulation pattern. At the normal, unblocked neuromuscular junction, TOF stimulation will evoke 4 equally strong muscle responses [i.e., the ratio between the last contraction and the first contraction (TOF ratio) is 100%]. During onset of depolarizing neuromuscular block, the strength of contractions fades, as an increasing number of junctional receptors are blocked, resulting in a TOF ratio <100%. The ability of the monitor to display optimal EMG responses depends on the algorithm that selects the most appropriate peak and trough EMG points. We aimed to compare the effectiveness of a newly developed peak-trough identification algorithm to that of current software.

Materials and Methods: The TetraGraph (Senzime AB, Uppsala, Sweden) is an EMG monitor that records and analyzes evoked EMG waveforms. The monitor's EMG detection algorithm was evaluated by manual (visual) interpretation and comparison of 1,437 randomly selected pairs of anonymized EMG printouts from patients undergoing neuromuscular block. The same data pairs were analyzed with both the old (12B) and the new (12D) algorithm, and contain pairs of TOF ratios, TOF counts, and post-tetanic counts (PTC). The patient EMG data were obtained from a cloud-based data repository (TetraConnect, Senzime AB).

Results and Discussion: Of the 1,437 pairs of EMGs compared, the old algorithm (12B) improved readings (1 TOF ratio, 4 TOF counts) in 5 instances (0.35% of readings). In contrast, the new (12D) algorithm showed improved readings in a total of 273 (19%) instances: 88 TOF ratios (Fig. 1); 146 TOF counts; and 39 PTC.

Conclusion: The new EMG-detection algorithm (12D) improved detection in 19% of readings.

7648

Opioid free anesthesia in elderly patients scheduled for laparoscopic cholecystectomy: Case series

Toleska M.¹, Dimitrovski A.¹, Kuzmanovska B.¹, Kartalov A.¹, Jovanovski-Srceva M.¹, Stojkovska A.¹

¹University Clinic for TOARILUC-KARIL, University Ss Cyril and Methodius - Skopje (Republic of North Macedonia)

Background: Older people undergoing elective surgery are at higher risk of adverse postoperative outcomes, resulting from combinations of age-related physiological decline, multiple co-morbidity, polypharmacy, cognitive dysfunction and geriatric syndrome, including frailty.¹ They are particularly sensitive to opioids and their use in higher dosage should be avoided.² Opioid free anesthesia (OFA) is defined as giving the non-opioid drugs with analgesic effect (ketamine, lidocaine, and magnesium sulphate) intraoperatively.

Case Report: Three female patients aged 79, 81 and 78, all ASA classification 3, were scheduled for elective laparoscopic cholecystectomy. Before surgery 1 gr paracetamol and 4 mg dexamethason were administered intravenously. After premedication with 1 mg midazolam, anesthesia induction was performed using lidocaine 1 mg/kg, propofol 2 mg/kg, ketamine 0.5 mg/kg and rocuronium bromide 0.6 mg/kg. Following intubation, anesthesia was maintained with sevoflurane 0.6 MAC in air-oxygen mixture and continuous intravenous infusion with lidocaine 2 mg/kg/h and magnesium sulphate 30 mg/kg. Before the end of surgery 1 gr metamisol was given intravenously. Postoperatively, pain was measured with numeric rating score (NRS) in all patients from 1 to 10 at rest and when coughing, appearance of nausea and vomiting and sleep disturbances, too. Ketoprofen 100 mg was given when NRS is 4-6/10 and 1 mg/kg tramadol when NRS is 7-10/10. One hour after surgery 2 patients have pain when coughing with NRS 6/10, and one have NRS 8/10. Four, eight, twelve and twenty four hours after surgery pain was 2-3/10 in all three patients. None of them have PONV and sleep disturbances after surgery.

Discussion: Inadequate analgesia for elderly surgical patients contributes to postoperative delirium, cardiorespiratory complications and failure to mobilize.¹ OFA has been shown that can give adequate analgesia in elderly patients, without respiratory depression, PONV, sleeping disturbances and early mobilization.

References:

1. Griffiths R, et al. Guidelines: Peri-operative care of the elderly. *Anaesthesia* 2014; 69(1): 81-98.

2. Kakkar B. Geriatric Anesthesia. *Anesth Commun* 2017;1(1):101.

Learning points: OFA achieve cardio-circulatory stability, avoid needs of opioids in the postoperative period, postoperative delirium, postoperative nausea and vomiting and sleep disturbances.

7649

Non - opioid anaesthesia for perioperative use in a patient with a colorectal carcinoma without the use of an epidural nor locoregional blocks – a case report

Panoska A.¹, Toleska M.², Boncanoska Panovska S.³, Simevska S.⁴, Asani E.⁵

¹University Clinic of Anesthesia, Reanimation and Intensive Care – Skopje - Skopje (Republic of North Macedonia), ²University Clinic of Anesthesia, Reanimation and Intensive Care - Skopje (Republic of North Macedonia), ³Department of Anesthesiology and Intensive Care, City General Hospital “8th of September” - Skopje (Republic of North Macedonia), ⁴Department of Anesthesiology and Intensive Care, University Clinic for Gynecology and Obstetrics - Skopje (Republic of North Macedonia), ⁵Department of Anesthesiology, General Hospital Struga - Struga (Republic of North Macedonia)

Background: Non-opioid anaesthesia is a revolutionising multimodal method of applying anaesthetics that decrease postoperative nausea, vomiting, drowsiness and reduce the level of postoperative pain which enhances patient recovery.

Case Report: We present a 66 years old patient with total body weight of 100kg for an elective colorectal carcinoma surgery. Patient had no history of previous surgeries but had a computer tomography scan with metastatic changes in lungs, liver and few thoracic and lumbar vertebrae. Therefore, the anaesthesiology approach was opioid free anaesthesia without an epidural catheter. The procedure started by administering 1gr paracetamol and 10mg dexamethasone. Continued with midazolam 0.04mg/kg, lidocain 1mg/kg, propofol 2mg/kg, ketamin 0.5mg/kg, rocuronium bromide 0.6mg/kg and sevofluran 2L with a MAC 0.8. The induction was very smooth, without any drastic changes of the vital parameters. Then, an intravenous mixture prepared for a 3h surgical intervention consisting of MgSO₄ 15mg/kg/h, ketamin 0.2mg/kg/h and lidocain 2mg/kg/h in 50ml syringe was applied with a rate of 18ml/h. At the end of the intervention 2.5gr metamizole sodium was given and the patient was successfully extubated. Haemodynamic stability persisted during the whole procedure with a proper fluid management and urine output. Postoperative assessment of pain was conducted in the following 24hours with an average VAS score 5/10 as well as PONV score 2/10.

Discussion: Non-opioid anaesthesia provides better postoperative results in relation to pain management, shortened hospital stay and overall patient satisfaction. Moreover, studies link the cancer recurrence and metastasis progression with the type of anaesthesia applied perioperatively (1).

References: 1. Piegeler T, Beck Schimmer B (2016). Anaesthesia and colorectal cancer – The perioperative period as a window of opportunity. European Journal of surgical oncology, Vol 42, Issue 9, P 1286 - 1295.

Learning points: Non-opioid agents mixed properly in sufficient doses as a relatively new anaesthetic approach can very fast become a method of choice in interventions that usually use opioids combined with central neuraxial blocks as main anaesthetic technique.

7663

Haemoglobin Köln and falsely low peripheral oxygen saturations: a case report

Portela E Silva R.¹, Marques P.¹, Bernardino A.¹

¹Centro Hospitalar e Universitário de Coimbra - Coimbra (Portugal)

Background: Pulse oximetry is one of the main methods for respiratory function monitoring and, in anaesthesiology, it has special relevance. A high oximeter reading soothes the anaesthesiologist suggesting that the oxygen is present in the alveoli, diffuses to the blood and reaches the periphery. The pulse oximeter passes two or more wavelengths of light through a vascularized translucent part of the body, measuring the different light absorbances by the two most common forms of haemoglobin (oxyhaemoglobin and deoxyhaemoglobin), calculating then the ratio of oxygenated haemoglobin or pulse oximetric saturation, SpO₂.

Case Report: 58 year-old male patient, ASA 2 (arterial hypertension), proposed for laparoscopic cholecystectomy and inguinal hernia repair. When arriving to the OR he presented with SpO₂ of 91%. He was asymptomatic, normothermic, had no anaemia in the preoperative blood

tests and the plethysmography waveform was normal. The oximeter probe position was changed, with no variation in SpO₂. After a preoxygenation of 3 minutes with FiO₂ of 100%, the SpO₂ was 92%. An arterial blood gas test was performed and the SaO₂ was 97.2%, with no significant values of carboxyhaemoglobin or methaemoglobin. Speaking with the patient he said that, in the past, he had a surgical procedure cancelled because of his low SpO₂ and that posteriorly, after investigation he was diagnosed with Haemoglobin Köln, explaining all our findings. A general anaesthesia was performed and during the procedure the SpO₂ oscillated between 91 and 93%. Serial ABG tests showed SaO₂ >97%. The procedure concluded with no complications.

Discussion: Haemoglobin Köln is a rare haemoglobin unstable variant caused by a mutation in the β-globin chain. The reason for the low SpO₂ measurement is the higher light absorption rates around wavelengths of 660nm, that usually reflects deoxygenated haemoglobin.1 Unknowingly believing the falsely low SpO₂ reading can lead to unnecessary and repetitive examinations, tests and procedures, spending financial and human resources.

References:

1.Brugger S, Santafé-Martí MD, Lakhal M. Low SpO₂ with normal SaO₂ during general anesthesia: A case report. 2017 Oct 1;9(7):197-198.

Learning points: Pulse oximetry is an indirect method for assessing oxygen saturation. It is essential to any anaesthesiologist the understanding of its fundamental principles. Multiple pathologies, like haemoglobinopathies, might generate false readings and lead to improper patient management.

Ambulatory Anaesthesia

6484

Evaluation of pain and patient satisfaction at 24h after ambulatory anorectal surgery. The experience of a day-case center in Portugal.

Rebello P.¹, Leite Silva A.¹, Pereira C.², Rebello P.¹, Quelhas M. J.¹

¹Hospital Pedro Hispano - Matosinhos (Portugal), ²Hospital Pedro Hispano - Porto (Portugal)

Background and Goal of Study: The prevalence of minor anorectal diseases is 4-5% in adult population. Most surgeries can be done in a day-case setting, but postoperative pain can be a cause for patient dissatisfaction. In this study, we compare pain and patient satisfaction of pain control in the first 24 hours(h) with different surgical and anesthetic techniques in a day-case setting.

Materials and Methods: In this retrospective study we collected data from a questionnaire done at 24h post anorectal surgery (hemorrhoidectomy and fistulectomy) from July 2013 to April 2021. To evaluate pain, we used the numeric pain scale (NPS) (0-10) and to assess satisfaction we used a scale of 1- 4 (1- highly dissatisfied and 4-highly satisfied).

Results and Discussion: We analyzed 391 patients submitted to fistulectomy (n=110) and hemorrhoidectomies (n=281). Mean age was 51 years with 55.8% of the patients being male. The type of anesthesia most used was general anesthesia (68.8%) followed by spinal anesthesia (25.3%) and monitor anesthesia care (MAC) (5.9%). We had 105 missing values in the NPS which were excluded. The median pain in the first 24h after surgery was 1 in 10. 133 patients (46.5 %) didn't have pain, 99 (34.6%) had mild pain (1 to 3), 38 (9.7%) had moderate pain (4 to 6) and 16 (4.1%) reported severe pain (≥ 7). Most patient were highly satisfied or satisfied with their pain control at 24h (55.0% and 15.3% respectively) with 2.0% dissatisfied and 0.5% highly dissatisfied. There were no statistical differences between type of anesthesia and the following: NPS in the first 24h after surgery (p = 0.959), satisfaction at pain control (p = 0.240), nausea (p = 0.814) and vomits (p = 0.660). There was a statistical difference between type of surgery and pain scale in the first 24h after surgery (p = 0.016) with more pain in the hemorrhoidectomies (median = 2) than in the fistulectomy (median = 0). There were no statistical differences between type of surgery and satisfaction of pain control (p = 0.398).

Conclusions: We can use general anesthesia, spinal or MAC for this

type of surgery with highly satisfaction to the patient with no difference in pain control. Even though, the satisfaction at pain control wasn't different between surgical groups the post-operative analgesic plan for hemorrhoidectomy should be adjusted to a more potent one, since this surgery was associated with more pain in the first 24h after surgery.

6755

Cardiac Arrest In Ambulatory Setting: How Can We Prevent It!

Rodrigues A.¹, Montenegro L.¹, Pedro D.¹, Pereira E.¹, Ribeiro M. I.¹
¹Hospital Garcia de Orta - Almada (Portugal)

Background: Operative hysteroscopy intravascular absorption (OHIA) syndrome is a rare complication caused by intravascular absorption of fluid distension/irrigation medium during hysteroscopy. We are reporting a case of a OHIA syndrome that resulted in cardiac arrest.

Case Report: A 37-year-old woman, ASA I, was admitted for hysteroscopic myomectomy (bipolar resectoscope; irrigation medium 0.9% saline) under balanced general anesthesia using a laryngeal mask airway. During the procedure there was an accidental disconnection between the resectoscope and the reservoir. The fluid deficit was calculated every 10 minutes and the surgeon was informed. At the end of the procedure the fluid deficit was at least 3000 mL. No others interferences were recorded, including signs of fluid overload and pulmonary oedema. After the patient was uncovered a generalized oedema was observed. Intravenous furosemide was given to enhance diuresis. The laryngeal mask was removed when the patient was awake and with an adequate ventilation. Minutes after the patient developed respiratory distress, SpO₂ dropped and bradycardia followed by asystole occurred. Cardiopulmonary resuscitation was started. Spontaneous circulation was achieved after 2 minutes. A oedema of all airway structures and pink and frothy secretion were observed. Crackling sounds were heard at the lung base area. Chest X-ray image showed patchy opacification. The patient was admitted to recovery room under mechanical ventilation. Extubation was performed 5 hours later without complications. On the next day the patient was discharged.

Discussion: Isotonic solutions reduce the risk of hypo-osmolarity and hyponatremia but do not eliminate the risk of fluid overload. A fluid deficit of 2500 mL should be used as threshold to define fluid overload when using isotonic solutions.¹

Minimising negative outcomes relies on limiting the absorption of irrigation fluid, recognizing complications early and providing prompt resuscitation. Little evidence supports any significant difference in outcomes between general or spinal anesthesia. The last one has the advantage of allowing the detection of early signs of this syndrome.²

Reference:

1. *Gynecol Surg* (2016);13:289–303

2. *ANEST & ANALG* (2011);113 (4):723-728

Learning points: Absorption of the irrigation fluid used in hysteroscopy can result in life-threatening fluid overload.

Anesthesiologists need to have a high index of suspicion in order to prevent morbidity and mortality.

6907

Respiratory Complications during the Recovery from Gastrointestinal Endoscopies Performed by Gastroenterologists under Moderate Sedation

Zbede A.¹, Pozin-Eidelman I.¹, Nadler M.¹, Zahavi G.¹, Orkin D.¹, Berkenstadt H.¹

¹Sheba Medical Center - Ramat Gan (Israel)

Background and Goal of the Study: The incidence of adverse events during sedation for gastrointestinal endoscopies has been extensively reported. However, there are hitherto limited data on the incidence of adverse events during the recovery from these procedures. The aim of this study was to investigate the incidence of respiratory complications in post procedure period.

Materials and methods: In this retrospective cohort study, data from electronic records of consecutive 657 patients, who underwent gastroenterological procedures under sedation, performed by a team of a gastroenterologist and nurse were collected. Definition of respiratory and hemodynamic complications was adopted from the consensus document from the World SIVA International Sedation Task Force. 1 The study also explored for the incidence of respiratory complications leading to emergency room or ambulatory visits in the 3 days period following the procedure.

Results and Discussion: SpO₂ of less than 90% for less than 60 seconds occurred in 82 patients (12.5%) and in 11 patients (1.7%) during the procedure and the post- procedure periods, respectively. SpO₂ of less than 90% for more than 60 seconds occurs in 79 patients (12%) and in 11 patients (1.7%) during the procedure and the post-procedure periods, respectively. SpO₂ lower than 75% occurred in 4 patients (0.6%) during the procedure but in no patient in the post-procedure period. There were no events of apnea or hemodynamic events. Desaturation in the post procedure period was more common in patients with desaturation during the procedure, patients aged 65 to 79, ischemic heart disease, diabetes mellitus, and patients undergoing ERCP and endoscopic ultrasound. No patient had respiratory complication in the three post procedure days.

Conclusions: We found no major complications in the recovery room after balanced propofol based sedation administered by a gastroenterologist-nurse team. There are patients with greater risk for desaturation events that possibly warrant closer monitoring.

References: 1. *Br J Anaesth*. 2012 Jan;108(1):13-20.

6916

Adverse Events of Special Interest Analysis of Remimazolam, Midazolam and Placebo in Phase III Clinical Trials in Procedural Sedation

Stoehr T.¹, Donsbach M.¹, Al-Rawi Y.², Dao V. A.³, Sahgal O.², Schippers F.⁴

¹PAION Deutschland GmbH - Aachen (Germany), ²PAION UK - Cambridge (United Kingdom), ³Paion Germany GmbH - Aachen (Germany), ⁴freelance - Brühl (Germany)

Background and Goal of Study: Remimazolam is a new, ultra-short acting benzodiazepine for procedural sedation. During clinical development hypoxia, bradycardia and hypotension have been classified as adverse events of special interest (AESI). The aim of this study was to characterize the incidence of these AESIs in the phase III clinical trials.

Materials and Methods: Three phase III clinical trials were conducted with a similar design and with a placebo and an active control arm (midazolam dosed according to label). The majority of placebo patients received rescue midazolam, dosed at the discretion of the physician. For these trials, specific criteria were applied to vital signs data in order to identify these AESIs.

Hypoxia: Oxygen saturation <90% for ≥1 min or any drop necessitating medical intervention. **Bradycardia:** <40 bpm or a drop in heart rate of 20% or more from baseline that lasts continuously for ≥30 s.

Hypotension: A fall in systolic BP to ≤80 mmHg or a fall in diastolic BP to ≤40 mmHg or a fall in systolic or diastolic BP of 20% or more below baseline or necessitating medical intervention.

Results and Discussion: AEsIs related to study drug are summarized below. The proportions of subjects experiencing hypoxia were similar in all treatment groups. The incidence of bradycardia was slightly lower in both the remimazolam and placebo groups than in the midazolam group. The incidence of hypotension was lower in the remimazolam group than in both the midazolam and placebo groups. The incidences of AEsIs were higher in the highest cumulative fentanyl dose category than in the lower dose categories. However, overall remimazolam subjects required less cumulative fentanyl (84±41 µg), than midazolam (101±46 µg) or placebo treated patients (114±60 µg). Age or ASA class did not influence incidences of AEsIs.

Adverse Event [n (%)]	Remimazolam	Midazolam	Placebo
Hypoxia	33/630 (5.2%)	9/210 (4.5%)	5/135 (3.7%)
Bradycardia	19/630 (3.0%)	12/210 (6.0%)	6/135 (4.4%)
Hypotension	117/630 (18.6%)	58/210 (28.8%)	29/135 (21.5%)

Conclusions: Remimazolam exhibits an adverse event profile similar than that of midazolam, albeit the incidence of bradycardia and hypotension was smaller. Interestingly, in these trials the efficacy of remimazolam was larger than that of midazolam (abstract #7063).

6977 Transnasal Humidified Rapid Insufflation Ventilatory Exchange (THRIVE) for operative hysteroscopy under general anesthesia: an observational study.

Frassanito L.¹, Vassalli F.¹, Piersanti A.¹, Ciano F.¹, Scorzoni M.¹, Draisci G.¹ Department of Scienze dell’Emergenza, Anestesiologiche e della Rianimazione - IRCCS Fondazione Policlinico A. Gemelli - Rome – Italy. ¹Fondazione Policlinico Agostino Gemelli, IRCCS - Rome (Italy)

Background and Goal of Study: The term THRIVE refers to the delivery of 100% heated and humidified O₂ via nasal cannulae in patients undergoing procedural sedation in order to maintain a viable gas exchange during a period of apnoea 1-4. O₂ flow into the lungs is driven by a negative pressure gradient generated by the difference between the alveolar rates of O₂ absorption and CO₂ excretion^{2,3}. Rise in CO₂ concentration is limited by cardiogenic oscillations and their interactions with supraglottic turbulence^{5,6}. Operative hysteroscopy (OH) is a brief surgical procedure usually performed in a day-surgery regimen under general anesthesia (GA) and ventilation through facial mask or laryngeal mask. Aim of this study was to investigate the effects of THRIVE apnoeic ventilation during OH under GA. Primary outcome: rate of success of the technique. Secondary outcome: number of collateral effects.

Materials and Methods: ASA 1-2 woman presenting for elective OH were enrolled. Standard monitoring included NIBP, ECG, SpO₂ and BIS. Transcutaneous carbon dioxide (tcCO₂) was continuously monitored by Radiometer TCM5 monitor. THRIVE was the only airway device. 3 minutes of pre-oxygenation was performed with 100% O₂ 30 L/min. GA was induced with propofol TCI-7 mcg/kg plus fentanyl 1 mcg/kg, then O₂ flow was increased to 70 L/min. GA was maintained with propofol TCI infusion (BIS value between 40 and 50). At the end of the procedure the patients were moved to the PACU. Success of ventilation was defined by: SpO₂ > 94%, tcCO₂ < 60 and no need for airway intervention mmHg for the entire procedure.

Results and Discussion: 20 patients aged 47.3 ± 11.5 years were included. Mean duration of the procedure was 25 ± 9.5 minutes and the success rate of the technique was 100%. Median SpO₂ was 100 (IQR 99-100%). Maximum mean CO₂ level was 51 ± 8 mmHg while mean CO₂ level during the procedure was 45 ± 7 mmHg. In 12 patients maximum CO₂ level reached was between 50-55 mmHg. 6 patients reached maximum CO₂ levels between 56-60 mmHg. No side effects were registered.

Conclusion: THRIVE oxygenation allows adequate ventilation during GA for OH. The application of THRIVE in this setting may allow minimal airway manipulation and great comfort for the patient.

References: 1. Patel Anesthesia 2015. 2. Gustafsson Br J Anaesth. 2017. 3. Mazzeffi Anesth Analg. 2021. 4. Conway Eur J Anaesthesiol 2021. 5. Slutsky J Appl Physiol Respir Environ Exerc Physiol. 1981. 6. Hermez Anaesthesia 2019.

7063 Efficacy of remimazolam versus midazolam for procedural sedation: post hoc integrated analyses of three Phase 3 clinical trials

Dao V. A.¹, Schippers F.², Stöhr T.¹
¹PAION Deutschland GmbH - Aachen (Germany), ²Creative Clinical Research GmbH - Brühl (Germany)

Background and Goal of Study: Remimazolam is an ultra-short acting, fast onset/fast offset benzodiazepine for intravenous use in procedural sedation, general anaesthesia, and intensive care unit sedation. The aim of this work was to compare the efficacy of remimazolam versus midazolam dosed according to medical practice (real-world midazolam) and midazolam dosed according to U.S. prescribing information (on-label midazolam) for procedural sedation.

Materials and Methods: This post hoc analysis was performed on the integrated data from three randomised, placebo and active (midazolam) controlled, phase 3 clinical trials in patients undergoing colonoscopy or bronchoscopy.

Results and Discussion: Remimazolam showed significantly shorter time from first dose to start of procedure (median 3 minutes) compared to on-label midazolam (median 8 minutes). Recovery time from end of procedure to fully alert was significantly shorter for remimazolam (median 6 minutes) than real-world midazolam (median 14 minutes), enabling earlier transfer of patients from the procedure room to the recovery area with a lower requirement for patient monitoring. The onset and recovery times with remimazolam showed significantly less inter-patient variability than with on-label midazolam and real-world midazolam, respectively. The total sedation time (Figure 1), from first dose to fully alert, was similar between on-label midazolam and real-world midazolam (median 27 minutes) but significantly shorter for remimazolam (median 20 minutes). Patients treated with remimazolam received significantly less fentanyl for analgesia (78.2 ± 28.4 µg) than did those treated with real-world midazolam (113.6 ± 60.1 µg) and on-label midazolam (92.5 ± 40.0 µg). The mean ± standard deviation dose of midazolam used in the Real-world Midazolam group was 6.2 ± 3.1 mg, compared with 3.5 ± 1.5 mg in the On-label Midazolam group.



Figure 1: Total sedation time
Conclusions: Remimazolam offers advantages over midazolam in terms of faster recovery and less fentanyl requirement, which may facilitate increased procedural throughput in clinical practice.

7073 Subarachnoid anesthesia with prilocaine in Ambulatory Surgery

Saldanha Marques J.¹, Barros M.¹, Oliveira F.¹, Fernandes M.¹, Carneiro E.¹
¹Centro Hospitalar Universitário São João - Porto (Portugal)

Background and Goal of Study: Subarachnoid block (SAB) can be an useful anesthetic technique for ambulatory setting. Prilocaine, due to its rapid onset and offset, could be the local anesthetic of choice for procedures lasting 60-90 min. The present study has been designed to evaluate the presence of intra and postoperative complications in patients undergoing SAB with prilocaine in Ambulatory Surgery.

Materials and Methods: Intervention study without comparator including adult patients undergoing SAB with prilocaine in Ambulatory Surgery, between December 2019 and July 2020. Patients with contraindication for SAB, inability and refusal to consent were excluded. Data was extracted in pre-operative, intraoperative and postoperative periods. Primary outcome was intra and postoperative complications and secondary outcomes were efficacy of anesthesia, time to hospital discharge and patient satisfaction.

Results and Discussion: A total of 50 patients were enrolled. Mean age was 52.18 years and ratio female:male was 1:1.38. Most patients were ASA PS II (n=40). 26 patients were submitted to Orthopedic Surgery. SAB was performed between L3 and L4 in 62% of the patients (n=31) and the block reached T10 level in 44.2%, after a mean time of 4.32min. The median dose of prilocaine used was 40mg. The 27G Whitacre needle was chosen in most cases for performing the technique. No intraoperative complications were recorded in 90% of cases (n=45), bradycardia and/or hypotension in 4 cases and nausea/vomiting in 1 case. Mean duration of motor block was 1h25min and sensitive block was 1h47min. Median time to void after SAB was 3h41min. Pain control in the immediate postoperative period was achieved with paracetamol and ketorolac in 82% of patients (n=41). Median time to hospital discharge was 6h12min. 58% of patients had no complications in the first 24h after surgery and 94% were satisfied with the anesthetic approach. Due to the growing number of ambulatory procedures, it has become essential to provide fast postoperative recovery and early discharge. A spinal anesthetic, such as prilocaine, that can offer a rapid onset and offset of sensory and motor block with few side effects is an asset in Ambulatory Surgery. The results of this study are in agreement with the current literature.

Conclusion: Prilocaine proved to be a safe and effective local anesthetic for SAB in Ambulatory Surgery.

References

1. BJA Education 19(10):321-328(2019)
2. Anaesth Crit Care Pain Med 35:417-421(2016)

7080

Myasthenic crisis in a patient under general anesthesia for ambulatory magnetic resonance imaging

Saldanha Marques J.¹, Santos P.¹

¹Centro Hospitalar Universitário São João - Porto (Portugal)

Background: Myasthenic crisis (MC) is defined as respiratory failure or delayed postoperative extubation for >24h in a patient with Myasthenia Gravis (MG) due to weakness of upper airway and respiratory muscles. The exposure to volatile anesthetic agents may increase myasthenic weakness. We report a case of MC in a patient under general anesthesia for ambulatory magnetic resonance imaging (MRI).

Case Report: A 69-years old woman was admitted for an ambulatory abdominal MRI. In the bedside assessment, the patient referred to comorbidities type 2 diabetes, CPAP at night (Pneumology prescription) and depression. Past anesthetic and surgical history included uneventful removal of benign tumours of the chest. The patient denied any chronic medication. General anesthesia was induced with 80mg of propofol and maintained with sevoflurane administration through a facemask. Spontaneous ventilation was maintained throughout the entire procedure. After sevoflurane discontinuation, the patient exhibited poor ventilatory dynamics, incapable of fully opening her eyes or even speaking. A sternotomy scar was noticed during pulmonary auscultation, and the possibility (considering the surgical past history) of MC was considered. A review of past medical history, including daughter's information revealed a diagnosis of generalized MG, medicated with pyridostigmine. Blood gas analysis presented type 2 respiratory insufficiency (pH 7.08, pCO₂ 95, pO₂ 136), but the patient had normal SaO₂ with a facial mask with 100 % oxygen. A total of 2.5mg of neostigmine was administered, with the patient monitored. Immediate improvement was noticed and fully recovered in 30 min, including blood gas parameters. The patient was transferred to the emergency department to be closely monitored, being discharged home the same day, without further complications.

Discussion: Early suspicion and treatment of MC is essential and could avoid the need of mechanical ventilation. Noninvasive positive-pressure ventilation (NIPPV) could be a helpful tool in preventing intubation and be considered as a bridging therapy while medical history and physical examination is obtained. Drugs that may increase myasthenic weakness, such as sevoflurane, despite not being contraindicated, should be used with caution.

References:

- 1 Neurological Research and Practice(2019);1:19
- 2 J Emerg Med(2017);53(6):853-853

Learning points: In patients with MG, a total intravenous anesthesia may be the preferred approach.

7136

Ambulatory surgery and the patient's perspective

Oliveira F.¹, Silva J.², Silva M.³, Bezerra de Lima Novo J.¹, Carneiro E.⁴, Mourão J.⁴

¹Centro Hospitalar São João, EPE - Porto (Portugal), ²Faculdade Medicina Universidade Porto - Porto (Portugal), ³Instituto Português Oncologia Porto - Porto (Portugal), ⁴Centro Hospitalar São João - Porto (Portugal)

Background and Goal of Study: Ambulatory surgery has brought several advantages for the patient. However, patients still have some concerns about potential risks, namely postoperative complications. The aim of this study is to study patient's knowledge and perspectives about the ambulatory surgery.

Materials and Methods: Prospective study performed at the Ambulatory Surgery Department, with the duration of 2 months. Patients older than 18 years old proposed for ambulatory surgery were included. Exclusion criteria were patient's refusal, non-autonomous or illiterate patients. Each patient filled a questionnaire before the assessment visit with the anesthesiologist.

Results and Discussion: A total of 251 patients were enrolled. Median age was 47 years, ratio female:male 75:158 (no-respondents:18). 128 patients (51%) answered correctly when asked about the meaning of ambulatory surgery. 77 (84.6%) patients which had a previous procedure on an outpatient basis, claimed to have received all the information needed to feel safe. When asked if they would prefer to stay in the hospital for a longer period of time, 86.8% (n=79) replied "no". Patient concerns with ambulatory surgery were in 20.7% (n=52) insufficient pain control and nausea/vomiting in 10% (n=25). 94.5% (n=237) of patients considered this regimen advantageous. The main perceived advantages were the reduction of surgical waiting lists (63.3%, n=159), a more peaceful recovery (33.4%, n=84) and the eviction of being surrounded by other patients (32.3%, n=81). When questioned about the most relevant aspects to their satisfaction, 52.2% (n=131) patients pointed the surgical outcome. A possible relationship between ambulatory surgery knowledge was made with general level of education and a previous ambulatory surgery procedure. No statistically significant differences were found for any of the other variables.

Conclusion: There still is a big gap in patient knowledge regarding ambulatory surgery. Despite the high level of satisfaction found, patients revealed several concerns about this regimen, as well as a desire for more information that should be pursued by the anesthesiologist, as both satisfaction and success of this regimen relies mainly on the patient.

7218

Outpatient surgery is not always smooth: a case of anaphylaxis.

Costa F.¹, Arantes R.¹, Gil F.¹, Cerqueira I.¹

¹Hospital de Braga - Braga (Portugal)

Background: Anaphylaxis is an acute, potentially life threatening, systemic hypersensitivity reaction that occurs when a patient is exposed to an antigen (1).

Case report: We report a case of a 40-year-old male smoker scheduled for correction of strabismus in ambulatory setting. He denied any clinical history, daily medication or allergies. At the operating room, the patient was monitored according to American Society of Anesthesiologists standards. Anesthesia was induced with infusion of remifentanyl (0.01 mcg/kg/min) and propofol (6 mg/kg/h). I-gel laryngeal mask (LMA) was placed. After that, the patient developed laryngo- and bronchospasm, associated with hypotension. Immediate therapy was started with rocuronium (70mg IV), adrenaline (1mg IM + 1mg IV), ketamine (100mg IV), magnesium sulfate (2g IV), clemastine (2g IV) and hydrocortisone (200mg IV). Orotracheal intubation was performed through LMA with fibroscopy. During fibroscopy, edema and hyperemia of the supraglottic structures were observed. The patient recovered hemodynamic stability and ventilation improved. Sedation and ventilation were maintained and the patient was admitted to the intensive care unit (ICU). At the ICU, he remained hemodynamically stable, with aminergic support. Levels of tryptase and complement were normal, with a slight increase in C1

esterase inhibitor (46mg/dL; normal range: 21 to 39mg/dL). At day-8 of ICU, the patient was discharged to the intermediate care unit of his referral hospital and was discharged on the second day. Follow up will be carried out in an immunoallergology consultation.

Discussion: Recognition of anaphylaxis during anesthesia is usually confusing since hypotension and bronchospasm can develop due to other reasons. In this case, sudden severe hypotension, SpO2 decrease, abrupt drop in ETCO2, obstructive pattern on capnography raised the clinical suspicion of anaphylaxis. The fact that tryptase levels remain normal may be a factor against anaphylaxis although tryptase level does not always rise (2). In this case, it will be important to clarify differential diagnoses of anaphylaxis, airway manipulation and hereditary and acquired angioedema.

References:

1. BJA Education 2019, Volume 19, Issue 10, 313-320.
2. Int Arch Allergy Immunol 2013;160:192-199

Learning points: Immediate identification and treatment of anaphylaxis are required to decrease morbimortality. Even in simple outpatient procedures, anesthetic care must be as differentiated as possible.

7252

Liposomal bupivacaine evaluation in patients undergoing hemorrhoidectomy: A retrospective cohort study

Mongan P.¹, Chitty L.¹, Johnson B.¹, Ridley B.², Hoefnagel A.¹
¹University of Florida - Jacksonville (United States), ²University of Florida - Jacksonville (United States)

Background and Goal of Study: This retrospective review examines the effect of intraoperative liposome bupivacaine on postsurgical pain control, patient satisfaction, and opioid use in patients undergoing outpatient stapled/excision hemorrhoidectomy.

Materials and Methods: 94 patients had ambulatory a stapled/excision hemorrhoidectomy under deep sedation/general anesthesia. Oral acetaminophen (1000 mg) and gabapentin (600 mg) were administered before surgery and liposome bupivacaine (EXPAREL, 266mg/30 mL, n=47) or bupivacaine (0.25%, 125mg, 50ml, n=47) was infiltrated during surgery. In recovery, patients were evaluated for pain (0 = no pain; 10 = worst imaginable pain) on admission, peak, and discharge. Hydromorphone was administered for pain scores ≥ 7 and oxycodone for pain scores ≥ 4 and <7. At discharge, patients were prescribed scheduled acetaminophen, gabapentin, methocarbamol, ibuprofen, and prn oxycodone (5 mg, 12-18 tablets) Pain, and surgical-related outcomes were assessed via telephone at 3 days and at 30 days by chart review. Outcomes of interest included pain scores after surgery, narcotic administration in recovery, time to discharge, request for additional pain medications, patient satisfaction with postsurgical pain control, and postoperative complications.

Results and Discussion: Demographic, surgical, and anesthetic variables were equivalent between groups. Figure 1 presents the outcomes of interest. In recovery, the bupivacaine group had a higher percentage of patients administered hydromorphone due to higher peak pain scores. However, the oral morphine equivalents were similar between groups. The increased narcotic administered prolonged the time to discharge by 13 minutes. There were no differences in requests for additional post-discharge medication or patient satisfaction with pain management.

Figure 1: Post-Operative Variables

	Bupivacaine (0.25%) (125 mg) (N=47)	Liposomal Bupivacaine (266 mg) (N=47)	p
Recovery Time (min) – median (IQR) ^a	80 (64-105)	67 (54-78)	<0.01
Preoperative Pain Score (NRS) – median (IQR)	0 (0-0)	0 (0-0)	NS
Peak Pain Score (NRS) – median (IQR) ^a	3 (0-6)	0 (0-4)	0.03
Peak Pain Score (NRS) ≥ 4 – n (%)	23 (48.9%)	15 (31.9%)	NS
Discharge Pain Score (NRS) – median (IQR)	2 (0-4)	0 (0-4)	NS
Rescue Narcotics (1 st dose) – n (%)	18 (38.2%)	12 (25.5%)	NS
Time to First Narcotic (min) ^b	66 (51-89)	65 (52-81)	NS
Oxycodone – n (%)	9 (19.1%)	10 (21.2%)	NS
Hydromorphone – n (%) ^c	9 (19.1%)	2 (4.3%)	0.02
1 st rescue OME dose – median (IQR)	0 (0-10)	0 (0-5)	NS
Rescue Narcotics (2 nd dose) – n (%)	6 (12.7%)	4 (8.5%)	NS
Oxycodone – n (%)	5 (10.6%)	2 (4.3%)	NS
Hydromorphone – n (%)	1 (2.1%)	2 (4.3%)	NS
2 nd rescue OME dose – median (IQR)	0 (0-0)	0 (0-0)	NS
Rescue Anti-Emetics in Recovery – n (%)	2 (4.3%)	0 (0.0%)	NS
Narcotic Refill Requested – n (%)	5 (10.6%)	6 (12.8%)	NS
Pain Control Effective – n (%)	36 (76.6%)	37 (78.7%)	NS
Reported Constipation on Day 3 – n (%)	8 (17.0%)	15 (31.9%)	NS

IQR= interquartile range, NS = not significant

^a Mann Whitney U-test

^b Time interval from intraoperative infiltration of local anesthetic and administration of first rescue narcotic

^c Chi Square Test

OME=oral morphine equivalent

Conclusion: In this cohort of patients (stapled/excision hemorrhoidectomy) there was a marginal benefit with EXPAREL local infiltration.

7647

Spinal anesthesia for outpatient endoscopic spine surgery: a case report

Aguiar A. R.¹, Castro A.¹, Quelhas M. J.¹, Lima C.¹, Fernandes R.¹, Seabra M.¹

¹ULSM Hospital Pedro Hispano - Senhora da Hora (Portugal)

Background: Spine surgery techniques have evolved in the last years into less invasive approaches, allowing the implementation of these procedures in an ambulatory setting. General anesthesia (GA) remains the gold standard anesthetic technique in outpatient lumbar surgery. We present a successful case of outpatient lumbar discectomy performed under spinal anesthesia (SA) and discuss the advantages of this technique.

Case Report: A 48-year-old female, ASA II, diagnosed with L5-S1 discal hernia, was scheduled for outpatient endoscopic lumbar discectomy. Her past medical history included previous open L4-L5 discectomy, hypertension, hypothyroidism, celiac disease, recently treated latent tuberculosis and postoperative nausea and vomiting (PONV). After obtaining patient consent, a paramedian subarachnoid block at L3-L4 level was performed with isobaric bupivacaine 0,5% 11mg and sufentanyl 2,5mcg. The patient was placed in prone position and the adequacy of block for surgery was tested before the incision, following sedation with propofol infusion. Surgery lasted 50 minutes and was uneventful. The patient remained hemodynamically stable during the whole procedure and was transferred to post-anesthesia care unit. Phase I lasted 210 minutes without any adverse event reported and the patient was safely discharged home in less than 24h post-procedure, after phase II, with adequate pain control and sensory-motor block reversal. Patient's overall satisfaction with the anesthetic care provided was good.

Discussion: SA can be a useful alternative to GA in outpatient lower spine surgery. SA usually contributes to a faster postoperative recovery, allowing better immediate pain control, lower PONV risk, which was particularly important regarding this patient's medical history, and avoiding complications associated with prone position under GA. Besides, SA is advantageous in patients with cerebrovascular disease, allowing central neurological evaluation. However, SA can delay postoperative lower limb neurological evaluation and it is a single shot technique, only suitable for short procedures.

References: 1. Abrão J et al. Anesthesia for Endoscopic Spine Surgery In An Ambulatory Surgery Center. Glob J Anes & Pain Med. Oct 2020, 3(5): 326-36.

Learning points: Spinal anesthesia is an advantageous anesthetic technique in ambulatory endoscopic spine surgery.

7672

Anaesthesia for carpal tunnel release in outpatient surgery - a retrospective study

Pedro L.¹, Pombo A. E.¹, Araújo A.¹, Costa A.¹¹Centro Hospitalar Universitário do Porto - Porto (Portugal)

Background and Goal of Study: The anaesthetic techniques for carpal tunnel release surgery (CTRS) must achieve a consistent, fast onset anaesthesia, and prolonged postoperative analgesia. General anaesthesia (GA), locoregional anaesthesia (LRA) and continuous anaesthetic monitoring (CAM) are among the most used techniques. In this context, postoperative complications of CTRS in an outpatient ambulatory care were analysed during a period of 1 year in a tertiary hospital.

Materials and Methods: A retrospective analysis of clinical process and postoperative satisfaction questionnaire from patients submitted to ambulatory CTRS from July 1st, 2019 to June 30th, 2020 was performed. Data related to anaesthetic technique, anaesthetic duration, postoperative complications including pain and postoperative nausea and vomiting (PONV), analgesia performed and daily life limitation in the postoperative period were collected. A descriptive analysis of the obtained data was carried out.

Results and Discussion: A total of 383 patients were included, of whom 236 have replied to the questionnaire. A GA was conducted in 67.3% of patients, 17.4% of patients were submitted to a CAM (associated with local anaesthesia by surgeon) and a LRA technique was performed in 15.3% of the patients. The average duration of anaesthesia was similar in the three groups: 28:33min, 28:35min and 30min for CAM, GA and LRA, respectively. Within the patients submitted to GA, 57.2% did not report any postoperative pain, 40.9% have reported slight pain and 1.9% had moderate pain. In LRA group, 50% of patients denied postoperative pain and 8.3% had moderate pain. In CAM group, 70.7% of patients didn't report any pain, 24.4% of them had mild pain and 4.9% had moderate pain. Concerning postoperative analgesic needs, 1.3% of patients submitted to GA did not perform any analgesia. In the other two groups, the percentage of patients who didn't need any postoperative analgesia was higher. Respecting the day life limitation, 49.1% of patients in the GA group didn't manifest any limitation. With respect to the patients of LRA group, one third haven't reported any limitation, 61.1% presented slight limitation and 2.8% experienced significant limitation. Only patients submitted to GA have reported PONV (1.3%).

Conclusion: This study shows the advantages and limitations of each anesthetic technique and highlights the importance of individualizing the anesthetic technique for each patient.

Regional Anaesthesia

6510

Current trends of regional anesthesia use in Greece and the impact of a structured regional anesthesia course on regional techniques knowledge and application

Theodoraki K.¹, Moka E.², Makris A.³, Stavropoulou E.⁴, ESRA Hellas Working Group¹Aretaieion University Hospital, National and Kapodistrian University of Athens - Athens (Greece), ²Creta Interclinic Hospital - Heraklion (Greece), ³Asklepieion Hospital of Voula - Athens (Greece), ⁴General Hospital of Attica KAT - Athens (Greece)

Background: Due to the growing interest in regional anesthesia (RA) techniques and the realization of the need for formalized education in them, the Greek Chapter of the European Society of Regional Anesthesia and Pain Therapy (ESRA-Hellas) has established a structured hands-on training Course held annually since 2009, which is quite popular in the community of Greek anesthesiologists. The aim of the current survey was two-fold: first to provide an overview about the current practice of RA in Greece and secondly to evaluate the effect the aforementioned training Course has on participants' knowledge and attitude towards RA.

Methods: An electronic questionnaire was uploaded on SurveyMonkey and a link giving access to the questionnaire was forwarded via email to an electronic database of 825 practicing Greek anesthesiologists held in the electronic database of ESRA Hellas. The survey was totally anonymous and no identifying information was collected throughout. It contained questions relating to the anesthesiologists' demographic characteristics, their RA practice and information pertaining to the RA training Course.

Results and Discussion: A total of 424 fully completed questionnaires were received, representing an overall response rate of 51.4%. Attendants of the Course are more familiar with the performance of peripheral nerve blocks with neurostimulation and/or ultrasound guidance as compared to non-attendants ($p < 0.001$). Attendants are also less likely to practice exclusively general anesthesia, more likely to use peripheral blocks for lower limb surgery and more likely to consider taking the European Diploma of RA in comparison to non-attendants ($p < 0.001$, $p = 0.018$ and $p = 0.002$, respectively). Both cohorts consider the Course of value and agree that the main reason to use regional techniques is to ensure optimal postoperative analgesia while the main hindrance to RA practice is the lack of relevant education in the techniques, especially those under ultrasound guidance. Regarding improvement of the Course, most participants suggested devoting ampler time in ultrasound hands-on practice and application.

Conclusion: Greek anesthesiologists seek educational activities in the field of RA and the Course seems to fulfil the majority of attendants' expectations. There will be further effort by the organizers to improve weaknesses of the current Course and undertake further educational initiatives in the field of RA according to international recommendations.

6531

Effect of supra-inguinal fascia iliaca compartment block on postoperative pain and opioid consumption in total hip arthroplasty by posterolateral approach: preliminary results

Carella M.¹, Beck F.², Piette N.², Lecoq J. P.², Bonhomme V.²¹Universitary Hospital of Liège - Liège (Belgium), ²Universitary Hospital of Liège - Liège (Belgium)

Background and Goal of Study: Total hip arthroplasty by posterolateral approach (THAPL) is followed by moderate to severe postoperative pain. Supra-inguinal fascia iliaca compartment block (SFICB) has been proposed as a promising analgesia technique. This trial was conducted to assess its interest on postoperative pain and opioid consumption in patients scheduled to undergo elective THAPL under spinal anesthesia.

Materials and Methods: Between December 16, 2020, and March 1, 2021, 32 patients scheduled for THAPL were enrolled for this randomized, prospective, controlled trial. Patients were randomly divided into two groups of 16 patients each. Both groups received spinal anesthesia using 2 mL isobaric 0.5% bupivacaine. Group R received additional SFICB using 40 mL of 0.375% ropivacaine using Desmettechnique. A blind observer noted morphine consumption on the patient-controlled analgesia device and evaluated pain intensity at rest and at mobilization on a 0 to 10 numeric rating scale (rest NRS and dynamic NRS) at fixed time points: 1h and 6h after surgery, day-1 and day-2 at 8am, 1pm and 6pm. Data were analyzed using chi-squared, Fisher's exact, Mann-Whitney, or generalized linear mixed model tests as appropriate. A two-tailed P value < 0.05 was considered statistically significant.

Results and Discussion: Total 48h morphine consumption was significantly lower in group R than in group C by 8 mg. There was a significant main effect of time and group on both NRS's, but no interaction between group and time, meaning that both rest and dynamic NRS were globally significantly higher in group C than in group R and followed a parallel decreasing evolution over time (Figure).

Conclusion: In THAPL, our data suggest that SFICB provides a better postoperative pain control at rest and at mobilization, and less postoperative opioid consumption. These results should be confirmed once the planned sample size of the study (86) will have been recruited.

References:

1. Desmet M et al. A longitudinal supra-inguinal fascia iliaca compartment block reduces morphine consumption after total hip arthroplasty. *Regional Anesthesia and Pain Medicine*. 2017(3):327-333.

6534

Association between erector spinae plane block and opioid sparing in adolescent scoliosis surgery: retrospective cohort study.

Somaglia M. J.¹, Biscaiburo J. P.¹, Terrasa S.¹¹Hospital Italiano de Buenos Aires - CABA (Argentina)

Background and Goal of Study: Adolescent scoliosis surgery is a procedure with high postoperative pain¹. The purpose of this study was to retrospectively analyse the association of the erector spinae plane block (ESP) with perioperative morphine consumption, intraoperative remifentanyl use, postoperative constipation and, length of hospital stay (LOS) in patients who underwent this procedure in the Hospital Italiano de Buenos Aires.

Materials and Methods: Ethics committee approval. 49 patients were included: 38 received conventional intravenous analgesia (IVA) while 11 received intravenous analgesia plus ESP (ESP) between January 2018 and October 2020. All variables were obtained from clinical records.

Continuous variables were described as medians and interquartile intervals, and compared with t-Test, whereas categorical variables were presented as absolute and relative frequencies and compared with chi-squared tests. We performed three different multivariable analysis adjusted by potential confounders: linear regression for total doses of perioperative morphine (mg/kg) and intra-quirurgic remifentanyl (mcg/kg), negative binomial regression for length of hospital stay (days) and logistic regression for administration or no administration of laxatives.

Results and Discussion: Patients in the IVA group had a longer time in surgery (230 min IVA versus 190 min ESP, $p=0.007$), lower consumption of Paracetamol (55.26% IVA versus 100% ESP; $p=0.009$) and Ketamine (13% IVA versus 63% ESP, $p=0.001$). After linear regression adjusted by these confounders, perioperative morphine and remifentanyl was significantly lower in the ESP group ($p=0.04$ and $p=0.03$, respectively) with a difference of 0.14 ± 0.67 mg/kg in morphine consumption and 23.41 ± 10.30 mcg/kg in remifentanyl consumption between groups. LOS and incidence of constipation exhibited no significant differences between groups.

Conclusion: ESP block was associated with lower perioperative opioid consumption. Our results are in agreement with other authors². A prospective study including a larger number of patients is needed to address the association of ESP block with length of hospital stay and constipation.

References:

1. Sieberg, C. B. et al. Pain prevalence and trajectories following pediatric spinal fusion surgery. *J. Pain* 14, (2013).
2. Finnerty, D. et al. A randomised trial of bilateral erector spinae plane block versus. no block for thoracolumbar decompressive spinal surgery. *Anaesthesia* (2021).

6540

Epidural blood patch as a treatment modality for spontaneous intracranial hypotension. A case series

Masourou Z.¹, Papagiannakis N.², Mitsikostas D. D.², Theodoraki K.¹¹Aretaieion University Hospital, National and Kapodistrian University of Athens - Athens (Greece), ²Aiginiteion University Hospital, National and Kapodistrian University of Athens - Athens (Greece)

Background: Spontaneous intracranial hypotension (SIH) is a rare syndrome characterized by heterogeneity of presentation and prognosis, which can occasionally result in serious complications, such as the formation of subdural hematoma (SDH). This case series aims to emphasize that SIH remains a diagnostic and therapeutic challenge; it can present with a far broad clinical spectrum of symptoms, can lead to SDH and if conservative treatment fails, an epidural blood patch (EBP) is a viable treatment option. Although the exact aetiology of SIH is not known, it is believed to be due to cerebrospinal fluid (CSF) leak or a low CSF pressure.

Case Report: Three patients (two males and one female) with age ranging between 38-53 years old who presented with complaints not only of an orthostatic headache, but with a variety of symptoms of SIH,

including the formation of two SDHs in one of them, were included in this series. These patients did not respond to conservative management and subsequently, given the clinical and radiological evidence of SIH, were referred to the Anaesthesia Department for an EBP. The exact site of the CSF leak was identified with imaging modalities, including magnetic resonance imaging (MRI) of the brain and spinal cord, prior to the EBP. All three patients were subjected to an EBP with an 18-gauge epidural needle placed into the middle epidural compartment at the T12-L3 level. A total of between 30-43 ml of autologous blood was collected from the patients' left basilic vein and was injected into the epidural space under strict aseptic conditions. Two lumbar (L1-L2, L2-L3) and one thoracic (T11-T12) EBPs were performed on the three patients. All patients reported complete resolution of symptoms following the EBPs, while MRI imaging improved substantially.

Discussion: This report describes three cases of SIH with CSF leak originating from the cervical, the thoracic and the lumbar level. The EBP restored CSF volume and relieved the patients' persistent symptoms. MRI helps in showing indirect signs of low volume of CSF, though it may not be possible to find the actual site of leak.

References:

1. Limaye K, Samant R, Lee RW. Spontaneous intracranial hypotension: diagnosis to management. *Acta Neurol Belg* 2016; 116:119-25
2. Mokri B. Spontaneous low pressure, low CSF volume headaches: spontaneous CSF leaks. *Headache* 2013; 53:1034-53

Learning points: EBP is a well-accepted and beneficial treatment modality for SIH when conventional measures fail.

6603

Temporary meningeal symptoms after epidural blood patch.

Oreshnikov E.¹, Oreshnikova S.¹, Kashaeva L.¹¹Chuvash State University - Cheboksary (Russia)

Background and Goal of Study: Post-puncture headache - an unpleasant rare event. Associated with epidural and spinal anesthesia. With epidural anesthesia, its cause is an unintentional puncture of the inner leaf of the dura mater. With spinal, intrathecal puncture itself.

Materials and Methods: 20 years of experience in post-puncture headache in a maternity hospital (~ 200 observations), associated with epidural analgesia in childbirth.

Results and Discussion: Almost 100% of observations - unintentional puncture of the inner leaf of the dura mater with an epidural needle. Manifests 6-18 hours after removal of the epidural catheter. In less than 50% of cases amenable to conservative treatment. Classical triad (bedrest, hydration, tylenol) - temporary unstable relief. Most have an epidural blood patch. In case of refusal, contraindications for filling, strict adherence to bed rest for 10-14 days. A single epidural blood patch with autoblood with a volume of 10-20 ml in almost 100% permanently relieves a headache. Repeated epidural autologous blood filling is required only in 1-2% of cases. In 1-2% of our cases of epidural blood patch, we observed short-term, up to 3-5 days, development of meningeal symptoms, in particular, pronounced occipital rigidity against the background of complete disappearance of positional headache. This occipital stiffness looks quite frightening, but usually practically does not bother patients and regresses spontaneously by 5 days after a blood patch.

Conclusion: A possible explanation for the development of meningeal symptoms immediately after an epidural patch is the ingestion of a small amount of autologous blood into the subarachnoid space, followed by irritation of the dura mater.

6648
Routine intraoperative heparinization during cementation in patients with an intracapsular hip fracture does not reduce the risk of thromboembolic events: a case control study.

Castro Lalin A.¹, García-Mansilla A.¹, Holc F.¹, Slullitel P.¹, Buttaro M.¹, Vescovo A.¹
¹Hospital Italiano de Buenos Aires - CABA (Argentina)

Background and goal of study: the activation of thrombogenesis in total hip arthroplasty (THA) mostly occurs during femoral time and the risk is increased in cemented fractures. Multiple studies have been published in relation to the administration of unfractionated heparin (UFH) during cementation in primary THA, however, its use in femoral neck fractures (FNF) has been less studied. The aim of this study is to compare the occurrence of perioperative thromboembolic events between patients with a FNF who received UFH during cementation and a control group that did not.

Material and Methods: we retrospectively reviewed 273 patients who underwent cemented THA due to FNF between February 2015 and March 2020. We compared a group of 139 patients without intraoperative administration of UFH (group A) with 134 patients who underwent THA with intraoperative administration of UFH (group B). Demographic data, patient's comorbidities, intraoperative events (desaturation, hypotension), in-hospital complications and readmission at 30 days for any reason were collected.

Results and Discussion: no significant differences were found in demographic data, comorbidities, surgical time, type of anaesthesia and use of tranexamic acid between both groups. One patient (0.7%) and 27 (20.01%) p<0.05 experienced desaturation during cementation in group A and B respectively. Hypotension during cementation was recorded in 4 patients (2.9%) for group A and 27 (20.01%) in group B p<0.05. Eight patients developed pulmonary embolism in the UFH group against two patients in the non UFH group p=0.166.

Conclusions: no significant differences were found in the prevention of thromboembolic events with the use of UFH in this FNF cohort treated with THA when compared with patients who did not receive UFH.

6661
Against all odds: epidural haematoma in a minor hepatic metastasectomy

Pereira S.¹, Gouveia H.¹, Nunes S.¹, Luís M.¹
¹Hospital Dr Nélio Mendonça - Funchal (Madeira) (Portugal)

Background and Goal of Study: Epidural analgesia (EA) in patients undergoing liver resection remains controversial because of the increased risk of epidural haematoma (EH), although extremely rare. We report a case of EH in a patient submitted to a hepatic metastasectomy, after EA.

Materials and Methods: A 71-year-old, diagnosed with metastatic cholangiocarcinoma and previously submitted to cephalic pancreatoduodenectomy, was admitted for elective metastasectomy (2x3 centimeters). Her history included hypertension on bisoprolol and chemotherapy two years previously. Preoperative assessment revealed minor changes, as described in table 1. The patient consented a combination of EA with general anaesthesia and a lower thoracic epidural catheter (T9-T10) was uneventfully placed.

Table 1
 Perioperative coagulation and liver function tests

	Preoperative	1POD	2POD*	3POD
PT (s)	13.6	17.1	14.7	15.7
INR	1.16	1.47	1.26	1.35
Platelet (x10 ⁹ /l)	108	91	92	77
Albumin (g/l)	45.2	25.8	26	26.1
ALT (U/l)	69.4	103	78	68.4
ALP (U/l)	56.6	103.8	66.8	46.7
Bilirubin (mg/dl)	0.7	0.73	1.15	0.77

A two-hour surgery was performed successfully, with insignificant blood loss. On postoperative day 2, the patient underwent emergent reintervention due to severe hemoperitoneum but no vascular bleeding point was detected and therefore, coagulopathy was assumed. After transfusion of 3 units of fresh frozen plasma (FFP) and 1 platelet concentrate (PC), haemorrhage resolved and the epidural catheter was removed the next day, considering a 12 hour interval since the last administration of prophylactic enoxaparin. 18 hours later, the patient presented with severe lumbar and inferior limb pain and paraparesis. A CT scan revealed an EH from T8-T10, and emergent laminectomy was performed. 1 PC, 4 FFP and 1000U of prothrombin complex concentrate were administered, ROTEM® guided. After several months of rehabilitation, the patient managed to walk unassisted.

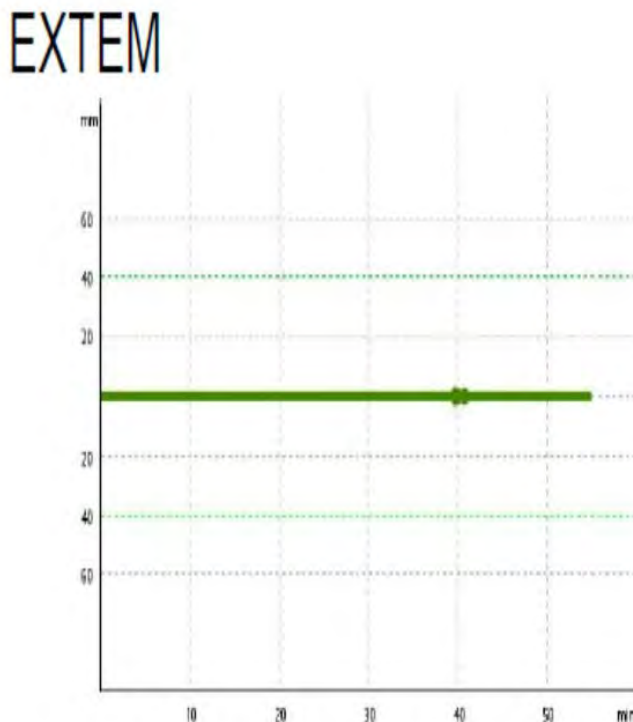


Figure 2 - ROTEM® Thromboelastometry showing no activation of clot formation in EXTEM.

Conclusion: Despite following every recommendation for epidural catheter handling, masked coagulopathy can prevail and thus a high level of EH suspicion should always subsist.

6663

Anaesthetic approach of a patient with Myasthenia Gravis and polytrauma undergoing spinopelvic reduction and fixation

Pereira A. P.¹, Teixeira F.¹, Morais D.¹, Norte G.¹, Sampaio J. C.¹, Abrunhosa R.¹

¹Centro Hospitalar Tras os Montes e Alto Douro - Vila Real (Portugal)

Background: Myasthenia gravis (MG) is a neuromuscular autoimmune disease that raises anaesthetic concerns, not only regarding neuromuscular blocking agents but also respiratory impairment and potential need for postoperative ventilation, mainly related to duration and severity of MG, coexisting chronic respiratory disease, important blood loss and major surgeries¹. MG places patients undergoing surgery at greater risk of adverse outcomes and alternatives to general anaesthesia (GA) and opioids may be encouraged. Prone spinopelvic surgery is customarily performed under GA. We describe the use of a combined spinal-epidural technique (CSE) to successfully circumvent post-operative pulmonary events in a patient with myasthenia gravis and important polytrauma.

Case Report: A 45-year-old woman, with MG (thymectomy at age 14 and under pyridostigmine therapy), hypertension, chronic obstructive pulmonary disease, alcoholism and chronic renal failure presented to the operating room after a stay in intensive care unit, in need for spinopelvic reduction and fixation due to acetabular and sacroiliac fracture and diastasis in the context of a car accident. At admission, she also had multiple rib and clavicular fractures, lung contusion and hemopneumothorax, T12 vertebrae fracture, rhabdomyolysis and hyperlactacidemia. A CSE at L3-L4 level (bupivacaine 15 mg and fentanyl 0,025 mg in spinal) was performed. IV infusions of dexmedetomidine (0,7-1 mcg/kg/h) and low-dose propofol were maintained during surgery for patient comfort. Ropivacaine 0,75% was administered epidurally as needed during surgery (twice, 5 ml each).

Patient underwent uneventful 5-hour intervention in prone position. Patient was comfortable during and after the procedure and safely discharged from anaesthesia care. The epidural catheter was left in place for 2 days for pain management. No postoperative complications were observed.

Discussion and learning points: Regional anaesthetic strategies are useful alternatives for spinopelvic surgery in patients with MG and important pulmonary impairment, namely thoracic trauma, who are at substantial risk for postoperative complications, avoiding further respiratory compromise in these patients. Amide local anesthetics are preferred as esters are metabolized by pseudocholinesterases, which can be problematic in patients taking anticholinesterases.

References:

1. Allman K, Wilson I, eds. Oxford Handbook of Anaesthesia. 4 ed. Oxford University Press; 2016

6730

Efficacy of Ultrasound-Guided Rhomboid Intercostal Block (RIB) on Perioperative Analgesia in Male Patients Undergoing Combined Power Assisted Liposuction with Pull-Through Excision of Gland for Breast Reshaping and Definition: A Randomized Controlled Trial

Wahdan A.¹, Salam A.¹

¹Cairo University Hospital - cairo (Egypt)

Background and Goal of Study: This study's main objective was to evaluate and compare the efficacy and safety of using rhomboid intercostal block in patients undergoing gynecomastia procedure under general anesthesia under general anaesthesia.

Materials and Methods: This double-blinded prospective randomised controlled study was conducted on 60 patients aged between 18 and 40 years; all were scheduled for gynecomastia procedure under general anaesthesia. Patients were randomly allocated into one of two groups: the RIB group (n=30) or the control group (n=30). All patients received Ultrasound-Guided Rhomboid Intercostal Block (RIB) after induction of

general anaesthesia, in the RIB group; 20 mL of levobupivacaine 0.25% were used, while 20 mL were given to the control group instead. The primary endpoint was the total amount of morphine consumed during the intraoperative and the first 24 postoperative hours. Secondary endpoints included, time to first request of rescue analgesia as well as incidence of adverse effects.

Results and Discussion: The time to first analgesic dose was significantly longer in the RIB group compared to those in the C with value. Moreover, the total amount of morphine consumed during the intraoperative and the first 24 postoperative hours was found to be significantly lower in the RIB group compared to the control group (P<0.001). No statistically significant differences were observed between the two groups regarding complications.

Conclusion: Ultrasound-Guided Rhomboid Intercostal Block (RIB) is useful intervention for providing adequate pain management in gynecomastia procedure under general anaesthesia.

6731

Evaluation of Magnesium Sulphate in Combination with Dexmedetomidine as Adjuvants to Levobupivacaine in Ultrasound-Guided Spermatic Cord Block: A Randomised Controlled Trial

Wahdan A.¹, Salam A.¹, Moussa A.², Farag M.³

¹Cairo University Hospital - cairo (Egypt), ²Beni Suef University Hospital - Beni Suef (Egypt), ³Cairo University Hospital - Cairo (Egypt)

Background and Goal of Study: Many additives were used in combination with local anaesthetics to increase the quality of anaesthesia and prolong postoperative analgesia. This study was conducted to investigate the effect of adding dexmedetomidine and magnesium sulphate to levobupivacaine 0.5% on the quality of spermatic cord block (SCB) anaesthesia in TESE surgery.

Materials and Methods: This prospective randomised double-blinded study was conducted on 113 patients scheduled for TESE surgery under local anaesthesia. Patients were randomly allocated into one of four groups. Each patient received bilateral SCB by levobupivacaine 0.5% 18 mL combined with 2 mL of either normal saline (group C), magnesium 100 mg (group M), dexmedetomidine 1 µg/kg (group D) or a mixture of the same doses of both magnesium and dexmedetomidine (group MD) according to group assignment. Patients were compared according to the time of first analgesic dose, onset and recovery from the sensory blocks, and analgesic intake in the first 24 h.

Results and Discussion: The time to first analgesic dose was significantly longer in the MD group compared to those in the C, M and D groups with value (20 ± 1.5 vs 9 ± 1.5, 14.4 ± 2.3 and 15.6 ± 2.2 h, respectively; P < 0.001). Moreover, time to onset of sensory block and the total amount of postoperative analgesia were significantly reduced in the MD group compared to those in others groups.

Conclusion: The combination of magnesium and dexmedetomidine added to levobupivacaine prolonged the time of postoperative analgesia and shortened the time to onset of sensory block with decreased postoperative analgesic consumption.

6760

Regional nerve blocks versus neuraxial anesthesia techniques for Lower Limb Peripheral Vascular Surgery at high-risk patients.

Masoodi A.¹, Dziuba D. O.², Loskutov O. A.²

¹Kiev Regional Clich Hospital - Kyiv (Ukraine), ²Shupyk National Medical Academy of Postgraduate Education - Kyiv (Ukraine)

Background and Goal of Study: Peripheral vascular disease (PVD) is a major cause of morbidity and mortality globally, with significant financial burdens on critical healthcare resources. Regional blocks are a widely used anesthesia techniques for high-risk patients with severe coexisting diseases and use of anticoagulants for whom general or neuraxial anesthesia is harmful and should be avoided. The aim of this study is to serve as a reminder of its significant value of regional anesthesia blocks in patients who are not appropriate for other type of anesthesia.

Materials and Methods: 82 patients undergoing a peripheral vascular reconstruction of lower limbs which were performed under either spinal anesthesia I group (27 patients) or regional block II group (n.femoralis, n.ischiadicus, n.obturatorius) with local infiltration at the site of dissection as needed (25 patients) or combined spinal-epidural anesthesia III group (30 patients). All patients had arterial lines. Arterial blood pressure and electrocardiographic monitoring were continued during surgery.

Results and Discussion: Operations included femoral-femoral, femoral-popliteal bypass grafting and thrombectomy. Average age of patients 72.7 years. ASA score III-IV. The intra-operative events showed that the mean time needed to perform the block and dose of analgesics and sedatives needed during surgery was greater in group II and III, compared to group I [P=0.01*, P0.029*, P0.039]. Local infiltration in the area on the dissection with 5 ml 1% lidocaine was required in patients in group II vs none in the spinal group and combined spinal-epidural technique. The incidence of pain requiring analgesics and especially opioids at postoperative period was higher in group I (VAS=+7,10) than in group II(+VAS=+0,1_) and III(+VAS=+2,4_) 8 hours after surgery. 24 hours after surgery at group I(VAS=+7,10) and II(VAS=+5,6) in compare to group III (VAS=+3,4) [P0.021*, p0.0028]. Urinary retention level was greater at group I and III and none at group II [P=0.01*, P0.029*, P0.039]. Incidences of hemodynamics drop higher at group I and group III then in group II.

Conclusion: Lower limb vascular reconstruction can be done under regional anesthesia (n.femoralis, n.ischiadicus, n.obturatorius blocks) with local infiltration at the site of dissection as what can allow to avoid hard complications at patients with high-risk diseases and optimize pain relief for them.

6795

Magnesium sulfate as an adjuvant to bupivacaine in ultrasound-guided supraclavicular brachial plexus block: a randomized, double-blinded clinical trial

Pietroski dos Santos N.¹, Macedo Lima T. M.², Rocha E. A.², Pivovar De Camargo Rosa R.², Arrais Garcia M.², Midory Marques Monteiro R.²

¹Hospital Estadual Mário Covas - Santo Andre (Brazil), ²Dept of Anesthesiology. Faculdade de Medicina do ABC - Santo Andre (Brazil)

Background and Goal of Study: Peripheral nerve blocks with magnesium sulfate (MgSO₄) as adjuvant have shown divergent results regarding its influence on the onset time of anesthesia. [1] The main goal of this study was to compare sensory latency on ultrasound-guided supraclavicular brachial plexus block. The hypothesis was that the addition of MgSO₄ to bupivacaine could reduce the block's sensory onset time.

Materials and Methods: Randomized, double-blinded clinical trial, carried out in adults PS ASA I-II who underwent surgeries of the upper limb under ultrasound-guided supraclavicular brachial plexus block. The B group received 24mL of 0.5% bupivacaine [120mg] and 6mL of saline, while BMag group received 24mL of 0.5% bupivacaine [120mg], 3mL of MgSO₄ 10% [300mg] and 3mL of saline. In total, each participant received 30mL of the randomized solution. The data were analyzed by independent t-test, Wilcoxon rank-sum test, or chi-square test. The robustness of the results was assessed by sensitivity analysis.

Results and Discussion: 21 participants were analyzed (B group n = 11, BMag group n = 10). Sensory onset time showed no difference between groups (B group 22.4 min ± SD 7.3, BMag group 22 min ± SD 7.7; p=0.89). The addition of MgSO₄ resulted in a lower median pain, as measured by means of the visual analog scale during the first 24 hours after surgery (B group 1.40 [IQR 1.60], BMag group 0.20 [IQR 1.20]; p=0.02). There was no difference between the groups in other secondary outcomes: onset time of motor block (B group 22.5 min [IQR 25], BMag group 24.9 min [IQR 17]; p=0.45); duration of motor block (B group 825.87 min ± SD 340.79, BMag group 931.25 min ± SD 465.13; p=0.55); duration of sensory block (B group 942.87 min [IQR 311.25], BMag group 770 min [IQR 556]; p=0.38); rebound pain (B group 50%, BMag group 22%; p=0.23).

Conclusion: We did not observe evidence to support the use of perineural MgSO₄ in supraclavicular brachial plexus block to decrease the onset time of sensory block; however, this adjuvant may be beneficial in reducing postoperative pain.

References:

1. Clin J Pain 2016; 32(12):1053–61.

6840

Damage control in the frail orthopedic elderly patient: case report

Martínez Domingo A.¹, Valencia Royo D.¹, Rodríguez Bermúdez J. A.¹, Maciel Goncalves J. L.¹, Hernández Aguado C.¹, Vives Santacana M.¹
¹Hospital Universitari Dr Josep Trueta - Girona (Spain)

Background: Aortic stenosis (AS) is the most common valve lesion in developed countries. It represents an obstruction at the left ventricular outlet, causing a pressure overload and compensatory hypertrophy. Cardiac output is maintained at the expense of preload with adequate blood volume and heart rate. Its increasing incidence, given the aging of the population, together with the high demand for non-elective orthopedic surgery in frail elderly patients, makes it not uncommon to find ourselves faced with the challenge of providing anesthesia in these patients.

Case Report: A 98-year-old woman, ASA IV, who has high blood pressure (HBP), atrial flutter with anticoagulant therapy and hemodynamic angina, pacemaker mode VVI, severe AS, tricuspid and mitral regurgitation, moderate pulmonary hypertension and cognitive impairment. She has suffered a subtrochanteric fracture, and requires urgent surgery. It does not present any analytical alterations that contraindicate regional anaesthesia. We decided to perform the procedure under continuous spinal anaesthesia (CSA), dural puncture was at L3-L4 level using a 18g Tuohy needle, and the catheter was introduced 3 cm intrathecally. 4mg Bupivacaina 0.1% + 10mcg fentanyl were given through the catheter. Satisfactory surgical sensitive blockade was achieved. Basic monitoring and restricted fluid therapy. Minimum dose iv of etomidate and haloperidol for sedation and to tolerate the puncture. No adverse hemodynamic effects or intraoperative pulmonary complications were noted, maintaining target heart rate. Patient was safely discharged from anesthesia care.

Discussion: Classically, spinal anaesthesia has been considered contraindicated due to the sympathetic block and the consequent reduction in preload, vascular tone, and heart rate. However, general anesthesia also poses a high risk due to vasodilation. The true contraindication is not to the technique itself but its hemodynamic effects.

References:

1. Amin S et al; Continuous spinal anesthesia for elderly patients with cardiomyopathy Egyptian Journal of Anaesthesia 2016; 32:535–540.

Learning points: Regional anaesthesia is the least invasive option in patients with high anesthetic risk. In this case of severe AS in a pluripathological elderly patient, CSA is a valuable option that allows us to adjust the dose of local anesthetics necessary, minimizing the hemodynamic risk and offering the rest of the advantages of a regional technique compared to general anaesthesia.

6877

Effectiveness of ultrasound-guided obturator nerve interfascial block with an inguinal approach during transurethral resection of bladder tumour: a prospective randomized double-blinded clinical trial

Pardo A.¹, Nohales G.², Andolz I.², Garcia-Larrosa A.², Rodriguez Malatesta R. A.², Corcoy M.¹

¹Department of Anaesthesia and Intensive Care Medicine, Parc de Salut Mar - Barcelona (Spain), ²Department of Urology, Parc de Salut Mar - Barcelona (Spain)

Background and Goal of Study: The obturator nerve is located lateral to the wall bladder and its stimulation during lateral-wall surgery can lead to an adductor spasm which can cause bladder perforation and incomplete tumour resection. Ultrasound-guided obturator nerve (ON) interfascial block with an inguinal approach is described as a successful technique to prevent the obturator reflex, but the studies carried out have low scientific evidence. The goal of the study is to assess whether this block with 10 milliliters of 2% lidocaine (local anaesthesia group, LA) reduces the incidence of adductor spasm, compared to the use of placebo (physiological saline group, SF) during transurethral resection of bladder tumour (TURBT) located on the lateral wall. A secondary aim is to find differences in the risk of bladder perforation, the quality of resection (muscle layer in the tissue sample) and surgery duration between both groups.

Materials and Methods: The study is a prospective, randomized, double-blinded clinical trial that includes 92 patients from Hospital del Mar who must undergo TURBT under spinal anaesthesia (sensory block at T10). A single ultrasound-guided injection technique is performed by the same anesthesiologist. Recruitment took place between November 2015 - April 2019. The analysis of muscle spasm and bladder perforation is calculated by the relative risk and the difference in risks. The macro! COR for SPSS Statistics is used, specifying the 95% confidence interval for these association measures. Statistical significance is set at $p < 0.05$.

Results and Discussion: 10 patients out of 39 from the SF group, and 7 patients out of 41 from the LA group suffered an ON stimulation, showing a Risk Ratio (RR) of 0.67 (95% CI 0.28 to 1.57, $p=0.35$). There were no differences in ON stimulation, the risk of bladder perforation and the duration of the TURBT between both groups. However, muscular layer in the tissue sample tended to be higher in the LA group (90% versus 74%), which could lead to a better tumour resection ($p= 0.07$). An insufficient volume of LA might explain not finding significant differences¹.

Conclusion: The interfascial ON block with local anaesthesia has not shown a significant benefit in reducing obturator spasm or the risk of bladder perforation. Although not significant, a higher quality of the resection in the LA group was found which may have some long-term impact. Further studies are needed.

References:

1. J.Anesth(2011)25:923-926

6905

Does the timing of intravenous prophylactic infusion of granisetron improve hemodynamic profile during spinal anesthesia in elective lower-abdominal surgery?

Cindea L.¹, Gherghina V.², Balcan A.², Samoila B.³, Prazaru M.¹, Costea D. O.¹

¹Emergency Clinical Hospital Constanta - Constanta (Romania), ²Ovidius University of Constanta - Constanta (Romania), ³John Radcliffe Hospital - Oxford (United Kingdom)

Background and Goal of Study: Cardiovascular perturbations, such as hypotension and bradycardia, are commonly observed during spinal anesthesia, increasing the risk of other adverse events. Granisetron, a 5-HT₃ receptor antagonist, was evaluated for its potential effect in prevention of spinal anesthesia-induced hemodynamic disturbances without consistent results. The purpose of our prospective randomized double-blind study is to estimate the impact of different timing of granisetron administration before the initiation of spinal anesthesia, on the hemodynamic profile during lower-abdominal surgical procedures.

Materials and Methods: We enrolled 76 patients (ASA I-III) scheduled for elective lower-abdominal procedures under spinal anesthesia. The eligible subjects were randomly allocated to group A (n=36 patients) and group B (n=36 patients), both of them being treated with 1 mg granisetron, diluted in 10 ml of normal saline solution, slowly intravenously infused 20 minutes, respectively 5 minutes before the initiation of spinal anesthesia. For 60 minutes after onset of spinal anesthesia, mean arterial pressure and heart rate were documented every 5 minutes. The incidence of nausea/vomiting as well as total consumption of ephedrine and atropine during the same interval were assessed, too. Collected data were analyzed using Student's t-test and Fisher's exact test with a significance level for $p < 0.05$.

Results and Discussion: Although all patients experienced cardiovascular disturbances, the hemodynamic profile was affected to a lesser extent in group A compared to group B, with statistically increased values of mean arterial pressure ($p < 0.05$) and heart rate ($p < 0.05$). Doses of ephedrine and atropine used throughout study period were significantly less in group A versus group B ($p < 0.05$). Nausea/vomiting events were statistically less frequent in group A, too. ($p < 0.05$).

Conclusion: The early prophylaxis with iv granisetron compared to its late administration, effectively mitigates the spinal anesthesia-induced cardiovascular changes with significant reduction of nausea/vomiting incidence and atropine/ephedrine doses during elective lower-abdominal surgery.

6914

Continuous Spinal Anesthesia, an option to general anesthesia in a patient with severe Obstructive Sleep Apnea, undergoing open appendectomy – a case report

Gonçalves D.¹, Roriz D.¹, Pereira A. P.¹, Teixeira F.¹, Pereira A. I.¹, Sampaio C.¹

¹Centro Hospitalar Tras os Montes e Alto Douro - Vila Real (Portugal)

Background: Continuous spinal anesthesia (CSA) is a technique with several advantages such as: the ability to administer small, titrated and incremental doses of local anesthetics; the achievement of adequate surgical sensory blockade level, associated with minimal hemodynamic instability. Patients with Obstructive Sleep Apnea (OSA) are at increased risk for perioperative complications which include potential difficult airway management, pulmonary aspiration, respiratory depression, hypoxemia, atelectasis, pneumonia, cardiac arrhythmias, myocardial infarction and airway obstruction post-extubation.

Case Report: A 70-year-old male patient, ASA III, with a history of ischemic heart disease, diabetes mellitus, obesity, and severe OSA was scheduled for an urgent exploratory laparotomy due to suspected appendicitis. Airway evaluation revealed a grade IV Mallampati, reduced mouth opening, short neck and neck circumference > 43 cm.

After obtaining consent to perform surgery under regional anesthesia, we decided to perform a CSA in case of surgery delay and also to minimize hemodynamic instability. Dural puncture was performed with a midline approach at the level of L3-L4 using a 18G Tuohy needle, a 20G catheter was introduced 3 cm intrathecally. 1.8 mL of 0.5% heavy bupivacaine were given through the catheter and satisfactory sensitive blockade, was achieved. A satisfactory sensitive blockade was achieved, which allowed surgery to proceed without complications. Patient's hemodynamics were stable throughout the entire procedure and no adverse events were registered.

Discussion: CSA has been shown to be a safe and effective technique to manage high risk patients. This technique not only allows us to carefully titrate local anesthetic dose and minimize the risk of a sudden hemodynamic collapse, but also enables us to slowly reach the desired surgical sensory blockade level without the risk of respiratory depression.

References: Tajender S. Vasu, M.D., M.S.1; Ritu Grewal, M.D.2; Karl Doghramji, M.D. Obstructive Sleep Apnea Syndrome and Perioperative Complications: A Systematic Review of the Literature Journal of Clinical Sleep Medicine, Vol. 8, No. 2, 2012

Learning points: Whenever feasible, the avoidance of general anesthesia seems to be an effective approach to reduce the incidence of complication in patients with OSA.

6960

Retrospective review of assessment and documentation of epidural monitoring of patients in Intensive Care and if this aligns with national guidelines

Khodatars S.¹, Abdoolraheem M. Y.¹

¹Hammersmith Hospital - London (United Kingdom)

Background and Goal of Study: We were interested in reviewing the process by which neuraxial anaesthesia was monitored in patients during the post-operative period. Our study focused on those cohort of patients admitted to the Intensive Care Unit at a tertiary centre for specialist surgery. Neuraxial anaesthesia is frequently encountered as part of the Enhanced Recovery after Surgery (ERAS®) protocol and is commonly utilised at the study site. The assessment of the epidural block documentation was compared to national guidelines as set out by The Faculty of Pain Medicine of the Royal College of Anaesthetists (1).

Materials and Methods: A retrospective review of epidural documentation for post operative patients entering level 2 and 3 care between 18/05/2021 and 20/04/2021. Documentation review included; timing of review, type of practitioner whom performed the assessment, assessment of block (sensory and motor), observations, sedation score, temperature, and pain intensity. Analysis of data performed using Microsoft excel 2010.

Results and Discussion: In total, 28 patient notes were reviewed. The patients' procedures comprised a mix between complex: cardiac, thoracic, hepatobiliary, upper gastrointestinal and gynaecology oncology cases. The results showed that of the cases, only 79% had documentation in accordance with the guidelines. Of those who did, 20% had an initial review performed by a health care professional with no prior training/education into assessment of blocks. Furthermore, in 15% of cases, epidurals were removed earlier than expected due to perceived poor analgesic use before any attempt of troubleshooting.

Conclusion: Our review showed that whilst there were appropriate online documentation systems available to comply with the guidelines set out, the perceived lack of education regarding assessment and management of epidurals when difficulties arose were inadequate.

We therefore believe regular education to all health care professionals working in clinical settings with epidurals as highlighted in the guidelines set out by the faculty of pain medicine should be reviewed. We demonstrated sustained improvement through delivering structured and reproducible educational sessions and would encourage others to review processes locally.

References:

1. Best Practice in the Management of Epidural Analgesia in the Hospital Setting. (2020). [online] . Available at: <https://fpm.ac.uk/sites/fpm/files/documents/2020-09/Epidural-AUG-2020-FINAL.pdf>.

6979

Erector spinae plane block for the management of scapular surgery pain: a case report

Petiz C.¹, Dias C.¹, Resende A.¹

¹Centro Hospitalar Lisboa Norte - Lisbon (Portugal)

Background: Literature regarding regional analgesia for scapula procedures is scarce. Although selective blockade of the dorsal scapular nerve can provide good analgesia to the osteotomes of the scapula, somatic innervation of the overlying skin is not covered with this block and additional analgesia may be required. Erector Spinae Plane (ESP) block is a paraspinous fascial technique in which the dorsal and ventral rami of the spinal nerves are blocked and a multi-dermatomal sensory blockade of the anterior, posterior, and lateral thoracic walls is achieved. We report the successful management of postoperative pain after surgical resection of a metastatic lesion of the scapula resorting to a continuous ESP block.

Case Report: A 72y old female with diagnosis of lung cancer and a sarcomatoid metastatic lesion of the scapula non responsive to RT was electively schedule for its surgical resection. She had history of well controlled hypertension and previous smoking habits. The ~4h procedure took place under general anesthesia without complications. At the end of surgery, an ultrasound guided ESP block was performed at T3 level with 20ml of 0.375% ropivacaine and a catheter was left in situ for continuous local anesthetic delivery via a drug infusion balloon for the next 3 days. She reported well controlled pain in the postoperative period and was doing well on follow up.

Discussion: The ESP block is a relatively recent and versatile regional anesthetic technique that has been used to provide analgesia for several conditions. Performed at a higher level than initially reported, blockade of cervical roots can be achieved as demonstrated by CT imaging, and a more effective scapular pain control can be obtained¹. Much of the information on the efficacy of ESP block is from case reports and circumstantial experiences, so formal research should take place.

References:

¹Forero, M., Rajarathinam, M., Adhikary, S. Das, & Chin, K. J. (2018). Erector spinae plane block for the management of chronic shoulder pain: a case report. Canadian Journal of Anesthesia, 65(3), 288–293. <https://doi.org/10.1007/s12630-017-1010-1>

Learning points: The ESP block may be a promising alternative in the management of scapula surgery pain and deserves further study.

7029

Ultrasound-guided genicular nerve block for knee arthroplasty. A randomized clinical trial.

Tatjer Hernanz I.¹, Cuiat T.², Martín N.², Basora M.², Comino-Trinidad O.², Sala-Blanch X.²

¹Hospital Clinic Barcelona - Barcelona (Spain), ²Hospital Clinic - Barcelona (Spain)

Background and Goal of Study: Total knee arthroplasty (TKA) is one of the most frequent surgical procedures in developed countries. Fast-track recovery protocols rely on early rehabilitation and adequate pain management. Local infiltrative analgesia (LIA) has gained popularity due to its simplicity. However, the lack of standardization on the dosage and its combination with motor sparing peripheral nerve blocks increases the risk of local anaesthetic intoxication. Genicular nerve block (GNB) has demonstrated improvement in chronic pain secondary to knee osteoarthritis and may offer comparable analgesia to LIA in the context of TKA (1). The primary outcome of this study was to test the non-inferiority of the first 24 h analgesic effect of GNB versus LIA in patients undergoing TKA.

Materials and Methods: Fifty-nine patients scheduled for TKA were randomized to either ultrasound- guided GNB or LIA. Five genicular nerves were blocked: superior medial genicular nerve, superior lateral genicular nerve, inferior medial genicular nerve, inferior lateral genicular nerve and recurrent tibial genicular nerve. The pain numeric rating scale (NRS) was recorded after post anaesthetic unit (PACU) discharge, at 12 and 24 hours and during postoperative rehabilitation (noninferiority criteria $\Delta = 1$). Opioid consumption during the first 24 hours was also assessed (noninferiority criteria $\Delta = 21$ mg of oral morphine equivalents).

Clinicaltrials.gov identifier: NCT04681547

Results and Discussion: The median difference between two groups in postoperative pain NRS were: 0.00 [95% confidence interval (CI), -1.00 to 0.99, P= 0.022] in PACU, 0.00 [95% confidence interval (CI), -1.99 to 0.00, P = 0.021] at 12 hours, -1.00 [95% CI, -2.00 to -1.00, P < 0.001] at 24 hours, and 0.00 [95% CI, -1.00 to 0.00, P = 0.007] during the rehabilitation at 24 hours. Median difference in cumulative opioid consumption was 0.00 mg [95% CI, -3.00 to 5.00, P < 0.001].

Conclusion: Ultrasound-guided GNB was non-inferior to LIA regarding pain control in the first 24 h after surgery in patients undergoing primary TKA. Therefore, GNB is an alternative to LIA in fast-track primary TKA.

References:

1. Pietrantonio P, Cuiñat T, Nuevo-Gayoso M, Martín N, Basora M, Sastre S, et al. Bloqueo de los nervios geniculares guiado por ecografía: una alternativa analgésica a la analgesia de infiltración local para la artroplastia total de rodilla. *Eur J Anaesthesiol* 2021; 38: 1–8.

7061

Is regional anesthesia an adequate option to perform a renal transplantation in a patient with pulmonary Aspergilloma?

Escribano Arranz A.¹, Cara Gilabert C.², Luque Pelaez M.², Montero Lopez P.², Sala Trull C.², Echarri Gonzalez G.²

¹Clinica Universidad de Navarra - Pamplona (Spain), ²Clinica Universidad de Navarra - Pamplona (Spain)

Background: The most appropriate anesthesia for renal transplantation is general anesthesia. However, there are patients in whom it's necessary to look for another alternative. We present the case of a patient who required combined spinal and epidural anesthesia to avoid manipulation of the airway.

Case report: The patient was a 42-year-old female, in peritoneal dialysis for chronic kidney disease stage 5D secondary to glomerulonephritis. She had paraseptal emphysema with bilateral pulmonary bullae and right upper lobe aspergillomas. She also had bronchiectasis with frequent pneumonia and colonization by *Pseudomonas aeruginosa*. Therefore, she was candidate for renal transplantation underwent regional anesthesia to reduce the risk of respiratory complications.

Combined regional anesthesia was performed with spinal and epidural (L1-L2) anesthesia. Hyperbaric bupivacaine 0.5% (10mg) with Sufentanil (2µg) were used for spinal anesthesia. After 90 minutes, Bupivacaine 0.5% was administered via epidural (25mg) and maintenance was performed with an infusion of Bupivacaine 0.25% with Sufentanil (0.1µg/ml) at 8ml/h. Surgery was performed by supraumbilical median laparotomy. It was carried out with invasive blood pressure monitoring, central venous pressure and cardiac output monitor. She presented hemodynamic stability, with few specific requirements of vasoactive (Phenylephrine).

Discussion: Pulmonary aspergilloma is a saprophytic colonization of a preexisting parenchymal cavity where *Aspergillus* grows. One of the main problems during general anesthesia with intubation is the possible spread of the disease. Regional anesthesia is a valid alternative in lower abdominal surgeries in which bronchial intubation would be a risk. In a renal transplantation, the use of combined techniques is preferable, starting with spinal anesthesia, which ensures complete motor and sensory block, and it has the advantage of being easy to perform and avoids manipulation of the airway. The main risk is sympathetic block, which can lead to bradycardia and hypotension during surgery. However, with proper management the risk of complications is low¹. The epidural is used to maintain the blockage and is also useful to control postoperative pain.

Learning points: Regional anesthesia could be safe in renal transplantation in cases with high risk of respiratory complications.

Reference:

1 Nicholls AJ. Awake Renal Transplantation; A Realistic Alternative to General Anesthesia. *Transplant Proc.* 2010;42

7086

Pneumothorax after thoracic epidural – a rare complication

Saldanha Marques J.¹, Rodrigues D.¹, Lourenço A.¹

¹Centro Hospitalar Universitário São João - Porto (Portugal)

Background: Epidural analgesia may improve postoperative outcomes in cardiac surgery by optimizing pain control and reducing postoperative pulmonary complications. Pneumothorax (PTX) during thoracic epidural anaesthesia is a rare complication. We report a case of a PTX associated with epidural catheter (EC) placement.

Case Report: A 68-years old woman with type 2 DM, arterial hypertension, obesity class 1, osteoarthritis, kyphoscoliosis, asthma, and depression admitted for elective resection of left atrial myxoma and correction of interatrial septal defect. Combined thoracic epidural and general anaesthesia (GA) was planned. In the OR, under sedation with dexmedetomidine, and with invasive blood pressure, INVOS, BIS and ASA standard monitoring, the patient underwent thoracic EC placement at T2-T3 with loss-of-resistance (LOR) saline technique. Two attempts were made with a 9cm 18G Tuohy needle (18TN), using midline (MD) and paramedian (PM) approaches, both unsuccessful. A 12cm 18TN was then used. After an initial attempt in MD, a PM approach was attempted with LOR at 10cm accompanied by sudden cough, pain and air leak from the needle. The needle was removed and another PM attempt was made successfully at the same level with LOR at 10cm. EC was inserted 4cm into the epidural space. Anaesthetic bolus of ropivacaine was administered and an analgesic infusion was maintained throughout the procedure. GA was then induced and endotracheal intubation plus CVC placement were performed. A small left PTX was observed after median sternotomy. The surgery lasted 212min without complications. Thoracic drains were left in place. The patient was extubated at the end of surgery and transferred to the ICU with norepinephrine support. The post-operative x-ray after removal of thoracic drains showed no signs of PTX. During hospital stay she was evaluated on a daily basis by an anaesthesiologist reporting pain intensity ≤ 3/10. No complications were observed, and she was discharged 14 days after surgery.

Discussion: PTX is a rare complication of EC placement that can be either uneventful or life threatening. From the existing scarce reports, it appears to be more frequent in the PM approach and in patients with spine deformity. This complication may be anticipated and perhaps prevented by imaging exams.

References:

J Anesth(2004);18:138-140

Learning points: Epidural technique is associated with important complications that need to be prevented and promptly treated when they occur.

7098

The importance of systematic verification on drug preparation and administration: the swiss cheese model

Mora Cruz Freitas Ferreira C. L.¹, Damasceno J.¹, Moreira Z.¹
¹CHUP - Porto (Portugal)

Background: Intrathecal morphine is used for postoperative analgesia in major abdominal surgeries. However, the maximum intrathecal morphine dose for greater analgesic effect with fewer side effects is still not consensual, and this balance is still being discussed.

Case Report: We report the case of a 79-year-old male, diagnosed with cholangiocarcinoma and submitted to open hepatectomy and biliary tract removal. For postoperative analgesia, a single subarachnoid shot of 250 µg of morphine was performed before general anaesthesia induction. No critical events occurred. All steps were reviewed by the anaesthesia team, and an intrathecal morphine overdosage error was detected. We concluded that an actual morphine dose of 2,5 mg was administered in the subarachnoid space. By the end of the surgical procedure, and before signs of stability, we decided to wake up the patient, who manifested agitation and nasal pruritus. The patient remained at the PACU for 24 hours, for additional care and vigilance, during which he presented with somnolence and mild respiratory depression, without need of supplemental oxygen.

Discussion: This case demonstrates an overdose of intrathecal morphine with mild manifestations and no morbidity associated. However, it provides a glimpse of how potentially devastating this situation can be, with greater doses usually being associated with greater probability of side effects.

Learning points: The systematic verification of every step in the performance of a subarachnoid approach, from drug preparation to the procedure itself, is of utmost importance. Applying systematic strategies of human error mitigation is essential to prevent these errors.

References:

1. M. Giovannelli, N. Bedforth, and A. Aitkenhead, 'Survey of intrathecal opioid usage in the UK', *Eur. J. Anaesthesiol.*, vol. 25, no. 2, pp. 118–122, Feb. 2008.
2. K. M. Fares, S. A.-B. Mohamed, and H. S. Abdel-Ghaffar, 'High Dose Intrathecal Morphine for Major Abdominal Cancer Surgery: A Prospective Double-Blind, Dose-Finding Clinical Study', *Pain Physician*, vol. 17, pp. 255–264, 2014.
3. L. S. Jensen, A. F. Merry, C. S. Webster, J. Weller, and L. Larsson, 'Evidence-based strategies for preventing drug administration errors during anaesthesia', *Anaesthesia*, vol. 59, no. 5, pp. 493–504, May 2004.

7111

A prospective randomized controlled trial to compare the efficacy and safety of different doses of clonidine when used as an adjuvant to intrathecal bupivacaine

Kaushik P. S.¹, A Sonkamble P.², R Badole U.²

¹Sir HN Reliance Foundation Hospital - Mumbai (India), ²Grant medical college and JJ hospital - Mumbai (India)

Background and Goal of Study: Various adjuvants increase duration of spinal anaesthesia. Clonidine, though a known analgesic, has few studies on its intrathecal use. This study aims to compare the efficacy and safety of different doses of clonidine when added as adjuvant to bupivacaine in subarachnoid block (SAB).

Materials and Methods: Objectives were: 1) Duration of analgesia/sensory block and block height 2) Hemodynamic variations- pulse, MAP, complications. Normotensive adults aged between 18- 65 years of ASA grade I and II, posted for elective orthopedic surgery were included. Patients of ASA III or more or with significant cardiovascular, renal, hepatic dysfunction, contraindication to SAB, allergy to clonidine or Bupivacaine, short stature (<140cm in height), obesity(>30kg/m² BMI) were excluded. After Institutional Ethical committee clearance and written informed consent, 90 patients were allotted randomly to one of the three groups (30each): Group 1: only bupivacaine, Group 2 and 3: 15µg and 30

µg clonidine added to bupivacaine respectively. Standard ASA monitors were attached, epidural catheter was inserted in all patients. Spinal time taken as 0, hemodynamics, sensory and motor block was recorded at various time points. Time taken for regression of sensory and motor block were noted.

Results and Discussion: Demographics and baseline hemodynamics of all 3 groups was comparable. Time taken to achieve maximum motor(p<0.01), sensory block(p<0.02) was significantly lower in group 3(8.2±3.36 and 6.16±3.55minutes), time taken to 2 segment regression of block was earliest in group 1(p< 0.002): similar to Gashi et al[1]. There was comparatively a significant decrease in mean arterial pressure in clonidine groups than group 1(p<0.02) unlike a study by Agarwal D et al [2] who found comparable hemodynamics (clonidine vs only bupivacaine).

Conclusion: Clonidine as an adjuvant in SAB causes early onset and prolonged block but with significant hemodynamic changes

References:

1. Gashi AG, Terziqi H, MD,† Pervorfi T, Kryeziu A. Intrathecal clonidine added to small-dose bupivacaine prolongs postoperative analgesia in patients undergoing transurethral surgery. *Can Urol Assoc J.* 2012 Feb; 6(1): 25–29
2. Agarwal D, Chopra M, Mohta M, and Sethi AK. Clonidine as an adjuvant to hyperbaric bupivacaine for spinal anesthesia in elderly patients undergoing lower limb orthopedic surgeries. *Saudi J Anaesth.* 2014 .8(2): 209–214.

7152

Analgesia in kidney transplantation: efficacy of two anesthetic techniques

Castro Lalin A.¹, Bader A.¹, Sanchez Novas D.¹, Ferré M. S.¹, Sio N.¹, Meuli M.¹, Ramiro León, Miguel Álvarez
¹Hospital Italiano de Buenos Aires - CABA (Argentina)

Background and Goal of Study: Kidney transplantation (KT) is the treatment of choice in patients with end-stage renal disease. Given the advances in medical and surgical management, the spectrum of candidates has increased, including elderly patients with multiple comorbidities, making KT a challenge for the anesthesiologist. Optimal postoperative analgesia is essential after KT. Insufficient control can lead to stress response, pulmonary complications with metabolic and immunological impact on graft function. The use of neuraxial anesthesia has shown benefits in abdominal surgery but in KT the literature is contradictory since many recipients have cardiac, hematological and metabolic disorders that increase the risk of neurological and hemodynamic complications with also potential graft involvement. An average of 70 KT per year are performed at our centre. However, we don't have a protocolized analgesic strategy. That's why we believe in the need to evaluate the different methods used in order to establish a consensus on the analgesic management of this surgery. The goal was to evaluate the efficacy and safety of two anesthetic strategies in adult patients undergoing kidney transplantation: multimodal general anesthesia and general anesthesia combined with intrathecal morphine.

Materials and Methods: Observational retrospective study that included 138 patients undergoing KT between 2017 and 2020 at our centre.

The sample was divided into two groups: 65 patients who received multimodal general anesthesia and 73 patients who received general anesthesia with intrathecal morphine. The primary goal was to evaluate postoperative opioid consumption in the first 48 hours. We also compared the Numerical Rating Scale (NRS), length of stay in the intensive care unit (ICU); mortality and occurrence of neurological and respiratory complications.

Results and Discussion: Patients with intrathecal morphine received 36% fewer rescues of intravenous opioids (IRR: 0.64; 95% CI 0.45 to 0.91) without statistically significant differences regarding the length of stay in ICU (IRR: 0.98; 95 CI % 0.79 to 1.23) or mortality. There were no events of respiratory depression or neurological complications in any group.

Conclusion: Less postoperative opioid consumption was observed in the first 48 hours with the use of intrathecal morphine. There were no significant differences in length of stay and mortality. There were no adverse events recorded in the sample studied.

7164

The contribution of Erector Spinae Plane Block in achieving perioperative multi-modal analgesia to patients undergoing Laparoscopic Colectomy

Sifaki F.¹, Mantzoros I.², Koraki E.¹, Bagntasarian S.¹, Tsapara V.¹, Chloropoulou P.³

¹General Hospital Georgios Papanikolaou - Thessaloniki (Greece),

²Aristotle University of Thessaloniki - Thessaloniki (Greece),

³Democritus University of Thrace - Alexandroupoli (Greece)

Background and Goal of Study: Laparoscopic colectomies (LC) are gaining ground in modern surgical practices and are performed as treatment for a variety of reasons (colon cancer, inflammatory bowel disease, diverticulitis). Although nowadays, LCs are performed with minimally invasive techniques, patients complain for moderate to severe postoperative pain. The effective management of perioperative pain is one of the cornerstones of anesthesiology and trunk blocks, such as Erector Spinae Plane Block (ESPB), contribute to the achievement of peri-operative, multimodal analgesia. In this study, we evaluated the contribution of continuous, bilateral ESPB as a method of perioperative analgesia, in patients undergoing elective LC.

Materials and Methods: Ultrasound-guided, Bilateral ESPB was performed at T9 level, before the induction of general anesthesia, to 13 patients scheduled for LC. 20ml of Ropivacaine 0,375% was infused at each side, 30 minutes before the induction of general anesthesia and 12, 24, 36 and 48 hours after surgery through continuous infusion catheters. Total perioperative opioids administered, mobilization time of gastrointestinal tract and of the patient, start of oral fluids and enteral nutrition, discharge time and satisfaction score of the patients regarding perioperative analgesia, were recorded.

Results and Discussion: All patients remained hemodynamically stable and no complications were recorded. Average perioperative remifentanyl and tramadol administration was (m±sd) 342,3±332,8mcg and 165,4±68,9mg respectively, average mobilization time of gastrointestinal tract was (m±sd) 16,6±7,5 hours after surgery and average start of oral fluids and enteral nutrition was (m±sd) 17,5±10,5 and 39,2±11,6 hours after surgery, respectively. Average mobilization time of the patients was (m±sd) 26,7±10,8 hours after surgery, average discharge date was (m±sd) 5,7±2,5 days after surgery and average satisfaction score was 5,7 out of 6.

Conclusion: Continuous, bilateral ESPB performance with the administration of ropivacaine perioperatively, is an innovative, safe and simple method which has not been studied yet in patients undergoing LC. In this study, we confirmed that ESPB is effective in ameliorating the quality of perioperative analgesia, avoiding the complications arising from opioid administration and thus, contributes in achieving multimodal analgesia to patients undergoing elective LC.

7189

Awake thoracic epidural anesthesia for laparotomic gastrostomy: a successful experience

Pereira C.¹, Rebelo P.¹, Pinto C.¹, Soares M.¹

¹ULSM- Hospital Pedro Hispano - Matosinhos (Portugal)

Background: General anesthesia(GA) is the preferred anesthetic strategy for abdominal surgery. However, it carries important risks of airway complications and postoperative lung injury. We report a case of a palliative laparotomic gastrostomy using thoracic epidural anesthesia (TEA) as the sole anesthetic technique.

Case Report: A 75 years old male, ASA III, admitted for surgical gastrostomy review after secondary peritonitis due to migration of feeding probe. He had recently undergone a laborious surgical gastrostomy under bilateral subcostal transversus abdominis plane(TAP) block and sedation for treatment of symptomatic esophageal stricture. He had a history of chronic obstructive pulmonary disease, previous laryngectomy due to laryngeal cancer, and stage I lung cancer submitted to lobectomy (<10 months). We anticipated difficult airway management, ventilation problems, and a technically demanding surgery. After a risk-benefit evaluation, we decided to advance to surgery under awake TEA. Epidural catheter was placed at T9/T10 intervertebral space, the tip introduced

4 cm cephalad and 5 ml 0.5% ropivacaine with 10 mcg sufentanil was administered. The patient was under spontaneous ventilation, stable and comfortable during the procedure, which lasted 1h. No sedation or additional analgesia was needed. After the recovery room, he was transferred to the ward and epidural analgesia was maintained.

Discussion: In this case, local anesthesia was not a viable option due to predictive laborious surgery. It faced us with a dilemma: a palliative procedure must be attempted for the well-being of a patient but the risk of GA is higher than its advantages. Regional anesthesia avoids airway manipulation and has a lower rate of perioperative respiratory morbidity. There's a growing number of successful reports of non-intubated abdominal surgeries under TEA with satisfactory levels of perioperative anesthesia and analgesia¹. Balanced risks and benefits, TEA as a sole anesthetic technique was the better choice for our case and we think it should be considered in selected patients.

References: J Anesth Clin Res 2014, 5, 5-6.

Learning points: TEA as a sole anesthetic technique is a valid and effective alternative to GA for certain abdominal procedures. It should be considered more often in patients with respiratory disease particularly prone to postoperative complications related to airway manipulation and mechanical ventilation.

7228

Blind lumbar epidural blood patch for spontaneous intracranial hypotension: a case report.

Costa F.¹, Ferreira C.¹, Alves J.¹, Soares E.¹

¹Hospital de Braga - Braga (Portugal)

Background: Spontaneous intracranial hypotension (SIH) is a rare clinical entity, caused by spinal cerebrospinal fluid (CSF) leakage, that remains difficult to diagnose and treat. The hallmark symptom is orthostatic headache. Epidural blood patch (EBP) is the mainstay definitive treatment for refractory cases (1).

Case Report: A 57-year-old healthy woman presented with a severe, diffuse and incapacitating headache that started two weeks before with a gradual increase in intensity. It was associated with dizziness, diplopia, tinnitus and distorted hearing. The pain was exacerbated in the upright position and relieved after lying down. There was no history of previous headache, recent head or neck trauma, or invasive procedures. The neurological examination was unremarkable. Computed tomography (CT) and magnetic resonance imaging (MRI) were normal. The diagnosis of SIH was reached by exclusion. Conservative measures were ineffective. An EBP was performed after obtaining written informed consent. An 18-gauge Tuohy needle was inserted into the middle epidural compartment at the L3-L4 level and a total of 24 mL of autologous blood was injected in aseptic conditions. The patient was discharged, asymptomatic, on the 4rd day after treatment.

Discussion: SIH must be considered as differential diagnosis of patients presenting with persistent and orthostatic headache. The primary goal of SIH therapy is to stop the CSF leak and increase its volume. Imagiological techniques such as CT myelography or MRI myelography may be useful to confirm the diagnosis and to document the site of the leak. After the failure of conservative measures, EBP relieves symptoms in up to 90% of cases. The success rate of an EBP in patients with SIH is considerably lower than in patients with post dural puncture headache (PDPH; 30% vs. 70–90%, respectively). PDPH patients often require more than one EBP and larger volumes of blood, since it's more likely to have multiple leakage sites (2). Despite the described limitations, the decision to perform a blind EBP was made in face of the patients' clinical deterioration. A single blind lumbar EBP was performed with complete remission of symptoms. In our case, the classical EBP proved to be a safe procedure with no complications.

References: 1 – Brain; 2017; 140(2):344-352. 2 - World Neurosurgery; 2017; 101: 343-349.

Learning Points: The reported case underlines the importance of EBP as a safe and highly effective treatment for SIH patients.

7232 Low dose levobupivacaine continuous wound infusion versus thoracic epidural in open abdominal surgery

Hita G.¹, Zamudio D.¹, Gisbert L.¹, García Zamorano S.¹, Marrero A.¹, Panadero L.¹

¹Hospital Universitario Fundación Alcorcón - Alcorcon (Spain)

Background and Goal of Study: Thoracic epidural has shown to provide excellent postoperative analgesia in open abdominal surgery, but this technique may be limited by adverse effects, technical difficulties and contraindications. Continuous wound infusion (CWI) of local anesthetics (LA) can be an alternative but the optimal catheter placement and infusion regimen is still unknown. We aimed to compare the analgesic efficacy and adverse effects of CWI with thoracic epidural.

Materials and Methods: Retrospective observational study including patients who underwent open abdominal surgery. Patients were grouped according to whether they had received CWI (preperitoneal or subfascial) or thoracic epidural for postoperative analgesia. We recorded visual analogue scores (VAS) at 0, 1, 6, 12, 24 and 48h after surgery, need for catheter LA boluses and intravenous morphine as rescue analgesia, complications (need for vasopressor therapy, nausea and vomiting, wound hematoma, accidental catheter removal), time to sedation, ambulation, oral intake, urinary catheter removal and hospital discharge. Figure 1 shows data analysis and statistical tests.

Results and Discussion: Mean VAS scores (figure 1) and the rest of variables were similar in both groups (p>0.05). CWI patients received more intravenous morphine and epidural patients more LA boluses (p>0.05) and accordingly further investigation is required to establish optimal boluses and infusion doses for CWI. CWI catheters were maintained more days (p<0.05), but time to ambulation, oral intake and hospital discharge were similar in both groups (p>0.05).

Conclusion: CWI of low dose levobupivacaine provided effective postoperative pain relief, similar to thoracic epidural, in open abdominal surgery. Further investigation is required to establish optimal infusion and boluses doses to administer through CWI.

7268 Combination of Pectoral blocks type1 and type 2 as a part of a multimodal analgesia plan in obese women undergoing total mastectomy

Yevsieieva V.¹

¹Diagnostic and treatment centre for children and adults of the Dobrobut medical network - Kyiv (Ukraine)

Background and Goal of Study: Various methods of regional blocks have been used in anaesthetic practice over recent decades. However, very few studies describe these techniques within the structure of multimodal analgesia in obese patients. The aim of this study is to compare the efficiency of analgetic action of the combination ultrasound guided Pectoral blocks type1 and type 2 (UGPEC1,2) and the local infiltration anesthesia (LIA) of surgery incision in obese women undergoing total mastectomy.

Materials and Methods: The retrospective, observational study included 40 women with BMI≥35 who underwent total mastectomy surgery. Women were assigned to one of two equal groups; group I had UGPEC1,2 and group II received LIA in the area of the surgical incision. Patients in both groups had a inhaled low-flow anesthesia with sevoflurane combined with pre-emptive (i.v. paracetamol and dexketoprofen) and systemic analgesia with fentanyl. The primary efficacy endpoint - total intraoperative dose of opioids. Secondary outcomes were highest postoperative pain scores, incidence of PONV.

Results and Discussion: The intraoperative fentanyl intravenous dose in group I was considerably decreased: 0.34±0.16 µg/kg/h vs 0.82±0.11 µg/kg/h in group II, (p=0.017). The pain level by VAS in patients in both groups, in average, did not exceed 4 points within the first post-operative day, and there was no need in rescue analgesia with opioids. Patients in the group I also had a lower incidence of PONV: 16% vs. 28%, (p < 0.001)

Conclusion: The combination of Pectoral blocks type 1 and type 2 has analgetic and opioid-sparing advantages in obese women undergoing total mastectomy and may become prerequisites for opioid-free anesthesia in this patient's group.

7283 The use of magnesium as an adjuvant in brachial plexus blocks: A systematic review and meta-analysis

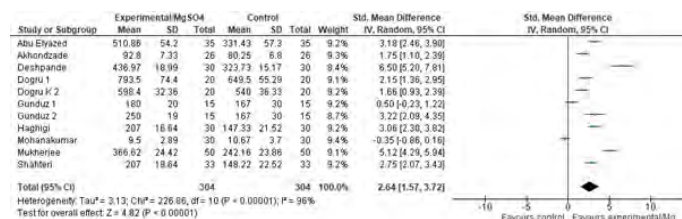
Tsoutsou M.¹, Malhotra R.¹, Banerjee A.¹

¹Royal Liverpool University Hospitals - Liverpool (United Kingdom)

Background and Goal of Study: The use of magnesium as an adjuvant to local anaesthetic (LA) for nerve plexus blocks may increase the duration of motor and sensory block. The aim of this systematic review and meta-analysis was to evaluate the effect of adding magnesium in motor block and sensory block duration in brachial plexus blocks, performed for upper limb surgery.

Materials and Methods: We searched the electronic databases PubMed, EMBASE, Google scholar and ResearchGate for RCTs comparing the use of LA vs LA+ magnesium in plexus blocks using keywords 'plexus', 'block', 'magnesium sulphate', 'magnesium sulfate'. The quality of each RCT was rated using a Jadad score. The primary outcome was the duration of motor block. Secondary outcomes were the duration of sensory block and the time to onset of sensory block. RevMan statistical software® was utilized inverse variance, as well as a random effect model to calculate standardised mean difference (SMD) with 95% confidence intervals for continuous variables.

Results and Discussion: Thirteen trials with a total of 939 patient were included, comparing LA vs LA+ magnesium. The Jadad score was between 2-5. Duration of motor block was significantly increased in the magnesium group SMD (IV, random, 95% CI) 2.64[1.57, 3.72] (P <0.00001) (figure 1). The duration of sensory block was also significantly increased in the magnesium group SMD (IV, random, 95% CI) 2.69[1.80, 3.57](P<0.00001). There was no significant difference in the time to onset of sensory block SMD – 0.06[-0.79, 0.66] (P= 0.86)



Conclusion: Magnesium used as an adjuvant in brachial plexus blocks significantly prolonged the duration of both motor and sensory block compared to LA alone without any significant difference to the onset of sensory block.

7295

The impact of regional anaesthetic techniques on pain scores and opioid use in patients undergoing an elective laparoscopic bowel resection

Read M.¹, Berwertz M.², Rao R.²¹The Rotherham NHS Foundation Trust - Rotherham (United Kingdom),²Sheffield Teaching Hospitals - Sheffield (United Kingdom)

Background and Aims: There are several different regional anaesthetic techniques commonly used for laparoscopic colorectal operations. The goal of this audit was to establish if different perioperative anaesthetic approaches used in elective laparoscopic colorectal bowel resections significantly affects postoperative opioid use and reported pain.

Materials and Methods: Retrospective data collection from all patients undergoing elective laparoscopic bowel resection by one consultant surgeon at Sheffield Teaching Hospitals over a 2-year period from June 2018 to June 2020. 47 patients were included in the audit and were divided into groups according to the type of anaesthetic received: (1) General Anaesthetic (GA) ± Local anaesthetic wound infiltration by surgeon (LA), (2) GA + Spinal Anaesthetic (SA), (3) GA + abdominal block, (4) GA + SA + abdominal blocks. The pain scores in PACU, at 6 hours, 12 hours and 24 hours post operatively were examined, and total opioid use in 24 hours following surgery (standardised to oral morphine equivalent in milligrams). The results were analysed using a Kruskal-Wallis test.

Results and Discussion: There was a statistically significant difference in pain scores between the different groups ($p=0.032$). 24-hour opioid use was highest in the GA ± LA group (141mg compared with 49mg (group 2), 51mg (group 3) and 67mg (group 4)). Opioid use was significantly reduced in the groups receiving regional analgesia, however, there was no statistical difference between these groups highlighting the non-superiority of any particular technique.

Conclusion: This finding supports usage of regional techniques as a part of multimodal analgesia in perioperative care in laparoscopic bowel resections. However, more data is needed for further analysis.

7296

Length of stay in patients undergoing elective laparoscopic bowel resection with different types of regional anaesthesia

Read M.¹, Berwertz M.², Rao R.²¹The Rotherham NHS Foundation Trust - Rotherham (United Kingdom),²Sheffield Teaching Hospitals - Sheffield (United Kingdom)

Background and Aims: The aim of this audit was to examine whether the type of anaesthetic technique (general anaesthesia (GA) vs GA + different regional anaesthetic techniques) had a positive outcome on length of stay in patients undergoing elective laparoscopic bowel resections.

Materials and Methods: Retrospective data was collected from patients undergoing elective laparoscopic bowel resection performed by one general surgeon over a 2-year period (June 2018 to June 2020). A total of 47 patients were identified for this audit and grouped according to the type of anaesthetic they received: (1) General Anaesthetic (GA) ± Local anaesthetic wound infiltration by surgeon, (2) GA + Spinal Anaesthetic (SA), (3) GA + abdominal block, (4) GA + SA + abdominal blocks. The length of stay in days was examined and analysed using Microsoft excel and a Kruskal-Wallis test.

Results:

The average length of stay was 7 days (± 4.7) in group 1, 4.6 (± 1.5) days in group 2, 4.9 days (± 2.5) in group 3 and 5.5 days (± 3.8) in group 4. There was no statistically significant difference in length of stay between the different groups ($P = 0.77$).

Conclusion: From the data collected, it appears that, the type of anaesthetic used did not appear to be a contributing factor towards average length of stay following laparoscopic colorectal resection. Sample sizes were small, therefore further investigation may be needed to support these findings.

7297

Ultrasound-guided genicular nerve block for anterior cruciate ligament reconstruction surgery: a case series

Ferraz I.¹, Carvalho S.¹, Gouveia J.², Flor De Lima I.¹, O'Neill P.¹, Ghira M.¹¹Hospital Beatriz Ângelo - Loures (Portugal), ²Hospital da Luz Lisboa - Lisboa (Portugal)

Background: The genicular nerve block and neurolysis are described as alternatives to the conventional treatment of chronic knee pain. [1] The authors proposed to evaluate the analgesic efficacy of the genicular nerve block in anterior cruciate ligament (ACL) reconstruction surgery.

Case Reports: An ultrasound-guided genicular nerve block with ropivacaine, dexmedetomidine and dexamethasone, was performed in four patients proposed for ACL reconstruction surgery as part of a multimodal pain management regimen. Twenty-four hours after surgery all four patients presented with no pain at rest, no need for additional analgesic medication and no limitations in functional rehabilitation. At one week postoperative, two patients required further analgesic treatment.

Discussion: The genicular nerve block prevents undesirable limitations associated with proximal nerve blocks, as seen in the femoral nerve block which is commonly associated with diminished quadriceps strength and delayed ambulation. It appears to contribute to adequate analgesia, mainly in the first twenty-four hours after surgery. Adequate pain management allows for an efficient recovery, as pain level correlates to functional rehabilitation and quality of life measurements after ACL reconstruction surgery. [2] Nevertheless, genicular nerve block does not provide complete analgesic blockade of the knee. The authors believe that in the future it may be necessary to associate this nerve block with an infrapatellar branch of the saphenous nerve block, in order to provide further analgesia to the anteromedial knee.

References:

- Demir Y, Güzelkücü Ü, Tezel K et al. A different approach to the management of osteoarthritis in the knee: ultrasound guided genicular nerve block. *Pain Medicine*, 2017; 18: 181-183.
 - Secrist ES, Freedman KB, Ciccotti MG et al. Pain Management after outpatient anterior cruciate ligament reconstruction: a systematic review of randomized controlled trials. *Am J Sports Med*, 2016; 44(9): 2435-47.
- Learning points:** 1. Ultrasound-guided genicular nerve block appears to contribute to adequate pain management twenty-four hours after ACL reconstruction surgery, allowing for early rehabilitation. 2. Although this nerve block does not provide complete sensitive blockade of the knee, its analgesic efficacy appears to be promising.

7305

Does emergent arterial bypass surgery hinder regional analgesia?

Arantes A.¹, Oliveira Costa F.¹, Ferreira C.¹, Gomes C.¹, Ribeiro L.¹, Louro J.¹¹Hospital de Braga - Braga (Portugal)

Background: The adductor canal (AC) block is an emerging interfascial plane block performed in the thigh, used for knee surgery, medial lower leg and ankle anaesthesia/analgesia, providing coverage of multiple distal branches of the femoral nerve.¹

Case Report: 50-55year male patient, ASA 2E, presenting with emergent popliteal aneurysm arterial thrombosis, for bypass surgery. ASA standard monitoring was ensured and rapid sequence induction of general anaesthesia (GA) performed with fentanyl (2mcg/kg), propofol (2.5mg/kg) and rocuronium (1,2mg/kg). Lidocaine was given at induction (1mg/kg) followed by infusion (1mg/kg/h). GA was maintained with Sevoflurane in Air/O₂ mixture. Heparin 5000UI was given before femoral clamp. Upon surgical closure, a perineural catheter (PC) was placed by the surgeon in AC and left at 18cm from skin, 200mg ropivacaine 0,75% were administered. Further analgesia was fulfilled with ketorolac (0,5mg/kg), paracetamol (15mg/kg) and tramadol (2mg/kg). Anaesthetic emergence went uneventful. At PACU he remained painless, being transferred to ward. Postoperatively, Acute Care Unit noticed adequate analgesia (VAS 0 at rest and mobilization), achieved with perineural ropivacaine 0,2%

(20mg q4h), paracetamol (1000mg q6h), ketorolac (30mg q12h, 48 hours) and tramadol (100mg q8h), not requiring SOS medication. Analgesia was deescalated at the 2nd postoperative (PO) day to ropivacaine 0,2% (10mg) on demand (2 bolus needed). The PC was removed on the 3rd PO day, with no side effects or complications to report.

Discussion: Given the surgery's emergent character and the indication for perioperative anticoagulation, the procedure was performed under GA, instead of neuraxial block. Even so, adequate pain control is vital in limb ischemia.² In collaboration with the surgical team, a PC was placed in AC, aiming at medial leg analgesia, consistent with the surgical site. The continuous AC block, as part of a multimodal analgesia, permitted adequate pain control without compromising PO anticoagulation or ability to ambulate. Thus, considering its simplicity and safety, we believe that this analgesic option can be replicated, formulating a valid protocol for this procedure.

References:

1. BJA Education.2015;15(5):225–230

2. Arch Bone Jt Surg.2017;5(3):131–132

Learning points: Adequate analgesia is vital to prevent arterial bypass complications. AC block at surgical closure may surpass anticoagulation and emergency issues, enhancing the importance of teamwork.

7327

Bilateral Erector spine plane block as a component of anesthesia for transforaminal percutaneous endoscopic discectomy: the prospective randomised control trial

Barsa M.¹

¹Rivne Region Hospital - Rivne (Ukraine)

Background and Goal of Study: About 60% to 80% of the population suffers from back pain making it one of the most common health complaints. The main cause of back pain is intervertebral disc herniation. As a result, number of patients being treated with surgery is increasing. The development of surgical techniques began with open discectomy and progressed to transforaminal percutaneous endoscopic discectomy (TPED). We offer Bilateral Erector spine plane block (ESPB) as a component of intraoperative anesthesia in combination with sedation. In our study we investigate intravenous sedation (IS) using propofol and fentanyl compered with ESP-block and sedation with propofol.

Materials and Methods: Fifty patients underwent TPED were randomly assigned to two groups: G1(n = 25) - IS without ESPB; G2(n = 25) - IS with bilateral ESB. We used 40 ml solution of Lidocaine 1% with Dexamethasone 0,02% and Epinephrine 0,00018%. Outcomes: amount of fentanyl and propofol (AFP); glucose level (GL) after surgery; postoperative sedation - Richmond Agitation-Sedation Scale (RASS); intensity of pain after surgery - visual analogue scale; sedation levels - modified observer's assessment of alertness/sedation scale (MOAA/S); satisfaction with analgesia - 5-point Likert scale (LS); heart rate (HR) and mean arterial pressure (MAP); mechanical pain threshold - von Frey monofilaments (MPTvonFray); adverse events (AE) during sedation - World SIVA adverse sedation event reporting tool (WSASERT).

Results and Discussion: AFP was significantly lower in G2, as well as GL, HR and MAP was lower in G2. There were no difference in intensity of pain - 1,6 (CI95%0,6-2.3) in G1 and 1,5 (CI95%0.8-2.4) in G2, MOAA/s (1-2 in both groups), LS (4-5 in both groups) and MPTvonFray (not more than 5% from baseline). They was no AE in G2 in contradistinction to G1 (2 patients – minimal risk descriptors, 5 – minor risk descriptors and 1 – sentinel risk descriptors) which required additional medication or rescue ventilation.

Conclusion:ERSPB reduce AFP during surgery and GL after surgery. It results in lower stress-respond. ESPB decrease adverse effects as a result of deeper sedation.



7356

Comparison of the Intraoperative and Postoperative Effects of Erector Spina Plane Block and Rectus Sheath Block

Salman E.¹, Bilgin H.¹, Akesen S.¹, Işık Ö.¹

¹Bursa Uludağ University - Bursa (Turkey)

Background and Goal of Study: We aimed to compare the intraoperative and postoperative analgesic efficacy of erector spina plane block (ESPB) and rectus sheath block (RSB) in a prospective and randomized controlled manner in patients undergoing subumbilical and supraumbilical median incisions in general surgery cases.

Materials and Methods: The study was conducted in 60 patients aged between 18-75 years, with the American Society of Anesthesiologists (ASA) classification 1-3, who would undergo subumbilical and supraumbilical median incision after ethics committee approval and written consent from the patients. The demographic data of the patients were recorded and after routine monitoring and general anesthesia induction, they were divided into two groups as group ESPB and group RSB. Hemodynamic data of all patients were recorded pre-induction, post-induction 1. minute and intraoperative 30-minute periods. Patient-controlled analgesia (PCA) prepared with morphine was administered to all patients. Patients intraoperative hemodynamic data and administered opioid dose, postoperative visual analogue scales (VAS) at rest and coughing, time to first PCA dose, postoperative opioid consumption, need for rescue analgesics, duration time until first mobilization, opioid side effects, patient and surgeon satisfaction were evaluated.

Results and Discussion: Intraoperative hemodynamic data and administered opioid dose were similar in both groups. In the ESPB group, postoperative pain scores were found to be lower at rest (60. minute, 2., 4., hour), during coughing (60. minute, 2., 4., 8. hour) (p<0,05), and the time to first PCA use was longer (p=0.001). Postoperative PCA requirement was found to be lower in the ESPB group (p=0.028). Additional analgesic requirement was similar in the two groups (p=0.085). It was found that the time to first mobilization was shorter in the ESPB group (p<0.001), and opioid-related side effects were similar (p=0.129). Patient satisfaction was similar in the two groups (p=0.356). Surgeon satisfaction was higher in the ESPB group (p=0.010).

Conclusion: As a result, it was concluded that the ESPB provided more effective postoperative analgesia than the RSB in patients who underwent subumbilical and supraumbilical median incision.

7375

Effects of ultrasound-guided adductor canal block versus femoral nerve block on quadriceps muscle strength and post operative pain in the patients undergoing unilateral total knee replacement surgery

Guja S.¹, Chekkapalli S.², Sumathi S.²

¹u N Mehta Institute Of Cardiology And Research Center, Ahmedabad, Gujarat, India - Ahmedabad (India), ²apollo Hospitals - Chennai (India)

Background and Goal of Study:The postoperative analgesic regimen should aim to reduce morbidity and enhance functional recovery as well as provide efficient analgesia with minimal side effects. This study aimed to posterior capsular infiltration with (ACB) adductor canal block versus (FNB) femoral nerve block in the patients undergoing total knee replacement surgery and compare the quadriceps muscle strength and analgesic efficacy in the post-operative period

Materials and Methods:A prospective, randomised, comparative study conducted at Apollo hospital Chennai, to compare the effects of ultrasound-guided ACB versus FNB on quadriceps muscle strength and post operative pain in 56 patients were randomly allocated to 2 groups undergoing unilateral total knee replacement surgery.

Sample size calculation is derived based on the software G*power 3.1.9.2. The formula used for the sample size calculation is n

$$= \frac{(Z_{\alpha/2} + Z_{\beta})^2 \times (P_1(1-P_1) + P_2(1-P_2))}{(P_1 - P_2)^2}$$

Where,

$Z_{\alpha/2}$ is the critical value of the normal distribution at $\alpha/2 = 1.96$
 Z_{β} is the critical value of normal distribution at $\beta = 0.84$, $P_1 = 8\%$, $P_2 = 49\%$.

Statistical Analysis: All the continuous variables were assessed for the normality using shapiro-wilk's test. If the variables are normally distributed, they were expressed as mean \pm standard deviation, otherwise median (inter quartile range). All the categorical variables were expressed either as percentage or proportions. Comparison of normally distributed, continuous variables was done by independent sample 't' test. Comparison of categorical variables was done by either Chi-Square test or Fisher's-Exact test. Comparison of non-normally distributed continuous variables was done by Mann Whitney 'U' test. Data analysis was carried out by SPSS version 25.0.

Results and Discussion: ACB is similar to FNB with respect to quadriceps muscle strength measured by MRC grading at 6 hours. However ACB is very effective in preserving the quadriceps muscle strength measured by MRC grading at 12 and 24 hours with a statistically significant 'P' value of 0.0001. ACB is comparable to FNB with respect to post-operative analgesia measured by VAS scores at 6-8, 12 and 24 hours after giving the ultrasound guided block.

Conclusion: ACB is very effective in preserving quadriceps muscle strength compared to FNB. It provides excellent analgesia which is comparable to femoral nerve block.

7393

Utilization of a neuronal stem cell model for peripheral regional anaesthesia research: A case study of lidocaine

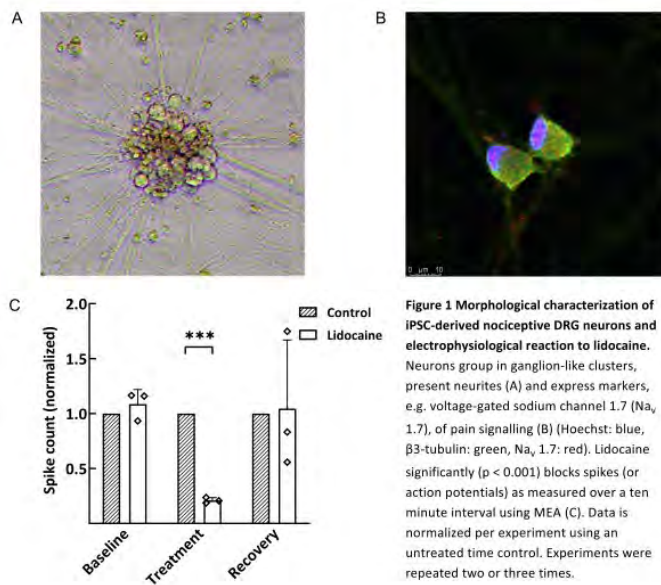
Smulders P. S. H.¹, Bernardino Morcillo C.¹, Hermanides J.¹, Hollmann M. W.¹, Ten Hoope W.¹, Weber N. C.¹
¹Amsterdam UMC, location AMC - Amsterdam (Netherlands)

Background and Goal of Study: In vitro research concerning peripheral regional anaesthesia (RA) has historically been conducted using animal cell types due to challenges in acquiring human adult or foetal neuronal tissue. The recent discovery of human induced pluripotent stem cells (iPSC), however, now offers an opportunity to circumvent these hurdles, as it allows reprogramming of conventional human cells to nociceptive dorsal root ganglion (DRG) neurons. Here, we demonstrate a human iPSC-derived RA model by means of a case study of lidocaine.

Materials and Methods: Commercially acquired iPSCs (Human iPSC-Derived Sensory Neuron Progenitors, Axol Bioscience) were differentiated according to an adapted version of the Chambers protocol.¹ Following differentiation, nociceptive DRG neuron identity was confirmed using bright field microscopy and immunofluorescence confocal laser scanning microscopy. Electrophysiological reaction to lidocaine was assessed using microelectrode array (MEA). Lidocaine-associated cytotoxicity was investigated by detection of lactate dehydrogenase (LDH).

Results and Discussion: Human iPSCs were successfully converted to a nociceptor fate. Cells displayed typical neuron morphology, coalesced into ganglion-like clusters and showed expression of canonical markers of pain signalling. MEA experiments demonstrated that 100 μ M lidocaine produced a reversible, almost complete blockade of electrical activity. No significant levels of LDH were detected after lidocaine treatment.

Conclusion: Human iPSC technology can be applied to study local anaesthetic-based RA, as shown using the example of lidocaine, and may facilitate progressive research. Future studies can utilize this model for drug discovery and disease modelling.



References:

- Chambers et al. Combined small-molecule inhibition accelerates developmental timing and converts human pluripotent stem cells into nociceptors. *Nat Biotechnol.* 2012;30(7):715-720.

7427

Comparison of neuraxial acoustic window in Hamstring Stretch Position (HSP) and Cross Legged Position (CLP): an Observational Study

Kaur M.¹, Sethi P.¹, Singh G.¹, Bhatia P.¹
¹All India institute of medical sciences, Jodhpur - Jodhpur (India)

Background: Lumbar spinal or epidural anesthesia is frequently administered in various surgeries to provide anesthesia and postoperative analgesia. Patient's positioning is one of the important factor affecting successful neuraxial block during spinal and epidural interventions.

Goal of the Study: 1.to measure the acoustic target (defined as intervertebral distance between the L3-L4 laminae) of the volunteers in hamstring stretch position (HSP) and cross legged position (CLP). 2.to compare ultrasonic measurements of the depth of ligamentum flavum from skin. 3.to compare intrathecal space and 4.to compare patient comfort in these two positions.

Materials and Methods: After ethical approval and written informed consent, 21 patients were enrolled for the study. Each subject was asked to position him or herself in two different positions, namely HSP and CLP. In HSP, patients were seated with the legs totally supported by the operating table and asked for knee extension and hip adduction. In CLP, patient sat on the table with knees and hip flexed, their legs and ankle crossed and arms hugging a pillow. Curvilinear ultrasonography probe was applied on the longitudinal paramedian position, 1-2 cm lateral to the spinous process. The intervertebral distance between the L3-L4 laminae, the distance between the skin and the ligamentum flavum (DBSLF) and the distance between anterior and posterior dura was measured in paramedian sagittal plane in L3-L4 intervertebral space.

Results and Discussion: There was no statistically significant difference in mean interlaminar distance, skin to ligamentum flavum distance and intrathecal distance in both the positions. There was statistically significant difference in patient comfort scores in both the positions. Patients were more comfortable in CLP in comparison to HSP position. When compared across genders, distance of ligamentum flavum from skin was more in female (p value:0.079). Rest all parameters were comparable.

Conclusion: This study concluded that various neuraxial acoustic parameters namely, interlaminar distance, DBSLF distance and intrathecal space are comparable in both these positions but patients are more comfortable in CLP than HSP. So, we recommend that CLP can be used as an alternative position for giving neuraxial blocks.

7431
Continuous Erector spinae plane block for post operative analgesia in Renal Transplantation : A case series

Vishwanath P.¹, Parimala B.¹, Deo A.¹, Vasudev M.¹, Bandagi A.¹
¹NU hospitals - Bangalore (India)

Background:Erector spinae plane(ESP) block is a novel technique for perioperative analgesia for various thoracic and abdominal surgeries(1). The authors present the **first** case series on the use of continuous ESP block for renal transplants.

Case Series:A series of 5 patients who underwent renal transplantation under general anaesthesia with ESP catheter were included.In prone position,after sedation,right ESP block was performed with 18G Tuohy needle at T8-T9,with bolus of 0.375% Ropivacaine 20ml +Dexmedetomidine 50mcg and a catheter placed.Prior to extubation,IV Paracetamol(PCT)1 gm was given and ESP infusion started with 0.125% Bupivacaine at 12ml/hr.Postoperative pain was assessed by Numerical Rating Scale(NRS) at 1,4,8,12,18 and 24 hours after extubation.Patients with NRS>3 received PCT and if pain persisted,IV Tramadol 50 mg was to be given.Patient demographics,NRS scores and supplementary analgesics are shown in table below.

Sl No	Age	Sex	Weight (kg)	Height (cm)	ASA	Pre-op NRS	1h NRS	4h NRS	8h NRS	12h NRS	18h NRS	24h NRS	Supplementary analgesics
1	34	M	65	170	3	0	0	0	0	0	0	0	PCT 1 gm
2	42	F	55	155	3	0	0	0	0	0	0	0	PCT 1 gm
3	41	M	60	165	3	0	0	0	0	0	0	0	PCT 1 gm
4	27	M	70	180	3	0	0	0	0	0	0	0	PCT 1 gm
5	38	M	68	175	3	0	0	0	0	0	0	0	PCT 1 gm

Out of 5 patients,4 required **single dose** of PCT and 1 patient required 2 doses in 24 hours.The NRS scores ranged from 0 during rest to a maximum of 4 on mobilisation.None of the patients required Tramadol.

Discussion: Analgesia in kidney recipients is challenging due to nephrotoxicity,coagulopathy and need to maintain graft perfusion. Epidural analgesia is excellent,but carries risk of hypotension,abscess & hematoma.Opioids can cause delayed recovery.ESP analgesia offers less risk of hypotension,spinal hematoma and adverse events.Aytuluk HG et al reported good outcome with single shot ESP block in 3 cases of kidney transplants(2).We concur with them and demonstrate the efficacy of continuous ESP block with minimal supplementary analgesics,without opioids.

References:

- 1.Luis-Navarro J,Seda-Guzmán M,Luis-Moreno C,Chin KJ.Erector spinae plane block in abdominal surgery:Case series. Indian J Anaesth.2018;62(7):54
- 2.Aytuluk HG,Kara MY.Erector spinae plane block for postoperative analgesia in kidney transplantation:A report of 3 cases.J Clin Anesth.2020;61(109683):109683

Learning points: Multi modal analgesia with ESP catheter can replace epidural analgesia for renal transplants.ESP block has a good safety profile and aids early recovery.

7455
Pneumocephalus Following Combined Spinal Epidural Anesthesia for Hip Replacement Surgery. A Case Report and Review of the Literature.

Bilaj-Miraka M.¹, Huti G.¹, Abdylia A.¹, Peci J.¹, Domi R.¹, Papa A.¹
¹Dept of Anesthesiology & Intensive Care Medicine,American Hospital - Tirana (Albania)

Background:Pneumocephalus (PC) is defined as the presence of air in any of the intracranial compartments.Combined spinoepidural anesthesia (CSEA) is an ideal alternative for hip fracture.PN is a rare complication after CSEA particularly when the "loss of resistance to air" LORA technique is used.We present a rare case of PC after CSEA with LORA technique.

Case Report:A 72-y-o, 60 kg, ASA 3, F was referred for surgical treatment of hip fracture.She had a history with controlled HBP and CHF under follow-up.She suffered from Parkinson's disease (Hoehn and Yahr scale

IV-V) for 10-y.CSEA was chosen as the technique of anaesthesia and postoperative epidural analgesia PEA.Combifix Standard spinal epidural-combined set was used.We performed needle through needle technique at L3/L4 interspace.An 18G Tuohy needle was used to identify the epidural space using LORA technique with a total use of 2-3 cc of air.There was no bleeding and there did not appear to be any accidental puncture of dura.Standard procedure with 3cc of 0,5% hyperbaric bupivacaine was injected through spinal needle and epidural catheter was inserted 6 cm in epidural space without any immediate complication.The operation lasted 2,5 h and was uneventful.The patient was transferred to the orthopaedic ward.PEA were given epidural bolus dose.No complications were noted during administration of PEA, only the symptoms of Parkinsonism.The Neurology service gave a reevaluation on the the Parkinson's disease situation and ordered a brain CT-scan.The CT-scan revealed air in the bilateral frontal horns of the lateral ventricle and subdural frontal sinister space and multiple chronic ischemic lesions.The Neurology service considered the PC not significant and recommended conservative treatment.On the 5th day, CT-scan showed the resorption of air. On the 7th day the patient was discharged from the hospital in a stable condition.

Discussion:In conclusion we present a case that concluded the possibility of PC after CSEA used the LORA technique. The use of saline to identify the epidural space may help to reduce the incidence of this complication. Close monitoring and appropriate treatment should be essential.

References:

1. Schirmer CM, et al. (2010) Pneumocephalus: case illustrations and review. Neurocrit Care

Learning points:There are no consensus which technique is superior, and providers use the technique they are most comfortable with. We suggest to use saline technique to minimise risk of this complication.

7457
Transcutaneous electrical nerve inhibition using medium-frequency alternating current

Venmans E.¹, Maris S.¹, Brands M.¹, Evers S.¹, Lenskens D.¹, Stessel B.¹
¹Jessa Ziekenhuis Hasselt Dienst Anesthesie - Hasselt (Belgium)

Background: Transcutaneous medium-frequency alternating electrical current (tMFAEC) consists of an alternating current between 1 and 10 kilohertz (kHz) and has unique nerve blocking properties. Applications in the reduction of chronic pain and in the improvement of quality of life after cancer therapy are already described. The aim of this study is to evaluate the effect of tMFAEC stimulation of the distal median nerve at a frequency of 2kHz and 10kHz with a fixed current intensity of 31.5mA on the level of sensory inhibition of the thumb and index finger of the dominant hand.

Methods: A single-center prospective interventional cohort study was conducted in adult healthy volunteers at the Jessa hospital, Hasselt, Belgium. The electrodes were placed on the distal median nerve, which was located with a Sono Site Xport Ultrasound transducer, with the first electrode being placed on the skin near the region of the transverse carpal ligament and the second electrode 7 cm superior to electrode 1. Tactile sensation was evaluated with Semmes-Weinstein monofilament test. Pressure pain sensation was evaluated with a 1-centimeter Wagner FDX algometer. All measurements were performed at baseline and after stimulation with 2kHz and 10 kHz and with two different electrodes (PALS and 3M) in a randomized manner. Statistical analyses were performed with a one-way ANOVA with bonferonni correction or a Friedman rank sum test, followed by the Wilcoxon signed rank test. A p-value <0.05 was considered statistically significant.

Results: From 9th to 13th of April 2021, 25 healthy volunteers were included in the Jessa hospital, Hasselt, Belgium. A significant reduction in tactile sensation after 2 kHz compared to baseline was observed (-0.11 ± 0.55 (PALS 2) and 0.35 ± 0.25 (3M 2) vs -1.25 ± 0.09, p<0.0001). A Friedman test shows no significant difference in pressure/pain threshold between the groups (p = 0.050). When groups are tested pairwise with a Wilcoxon Signed Rank Test, 3M electrodes show a significant elevation of pressure/pain threshold compared to baseline and to PALS electrodes at 10 kHz.

Conclusion: This study demonstrates that tMFAEC stimulation on the distal median nerve successfully inhibits sensory nerve activity in the index finger and thumb. We observed a general reduction of tactile sensation in all subgroups, but more profound with 2kHz stimulation compared to 10kHz stimulation and also more pronounced in the 3M electrode groups.

7467

When you least expect, spinal subarachnoid hematoma after spinal anaesthesia: A case report.

Machado M.¹, Lima A. P.¹, Pinho C.¹, Barbosa M.¹
¹Centro hospitalar universitário de são joão - Porto (Portugal)

Background: Spinal subarachnoid hematoma (SSH) is a rare complication after an atraumatic spinal anaesthesia (SA) mainly in the absence of coagulopathies. SSH has the potential to cause significant spinal injury/morbidity, without prompt management.

Case Report: A 72-year-old woman, ASA II, with obesity, dyslipidemia and hypertension, was scheduled for an elective, post-traumatic, ankle fracture osteosynthesis. Pre-operative platelet count and coagulation tests were normal. After standard monitoring, a midline L3-L4 SA was made using a 25-G Quincke with clear cerebrospinal fluid (CSF) outflow observed on the second attempt. Hyperbaric bupivacaine with sufentanil was injected into the subarachnoid space. No incidents reported. Temperature testing was used to determine the bilateral T10 dermatome level of the block. With completed SA reversal, deep vein thrombosis prophylaxis was administered 24 hours after the surgery. Severe low back pain and progressive bilateral hypoesthesia presented on day 2, with bilateral lower limbs paralysis and hypoesthesia below T12 upon neurological examination. Immediate MRI was made, revealing an epidural D9-L2 hematoma and a subdural L3-L4 hematoma. Intravenous corticosteroid was started and emergency neurosurgery was performed within 6 hours. Intra-operatively an extensive SSH from D10-L2 was seen and laminectomy, durotomy and hematoma drainage were performed. On a 2-month follow-up, the patient is still in physiotherapy and maintained lower extremity paralysis.

Discussion: SSH after SA, a rare complication, can cause permanent neurologic deficits. SSH can be iatrogenic, traumatic, coagulation defect related and multifactorial. Diameter and shape of the spinal needle can play a role in iatrogenic SSH. Iatrogenic puncture of radicular vessels, with subsequent subarachnoid bleeding is also important. The balance between CSF washout and bleeding can lead to SSH formation. Clinical presentation begins with acute back pain and subsequent development of spinal cord compression signs. Early diagnosis is the key to full recovery. An immediate MRI should be performed. Early surgical intervention is indicated in rapidly evolving neurologic symptoms.

Learning points: The odds of SSH after SA are extremely rare but possible, even when guidelines for safe practices are followed. If suspected, a prompted MRI should be made to confirm the diagnosis and emergent treatment must be placed before permanent neurological damage.

7486

Comparison of mid point transverse process to pleura (MTP) block and erector spinae plane block (ESP) for post operative pain in modified radical mastectomy patients: A double blinded randomized trial

Sethi P.¹, Kaur M.¹, Bhatia P.¹, Kumari K.¹, Goyal S.¹
¹AIIMS, Jodhpur - Jodhpur (India)

Background and Goal of Study: Modified radical mastectomy (MRM) is associated with moderate category of severe pain, which if not controlled can lead to chronic pain in post-mastectomy patients. Various modalities have been described for managing postoperative pain in this subset of patients as epidural, paravertebral and erector spinae plane block. Recently a newer block, mid point transverse process to pleura block have been described as a modality for pain control in such patients. No study has been published till date comparing ESP and MTP block for postoperative pain in MRM patients.

Materials and Methods: After ethical approval and written informed consent, 66 patients of ASA grade 1, 2 and 3 were randomised to two groups namely ESP and MTP. All patients received block as per group allocation in preoperative area. Infusion of 0.5% was started intraoperatively, which was converted to 0.2% in postoperative period. Patient was assessed for postoperative pain using NRS score for next 24 hours at different time periods at 1, 2, 3, 4, 8, 12, 16, 20 and 24 hours. Time for

administration of first rescue analgesia was also compared along with patient satisfaction score in both the groups.

Results and Discussion: There was statistically significant difference in postoperative pain scores in both the groups. During initial two hours pain scores were similar in groups both in rest and movement. After two hours pain scores were significantly better in ESP group in comparison to MTP group. Median time for rescue analgesia was 7 hours in MTP and 3 hours in ESP block. Total 8 patients needed rescue analgesic in MTP group and three in ESP group. Patient satisfaction score was statistically significant in ESP group in comparison to MTP group.

Conclusion: MTP can be considered as potential alternative in managing postoperative pain in MRM patients. In our study ESP proved to be better when compared with MTP. Larger sample size studies may be needed to further establish this fact.

7487

Impact of tunneling on bacterial colonization of epidural catheter tip.

-V.¹, Sahay N.¹, Kumar Pati B.¹, Naaz S.¹, Kumari P.¹, Kumar R.¹
¹AIIMS PATNA - PATNA (India)

Background and Goal of study: Fixation of the epidural catheter is crucial to prevent its migration. The tunneling method serves this purpose well and has also been hypothesized to prevent bacterial colonization on epidural catheters tips. Lower growths would promote a more prolonged use and thus better patient analgesia postoperatively. This study was aimed to assess the effect of tunneling on bacterial colonization of an epidural catheter tip when compared to the conventional non-tunneling methods of fixation.

Material & Methods: A total of 105 patients were randomly allocated into two groups. Patients in group T (n=47) had their epidural catheter tunneled and for those in Group NT (n=58) it was non-tunneled. In both groups, catheters were secured by a transparent sterile dressing (Tegaderm). The catheter was kept in situ for a minimum of 72 hours and on removal, distal 3 cm of the catheter including the blue tip was sent for microbiological assay and culture along with a skin swab sample from the catheter entry site. The primary objective of the study was to compare the effect of tunneling on the incidence of bacterial colonization. Secondary objectives were to identify the nature of bacteria on the epidural catheter tip and at the site of entry of the catheter into the skin.

Results and Discussion: Out of 105 catheters studied, colonization was noted in 3 patients. 2 catheters were non-tunneled while 1 was tunneled. (p-value 0.686). In all these 3 patients, even the skin swab was positive for the same bacterial growth. Most catheters were in situ for 72 hours to 96 hours. Methicillin-resistant coagulase-negative Staphylococcus Aureus (MRCoNS) was noted in two patients whereas Enterococcus faecalis was found in the third patient. Skin swabs from 9 patients reported growth. 5 were in the non-tunneled group and 4 in the tunneled group. The most common organism was MRCoNS. No patient showed any evidence of meningismus and no sign of inflammation was evident in any patient.

Conclusion: Tunneling afforded no significant protection against bacterial colonization of epidural catheter tip in our study. Bacterial colonization of epidural catheter tip is very rare (2.9%) when placed for 72 hours for post-operative analgesia. Bacteria apparently migrate from the skin entry area to the catheter tip as similar growths were noted at both places. Meticulous skin antisepsis could reduce catheter tip colonization.

7503 comparison of ropivacaine alone versus dexmedetomidine or ketamine as an adjuvant to ropivacaine in pectoral nerve block type II among patients undergoing breast surgeries: A randomized double blind controlled trial

LENIN D.¹, Kumar R.¹, Kumar A.¹, Kumari P.¹, Kumar Singh P.¹
¹All India Institute of Medical Sciences - patna (India)

Background and Goal of the study: Modified pectoral nerve block (Pecs II) using local anesthetic agent is a newer analgesic technique for breast surgeries. This study further evaluates the effect of addition of ketamine and dexmedetomidine to local anesthetic agent (ropivacaine) to determine the time required for first request of rescue analgesia and postoperative fentanyl consumption.

Materials and Methods: A total of 75 American Society of Anesthesiologist grade I and II female patients with age group of 18 – 65 years scheduled for breast surgery i.e., Modified radical mastectomy, were enrolled in the study. Patients were randomized in to three equal groups of 25 each. Group R (n = 25) received ultrasound guided Pecs II block with 30 ml of 0.2% ropivacaine. Group RD (n = 25) received ultrasound guided Pecs II block with 30 ml of 0.2% ropivacaine and dexmedetomidine 1mcg/kg body weight. Group RK (n = 25) received ultrasound guided Pecs II block with 30 ml of 0.2% ropivacaine and ketamine 1mg/kg body weight. The time required for first request of rescue analgesia and total fentanyl consumption was noted in 48h period. Numerical rating scale (NRS) and Ramsay sedation score was used to assess the pain and sedation in post operative period. Chi square test, mean and standard deviation & P value used for statistical significance testing.

Results and Discussion: A high statistically significant increase in the time required for first request of rescue analgesia (in hours) was recorded in the Group RD (18.79 02.39) followed by Group RK (16.26 02.84) and Group R (14.26 02.97) (P< 0.001). Total post-operative opioid (mcg) consumption in 48 hours shown statistically significant among Group RK (12.51 04.62) followed by Group RD (14.89 02.43) and Group R (17.26 03.14) (P<0.001). No patient under study reported any adverse effects.

Conclusions: Addition of 1mcg/kg dexmedetomidine to 0.2% ropivacaine for Pecs block increases the duration of first request of rescue analgesia and addition of 1mg/kg ketamine to 0.2% ropivacaine decreased post-operative fentanyl consumption in 48 hours.

7506 Pupillary pain index predicts postoperative pain, but not the effect of regional anaesthesia: an observational study

Thudium M.¹, Gehlen L.¹, Soehle M.¹, Kornilov E.²
¹University Hospital Bonn, Dept. of Anesthesiology and Intensive Care Medicine - Bonn (Germany), ²Rabin Medical Center, Beilinson Hospital, Department of Anaesthesiology - Petach Tikva (Israel)

Background and Goal of Study: The novel Pupillary Pain Index (PPI) permits the evaluation of intraoperative nociception level by measuring the pupillary reaction after a localized electrical stimulus. We investigated the PPI to evaluate analgesia before and after the insertion of peripheral nerve blocks such as the fascia iliaca block (FIB) or the adductor canal block (ACB) during general anaesthesia in relation to postoperative pain and opioid consumption.

Materials and Methods: Patients with elective hip or knee arthroplasty were included. After anaesthesia induction and intubation, patients received ultrasound-guided single-shot FIB or ACB with 30 ml and 20 ml of 0.375% ropivacaine, respectively. Anaesthesia was maintained with isoflurane or propofol and remifentanyl. The first PPI measurements were performed after anaesthesia induction and before insertion of the nerve block, the second at the end of surgery. Pupillometry scores were evaluated at the sensory area of the blocked nerve (femoral or saphenous nerve, target) and at the C3 dermatome (control). Primary outcome was the difference between PPI indices before and after peripheral block insertion, secondary outcomes were pain scores and opioid requirements 24- and 48-hours after surgery.

Results and Discussion: PPI decreased significantly from the first to the second measurement (4.17±2.7 vs 1.6±1.2, P< 0.001 for target; 4.46±2.7 vs 2.17±2.1, P<0.001 for control). Control and target measurements did not show significant differences. 48-hour pain scores in movement were connected to second postoperative day opioids and target area PPI before block (adjusted r²=0.385). We attribute the non-significant differences between target and control to a large effect of intraoperative opioids on PPI, thus obscuring the effect of regional anaesthesia. Irrespective of regional anaesthesia, a disposition for increased postoperative pain and opioid consumption can be identified using PPI.

Conclusion: While the effect of FIB and ACB could not be shown with PPI, postoperative pain scores after 48 h were related to PPI measurements before block insertion. These results suggest that preoperative PPI may be used to predict postoperative pain.

7518 iPACK combined with adductor canal block as a safe adjunct to perioperative pain management in patients with severe hemophilia A undergoing total knee arthroplasty: a case report

Fidalgo A.¹, Rodrigues A.², Marques P.², Ferreira L.², Matias F.², Pratas M.²

¹Centro Hospitalar de Leiria - Leiria (Portugal), ²Centro Hospitalar e Universitário de Coimbra - Coimbra (Portugal)

Background: Hemophilia is an inherited coagulation disorder leading to bleeding in the muscles and joints.¹ Knee joint arthritis are responsible for long term pain and disability. Total knee arthroplasty (TKA) is the definitive treatment when conventional therapy fails.¹ Regional analgesia with motor sparing plays an important role on pain and hemodynamic management because TKA leads to severe postoperative pain, PONV and bleeding, causing prolonged rehabilitation and hospital stay.²

Case Report: A 43-year-old man presented for elective TKA. He had a history of severe hemophilia A. General anesthesia combined with iPACK and adductor canal block was planned for surgery. Informed consent was obtained. Preoperative FVIII activity and FVIII antibody presence was checked and recombinant FVIII administered 1 hour before procedure. In the OR US guided adductor canal followed by iPACK block with 2% mepivacaine and 3,75% Ropivacaine were performed. After, General anesthesia was done. The intraoperative course went smoothly and uneventfully with sevoflurane anesthesia and no need of opioids. In the recovery room he was supplemented with 2,5mg of morphine hourly (total 7mg) for moderate knee pain in the recovery room. On postoperative course the FVIII levels maintained above 100%. He was medicated with peripheral analgesics with no need for rescue analgesia. On day 1 he was able to walk with help.

Discussion: The incidence of hemophilia A is rare. The predisposition to hemarthroses and joint destruction is high leading to pain and disability. Perioperative management of hemophilic patients requires FVIII assays, blood products as well as a multidisciplinary team effort.¹ The regional analgesia acts as an adjunct to pain management as it can avoid excessive opioid consumption, leading to keen recovery and shorter hospital stay.²

References:

1. Kumar, P. & Banerjee, Arnab & Bansal, T. & Pirkad, A. & Govil, V.. (2016). Hemophilia A: An anesthetic challenge. *Anaesthesia, Pain and Intensive Care*. 2. Vanarase MY, Pandit H, Kimstra YW, Dodd CA, Popat MT. Pain relief after knee replacement in patients with a bleeding disorder. *Haemophilia*. 2007

Learning points: A multidisciplinary team is necessary to manage the perioperative course of hemophilic patients due to the high risk of hemorrhagic complications. The use of nerve blocks could be an adjunct to better manage perioperative pain, provide early ambulation, leading to better patient outcomes.

7529

To evaluate the efficacy and safety of continuous transmuscular quadratus lumborum block for postoperative analgesia after laparoscopic nephrectomy – A prospective randomized clinical trial

KUMARI K.¹, Jain N.¹, Rathod D.¹, Meshram T.¹, Sethi P.¹¹AIIMS, Jodhpur - Jodhpur (India)

Background and Goal of Study: Postoperative pain after laparoscopic nephrectomy is significant, because of cumulative effects of lower abdominal incisions (to retrieve the kidney), pelvic organ nociception, port site pain and severe neuropathic pain caused by trocars.[1] As a part of multimodal regimen, ultrasound (US) guided Quadratus lumborum block (QLB) is a novel truncal block with an established role in providing post-operative opioid free analgesia without systemic and neuraxial side effects.[2] In transmuscular QLB (or QLB-3), the needle is advanced through the quadratus lumborum (QL) muscle and local anesthetic is injected between QL and psoas major muscle.[3] There is no study on use of continuous transmuscular QLB following laparoscopic nephrectomy. So, present study was planned to evaluate the efficacy and safety of US guided continuous transmuscular QLB (or QLB-3) for post-operative analgesia after laparoscopic nephrectomy. We hypothesise that continuous QLB-3 block will provide satisfactory postoperative analgesia with reduction of postoperative opioid consumption.

Materials and Methods: In this prospective randomized study, 60 adult patients undergoing laparoscopic nephrectomy were randomly allocated into QLB-3 group (Group Q) and control group (Group C). In Group Q patients, after completion of surgery prior to extubation, QLB-3 was given with 0.4 ml/kg of 0.25% ropivacaine followed by catheter insertion for continuous infusion of 0.25% ropivacaine at 0.1 ml/kg/hr postoperatively. Patients in both the groups received fentanyl (0.5 µg/kg) as rescue analgesia by IV PCA pump. Primary objective was to compare total fentanyl consumption (as rescue analgesic) during first 48 hours postoperatively. Duration of analgesia, pain scores (NRS), patient satisfaction and any complications associated with block were also noted.

Results and Discussion: Total postoperative fentanyl consumption and NRS pain scores at movement and rest, at all the time intervals were significantly lower in Group Q patients ($p < 0.05$). Duration of analgesia and patient satisfaction was significantly higher in Group Q patients ($p < 0.05$). No block related complication were noted.

Conclusion: Continuous transmuscular QLB was effective in providing postoperative analgesia with less postoperative opioid consumption and without any block/catheter related complications in patients undergoing laparoscopic nephrectomy.

7548

Comparison of Spinal Needle Placement Between Traditional Sitting Position and Squatting Position in Cesarean Section

Shiba S.¹, Al-Dabbagh A.¹¹Hawler Hospital - Erbil (Iraq)

Background and Goal of Study: Success of spinal anesthesia in pregnant women is strongly affected by the position of the patient at time of spinal needle insertion, squatting position is a new position introduced to increase the intervertebral space¹.

Materials and Methods: This study was randomized comparative study, in patients undergoing elective cesarean section under spinal anesthesia. The 100 participants divided into two equal groups randomly traditional sitting position group T(n=50), squatting position group S(n=50). The ease of landmark palpation, successful of spinal needle placement was determined by number of attempts, number of needle bone contact and number of levels tried. The inclusion criteria were pregnant women aged between 18 to 40 years, BMI less than 35, the physiological statuses II based on (ASA) classification.

Results and Discussion: This study was controlled with data expressed as the mean±S.D, analysis was performed by a t-test. Statistical analysis by using SPSS and excel Microsoft software for input data and making of graphs. probability value of less than or equal 0.05 was statistically

significant. we found that in squatting position the number of needle bone contact was less than traditional sitting position with significant result p -value < 0.0001 , also successful of spinal needle placement was higher in squatting group compared to the traditional p -value = 0.006.²The ease of landmark palpation in the squatting position more than the traditional position with P -Value of 0.001.

Conclusion: 1-This study concluded that the position of the patient during spinal anesthesia in pregnant females is important. The squatting position had significantly offered easier landmark palpation and spinal needle placement with less number of needle bone contact as compared with traditional sitting position. 2-Squatting position can be used as alternative to traditional sitting position to provide successful first attempt spinal puncture in pregnant women undergoing cesarean section under spinal anesthesia.

References: 1-Chestnut DH, Wong CA, Tsen LC, Kee WDN, Beilin Y, Mlyre J. Chestnut's obstetric anesthesia: principles and practice. Elsevier Health Sciences;2014.

2-Mohammadi S., Hassani M.,and Marashi S.,Comparind the squatting position and Traditional sitting position for Ease of spinal Needle placement:A Randomized Clinical Trail,Anesh pain med.4(2);may 2014.

7550

The efficacy and safety of magnesium sulphate as an adjuvant to 0.375% ropivacaine in PECS II block for unilateral breast surgery; A randomised controlled trial

Kang W. P.¹, Abdul Mukmin L.¹, Zainal Abidin H.¹, Abdul Razak N.², Yahya M. M.¹¹University Hospital Sains Malaysia - Kota Bharu (Malaysia), ²Hospital Klang - Klang (Malaysia)

Background and Goal of Study: The paradigm shift of enhanced recovery after surgery (ERAS) from traditional surgical care in the breast surgery has brought to a lesser usage of opioid in the peri-operative period. Implementing ERAS protocols in breast surgical patients cause a reduction in length of hospital stay. Ultrasound guided regional anaesthesia has led to a refinement of a number of new approaches to complement ERAS strategies. We conducted a study comparing between 0.375% ropivacaine and 0.375% ropivacaine plus magnesium sulphate in pectoralis nerve and serratus plane nerve blocks (PECS) for unilateral breast surgery.

Materials and Methods: This is a double blinded, prospective randomised controlled trial. A total of 50 patients with American Society of Anaesthesiologist (ASA) I and II undergone unilateral breast surgery with or without axillary clearance were included in the study. The patients were randomised into two groups namely intervention group (n=25); 30 ml of 0.375% ropivacaine plus 5mmol Magnesium Sulphate and control group (n=25) 30 ml of 0.375% ropivacaine. Ultrasound guided PECS II block was performed prior to skin incision. Our primary outcomes were postoperative pain scores at 0, 4, 8, 12 and 24 hours intervals and total opioid consumption. Where else our secondary outcomes were the safety and adverse reactions developed from both arms.

Results and Discussion: There were a significant reduction in post-operative pain scores at rest and on movement in the intervention group from 4 hours postoperative period onwards with p -value of < 0.01 . Total intraoperative opioid used was significantly reduced in the intervention group with the p -value < 0.01 . However, there was no significant difference in post-operative opioid consumption between the groups. There were no significant side effects or serious complications developed from this study.

Table 1: Pairwise comparison mean difference post-operative pain score at rest and movement between control and intervention group at each time interval 0,4,8, 12 and 24 hours

Table 2: Comparison intra-operative opioid rescue usage between control and intervention group

Conclusion: Adding magnesium sulphate to ropivacaine in PECS II block is an effective adjunct to analgesia for unilateral breast surgery with no significant adverse reactions. Clinical trials with larger sample size are highly recommended.

7561 How clean is your ultrasound probe? A survey of hospitals within the South East London anaesthesia training programme.

Nzekwu B.¹, Zaky M.¹, Young B.¹, Pawa A.¹
¹Guys and St Thomas' NHS Foundation Trust - London (United Kingdom)

Background: Ultrasound guided regional anaesthesia (UGRA) blocks are conducted routinely in hospitals. Despite this, little universal guidance exists on good practice. UGRA block Infection rates between 0-3% have been quoted. Using non-sterile ultrasound gel has been associated with various infection outbreaks worldwide despite availability of sterile ultrasound gel. An ongoing debate exists relating to the invasiveness of an UGRA block and the need for an ultrasound probe cover. Public Health England have recently published guidance on using ultrasound gel and classify passing a device through tissue as invasive.

Methods: A 14-question sterility survey was sent to anaesthetists working within SE London and Kent.

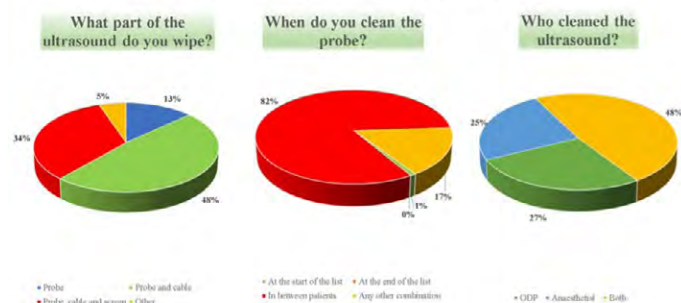
Results: We received 117 responses. 94% clean the ultrasound machine prior to usage. 82% (n=96) used ultrasound gel sachets whilst 16% (n=21) reported mixed usage (sterile/non-sterile gel). 96% (n=112) used an ultrasound cover [Tegaderm 50% (n=59), single-use sterile probe cover 23% (n=27) or a combination 23% (n=26)]. Anaesthetists reported they were more likely to use sterile probe covers if inserting a nerve catheter. 92% (n=106) maintained some sort of sterile field [sterile dressing pack 38% (n=44), sterile glove cover 44% (n=51) or a combination 10% (n=11)]. The rest of the results are displayed below.

Conclusion: Results reassuringly show most anaesthetists maintain some sterility during UGRA block, reflecting the low UK infection rates. However, we welcome guidance from international societies on optimal practices for UGRA. In the interim, we would recommend at minimum, using sterile probe covers, sterile gloves, sterile gel and a sterile dressing pack (including drape). Additionally, we feel as anaesthetists we should take responsibility for disinfecting ultrasound machines just as we have done with anaesthetic machine checks.

Table 1: Agents Used To Clean The Patient's Skin And Ultrasound

Surface/ Cleaning Agent	2% chlorhexidine and 70% alcohol wipe	0.5% chlorhexidine and 70% alcohol spray	Chloraprep stick	Citell universal sanitizing wipes	Soap and water	Betadine	BHicrob	Iodine	A combination of either	Nothing
Skin	16.2% (n=19)	20.5% (n=24)	36.4% (n=66)	0	0	0	0	0	6% (n=7)	0.9% (n=1)
Ultrasound Machine	11.5% (n=13)	2.7% (n=3)	0.9% (n=1)	80.5% (n=91)	0.9% (n=1)	0	0	0	3.5% (n=4)	0

ULTRASOUND CLEANING PRACTICES



7564 When it comes to neurologic complications in the context of neuraxial anesthesia, not everything is as it seems

Silva Sousa B. C.¹, Rodrigues Roque Dos Santos D. J.¹, Nunes J.¹
¹Hospital Prof. Doutor Fernando da Fonseca - Amadora (Portugal)

Background: Neuraxial anesthesia can have several types of complications. Neurological complications are frequently manifested by changes in sensibility or muscle strength that can be instantaneous, transient or permanent (1). It is extremely important to recognize them, however, even when the cause-effect relationship seems obvious to us, it is important to make a differential diagnosis before assuming that neuraxial anesthesia is the culprit.

Case Report: The clinical case refers to a 67-year-old male, with a history of insulin-dependent diabetes mellitus, poorly controlled arterial hypertension, peripheral arterial disease and degenerative osteoarticular disease, who underwent right Lichtenstein inguinal hernioplasty under spinal anesthesia with a 25G needle at the L4-L5 interspace with 40mg of prilocaine. The procedure and the first 24 hours were uneventful. After 48 hours, he presented right calf pain without associated neurological deficits. Deep venous thrombosis was excluded. The clinical picture worsened with the onset of hypoesthesia in dermatomes L3 to S2, anesthesia in dermatomes L5 and S1, functional impotence of the right foot, namely in dorsiflexion and plantar flexion, hyporeflexia of patellar and calcaneal tendons and steppage gait on the right. Electromyography and magnetic resonance did not reveal any acute findings that would justify the current situation. The case was referred to neurosurgery and vascular surgery. Acute on chronic ischemia of the right popliteal artery was diagnosed and a right femoropopliteal bypass was performed.

Discussion: Changes in sensitivity and muscular strength can have several causes. In the context of regional anesthesia these causes are centered on the neurological complications that can result from it (2). However, although a cause-effect relationship can be very suggestive, such as the appearance of symptoms after a neuraxial technique, it is important to consider other causes.

References:

- Liu, S., & McDonald, S. (2001). Current Issues in Spinal Anesthesia. *Anesthesiology*, 888-906.
 - Pages-Arroyo, E., & Pian-Smith, M. (2013). Neurologic Complications of Neuraxial Anesthesia. *Anesthesiology Clinics*, 571-594.
- Learning points:** We must be familiar with neuraxial anesthesia complications. They frequently show up soon after the technique has been performed. Yet, when they show up, we must do differential diagnosis, even when a cause-effect relationship seems so likely.

7625 Myotonic dystrophy: the multisystemic disease, the multidisciplinary approach and the multimodal anesthetic strategy

V. Magalhães J.¹, Sousa G.¹, Alves B.¹, Pereira C.¹, Assunção J. P.¹
¹Centro Hospitalar Tondela-Viseu - Viseu (Portugal)

Background: Myotonic dystrophy type 1 (DM1) is a rare, systemic, autosomal dominant disease, characterized by skeletal muscle weakness and myotonia, with cardiorespiratory and central nervous system involvement. With this case report, we intend to highlight the peculiarities inherent to this disease and their repercussion on the perioperative period.

Case Report: A 56-year-old patient, classified as ASA IV due to DM1 with severe obstructive sleep apnoea needing continuous positive airway pressure (CPAP), general muscle weakness and choking episodes with food, was proposed for bilateral laparoscopic adnexectomy for removal of adnexal tumor. We discuss the surgical approach with the surgical team, being decided that the best option would be to perform an open adnexectomy, thus, making possible to avoid general anesthesia (GA). After monitoring, a spinal anesthesia was performed reaching an adequate level of blockage (T10). For sedation, an infusion of propofol was started after adjusting CPAP's parameters. The patient was warmed up during surgery, which was uneventful. At PACU, a bilateral ultrasound

guided TAP block was performed. The patient remained haemodynamic stable.



Discussion: The severity of the patient's disease must be evaluated on the preoperative period and discussion of the best surgical and anesthetic technique should involve a multidisciplinary team. In this case, the final decision was to perform an open adnexectomy under regional anesthesia, avoiding profound neuromuscular blockage and invasive ventilation. It was also important to prevent shivering, that may induce myotonia, with active warming. In terms of postoperative analgesia, we perform a regional block to avoid the respiratory depression of opioids.

Learning points: The importance of good communication and synergy between the anesthetic and surgical teams is undeniable. The ultimate goal is the minimal impairment of the patient's fragile physiological balance. In this particular case the success was achieved with avoidance of GA (favoring locoregional anesthesia), opioid-sparing multimodal analgesia and longer and adequate surveillance level in the postoperative period.

7644

Opioid free anesthesia and bilateral transversus abdominis plane block for major abdominal surgery: Case series

Toleska M.¹, Dimitrovski A.¹, Kartalov A.¹, Kuzmanovska B.¹, Mikjunovikj-Derebanova L.¹, Naumovski F.¹

¹University Clinic for TOARILUC-KARIL, University Ss Cyril and Methodius - Skopje (Republic of North Macedonia)

Background: Bowel resection surgeries are associated with severe pain during and after operation. Opioids are often used for pain management during colorectal surgical procedures and postoperatively and have immunosuppressive effect and carcinogenesis.¹ Opioid free anesthesia and transversus abdominis plane (TAP) block is very good alternative to lower need for opioids during surgery, especially in patients who reject to have thoracic epidural analgesia.²

Case Report: Male patients aged 71, 68 and 72, all ASA classification 3, were scheduled for bowel resection surgery. Before surgery 1 gr paracetamol and 4 mg dexamethason were administered intravenously. After premedication with 2 mg midazolam, anesthesia induction was performed using lidocaine 1 mg/kg, propofol 2 mg/kg, ketamine 0.5 mg/kg and rocuronium bromide 0.6 mg/kg. Following intubation, anesthesia was maintained with sevoflurane 0.7 MAC in air-oxygen mixture and continuous intravenous infusion with lidocaine 2 mg/kg/h and magnesium sulphate 25 mg/kg. Bilateral TAP block was performed with 20 ml 0.25% bupivacaine on both sides. Postoperatively, pain was measured with numeric rating score (NRS) in all patients from 1 to 10 at rest and when coughing. Postoperative analgesia was ordered on demand, 1 gr metamisol every 8 hours and 1 mg/kg tramadol when NRS is 7/10 and above. The pain was measured first 72 hours after surgery. Second and third patient have pain when coughing with NRS 7, 24 hours after surgery, and tramadol was given intravenously.

Discussion: Adverse effects from opioids are well known. Opioid free anesthesia with bilateral TAP block, as a part of multimodal pain management strategy, can lower the pain scores in the postoperative period. All time after surgery patients remain stable, without severe pain, nausea and vomiting.

References:

- Kosciuczuk U, Knapp P, Lotowska-Cwiklewska AM. Opioid-induced immunosuppression and carcinogenesis promotion theories create the newest trend in acute and chronic pain pharmacotherapy. *Clinics*. 2020;75: e1554.
 - Escudero-Fung M, Lehman EB, Karamchandani K. Timing of Transversus abdominis plane block and postoperative pain management. *Local Reg Anesth*. 2020;13:185-193.
- Learning points:** Methods of opioid free anesthesia combined with bilateral TAP block in major abdominal surgeries are possible to provide an adequate level of analgesia with proper perioperative safety.

7657

BRILMA and PEC blocks as main anesthetic technique for breast cancer surgery in a high-risk patient

Dimitrovski A.¹, Toleska M.¹, Kuzmanovska B.¹, Kartalov A.¹, Toleska Dimitrovska N.², Petrusheva A.¹

¹PHI KARIL - Skopje - Skopje (Republic of North Macedonia), ²PHI UK for Thoracic and vascular surgery - Skopje (Republic of North Macedonia)

Background: Regional anesthesia techniques in breast surgery provide good analgesia and short hospital stay¹. The combination of PEC 1 and The block of lateral branches of the intercostal nerves in the midaxillary line (BRILMA) as the basic anesthesia technique in a patient planned for breast cancer surgery.

Case Report: We present a 77 year old female patient with multiple comorbidities, who is scheduled for lateral quadrantectomy with axillary dissection. The patient is ASA 4, with aortic coronary bypass 3 months ago, EF 30%, COPD, DM type 2 and chronic renal failure. After placing of basic monitoring and invasive arterial monitoring, 1mg of midazolam and 50 mcg fentanyl were given. PEC block was applied with 10 ml bupivacaine 0.5% and 10 ml Lidocaine 2% was given. The BRILMA block was applied with 10 ml bupivacaine 0.5% and 10 ml lidocaine 2%. The operation started 30 minutes after the application of the blocks. The patient had no pain, with spontaneous breathing and was hemodynamically stable. In the postoperative period the patient had no pain in the first 24 hours.

Discussion: The use of peripheral nerve blocks in breast surgery provides good analgesia during surgery and postoperatively, significantly reduces the occurrence of chronic postoperative pain. Especially important is their use as the main anesthesia technique in patients with comorbidities, thus avoiding general anesthesia and its related complications. PEC block is an interfascial block, the local anesthetic is applied between the fascia of pectoralis minor and pectoralis major muscle where the medial and lateral branches of the pectoral nerves are located. BRILMA block is an interfascial block, the local anesthetic is applied between m. Serratus anterior and mm. Intercostales externi where the intercostal nerves of T2-T8 are located.²

References:

- Ahiskalioglu A, Yayik AM, Demir U, et al. Preemptive Analgesic Efficacy of the Ultrasound-Guided Bilateral Superficial Serratus Plane Block on Postoperative Pain in Breast Reduction Surgery: A Prospective Randomized Controlled Study. *Aesthetic Plast Surg*. 2020 Feb;44(1):37-44.
 - Diéguez P, et al. BRILMA methylene blue in cadavers. Anatomical dissection. *Rev Esp Anestesiol Reanim*. 2015. <http://dx.doi.org/10.1016/j.redar.2015.03.007>
- Learning points:** The combination of these two blocks in patient with high risk (ASA 4) provides excellent perioperative analgesia, haemodynamic stability, as well as general anesthesia and related complications are avoided.

7658

Anesthesia management of an ALS patient: fascia blocks - the road to follow?

Marques Franco R.¹, Simões D.¹, Lareiro N.¹, Saraiva L.¹
¹Centro Hospitalar do Baixo Vouga - Aveiro (Portugal)

Background: Amyotrophic lateral sclerosis (ALS) is a neuromuscular disease characterized by progressive degeneration of upper and lower motor neurons. The motor involvement causes weakness, spasticity, muscular atrophy, hyperreflexia and fasciculations. Clinical manifestations typically begin in the limbs and eventually involve the bulbar and respiratory muscles resulting in pulmonary complications with respiratory failure and dysphagia or immobility.

Case Report: These patients present unique challenges since there is no consensus on the ideal anesthetic approach and it is well known that general anesthesia may worsen respiratory function and that regional techniques may exacerbate pre-existing neurologic symptoms. Furthermore, patients may be more sensitive to muscle relaxants and opioid based analgesia leading to functional decline in the post-operative period. Major anesthetic concerns in these high-risk patients include gastric aspiration, postoperative respiratory insufficiency and symptoms exacerbation.

Discussion: In this case report, a 48-year-old male patient, ASA III with ALS diagnosis a year ago with progressive disability involving dysphagia, dysarthria and stiffness was proposed for a surgical percutaneous gastrostomy. The patient had ASA standard monitoring and Bispectral Index. A combined anesthesia technique was performed with an ultrasonography guided fascia block and sedation, in order to avoid general anesthesia and its complications. A bilateral subcostal transversus abdominis plane was performed with mepivacaine on each side and sedation was induced with dexmedetomidine perfusion and a single bolus of ketamine. Hemodynamic and respiratory stability was maintained during the entire procedure with the patient spontaneously breathing. In the post-anesthesia care unit paracetamol was given and the patient was discharged to the general surgery ward with no immediate complications.

Conclusion: This case represented a challenge since postoperative respiratory failure is a major concern in these patients, which makes regional techniques preferred although its risks due to neurologic susceptibility. The use of fascia block and sedation with dexmedetomidine and ketamine allowed the surgery to be performed maintaining spontaneous ventilation and analgesic control. Ultimately the choice of anesthesia technique should be based on the patient's risk against the potential benefits and further studies are necessary to access guidelines on the perioperative management of ALS.

7661

Local Anesthetic Systemic Toxicity (LAST) after brachial plexus block in patient with left bundle branch block

Gonçalves Ribeiro S. R.¹, Pedro L.¹, Carvalho M.¹
¹Centro Hospitalar Universitário do Porto - Porto (Portugal)

Background: Local anesthetic systemic toxicity (LAST) is a rare and life-threatening anesthetic complication.¹

Case Report: A 60-years-old, ASA III, female patient was admitted for left carpal tunnel release. Medical history revealed rheumatoid arthritis and hemochromatosis. There was no history of drug allergies. EKG showed sinus rhythm with complete left bundle branch block. Biometric parameters were 52kg and 155cm. The anesthetic plan was an ultrasound-guided peripheral nerve block (PNB) of the brachial plexus (axillary approach) combined with intercostobrachial nerve block. The patient was monitored according to ASA guidelines. After establishing a good visualization of the neurovascular structures, perineural administration of local anesthetic (LA) was made in small incremental doses following negative aspiration and LA dispersion was visualized. Total LA administered dose was 400mg of 2% lidocaine. The left arm experienced dense sensitive and motor block. 15 minutes later, the patient developed psychomotor agitation. Vital signs were evaluated: BP 69/48 mmHg; HR 115 bpm;

SpO2 98%. The diagnose LAST was assumed. 75ml of intravenous Intralipid were administered in one minute followed by an infusion at 750ml/h. Hemodynamic stabilization was achieved within five minutes. Nonetheless, there was a slow neurologic recovery. Surgical intervention was postponed and the patient was sent to the emergency department to exclude other causes for the neurologic symptoms.

Discussion: The maximum recommended dose of lidocaine for performing PNBs is 5mg/kg. However, awareness of pharmacokinetic and pharmacodynamic variables among patients suggests that the AL dose should be considered individually.¹ In this case, the presence of a heart conduction disorder along with the performance of PNBs in a highly vascularized area may have render the patient more susceptible to LAST. This case showed us that LAST is a possible complication of PNBs even when technique is flawless and highlights that monitoring the patient is mandatory as it facilitates early recognition of LAST.

References:

1. Macfarlane AJR, Gitman M, Bornstein KJ, El-Boghdady K, Weinberg G. Updates in our understanding of local anaesthetic systemic toxicity: a narrative review. *Anaesthesia*. 2021 Jan;76 Suppl 1:27-39. doi: 10.1111/anae.15282

Learning points: Dose of LA should take in consideration individual factors and the site of the block. Monitoring the patient is crucial for early LAST diagnosis.

Obstetric Anaesthesiology

6474

Pregnancy blindness and eclampsia: not always a stroke

Lopez Herrera J.¹, Monge Cid E.¹, Corbella Giménez C.¹, Lema Tome M.¹, Fernandez Plotka B.¹, Bermejo Albares L.¹

¹Hospital General Universitario Gregorio Marañón - Madrid (Spain)

Background: Posterior reversible encephalopathy syndrome (PRES) is a clinical-radiographic entity which has been associated to hypertensive pregnancy disorders. Its clinical manifestations may mimic a stroke.

Case Report: An 18-year-old primigravida at 40 weeks of gestation was admitted to the emergency room after a generalised tonic-clonic seizure. At first assessment she remained in a post-ictal phase. Intravenous magnesium sulphate was administered and an urgent caesarean section under general anaesthesia performed. Early neurologic evaluation revealed GCS 10, bilateral visual loss and generalized hyperreflexia. MRI showed areas of hyperintensity in left temporo-occipital lobes, typical in PRES. In the following hours, her blood pressure gradually increased. Hence, and backed by analytical findings, diagnose of severe preeclampsia (PE) was established. Upon close range control of blood pressure, she progressively began to recover from her neurological deficits by the end of the second postoperative day.

Discussion: PRES has become increasingly recognised over recent years. In pregnancy the incidence is unknown, being a rare complication in patients with acute hypertensive disorders, like PE. Our patient maintained normal ranges of blood pressure until delivery. The most common clinical manifestations of PRES are: acute-onset headache, visual disturbances and seizures. Diagnosis must be confirmed by neuroimaging. MRI typical findings are hyperintense signals on T2 sequences and either iso/hypointense on T1 images 1,2, mostly involving parieto-occipital areas. In pregnant women, prompt delivery should always be considered. Normalisation of blood pressure is mandatory, and if present seizures and status epilepticus must be treated. Although mortality has been observed mainly due to secondary ischemic and haemorrhagic strokes, good outcomes are reported in patients timely treated 2.

References:

1. Hinduja A. Posterior Reversible Encephalopathy Syndrome: Clinical Features and Outcome. *Front Neurol*. 2020; 11:71
 2. Pilato F, et al. R. Posterior reversible encephalopathy syndrome and reversible cerebral vasoconstriction syndrome: clinical and radiological considerations. *Front Neurol*. 2020; 11:34

Learning points: Early suspicion of PRES is extremely important to avoid permanent neurological damage or even death, as it may be fully reversible once appropriate treatment is established. Blood pressure control is paramount and end of gestation must be assessed.

6498

Immune thrombocytopenia and labour: when thrombocytopenia is refractory

Fernandes D.¹, Gonçalves Pereira A. I.¹, Luís M.¹
¹Hospital Central do Funchal - Funchal (Portugal)

Background: Immune thrombocytopenia (ITP) is the third most frequent cause of thrombocytopenia in obstetric population. Its severity is variable and can change throughout pregnancy. We present a case of a pregnant woman with previously diagnosed ITP that developed a peripartum refractory thrombocytopenia, challenging delivery management.

Case Report: A 33 year-old primigravida, with asymptomatic non-medicated PTI, was admitted to our facility at 36+6 weeks of pregnancy due to decremental platelet count (81 000 /microL at admission, no accompanying signs). Corticoid and immunoglobulin therapy were initiated, but after three days of nonresponse, a cesarian delivery was determined. At this point, haemoglobin was 10,1 g/dL and platelet count 48 000/microL. After consultation with Immunohemotherapy, it became consensual to only transfuse platelets in the case of uncontrolled bleeding. Surgery was performed under general anesthesia, with Cell Saver® and blood products on the ready. There was no significant hemorrhage, nor necessity to transfuse. Postoperatively, no major blood losses were documented, with a minimum haemoglobin of 6,9 g/dL and no hemodynamic impact. Intravenous iron was initiated and 1 unit of erythrocytes was given efficaciously. Thromboprophylaxis included early ambulation, hydration, compressive stockings and 20 mg LMWH daily. At discharge, platelet count was 99 000/microL.

Discussion: In PTI, platelets appear to maintain normal function, explaining why hemorrhage severity is non-correlated with platelet values. There are no unambiguous safe thresholds, even for invasive procedures. Management has the goal of lowering hemorrhagic risk, not normalizing platelet count. Preprocedural optimization is nonconsensual due to an unpredictable course. We emphasize the importance of a multidisciplinary approach, involving Immunohemotherapy consultation and blood-saving techniques.

Learning points: Management of pregnant woman with PTI and platelet count less than 100 000/microL isn't consensual. Therapeutic optimization doesn't seem to be correlated with improved platelet count.

6519

Virtual Reality Hypnosis for Labor Pain Relief: The VRH4L study, A prospective interventional randomized controlled trial evaluating the impact of Virtual Reality Hypnosis during Labor Induction.

Piccart L.¹, Bosteels A.², Schaub I.²
¹KU Leuven Gasthuisberg - Leuven (Belgium), ²Clinique St-Jean - Bruxelles (Belgium)

Background and Goal of Study: New options for the alleviation of labor pain continue to be investigated as non-pharmacological remedies represent a popular alternative. Hypnosis and virtual reality (VR) have been studied with encouraging results. Until now, the combination of VR and hypnosis (VRH) has not been assessed during labor, although it has shown promising results in other acute pain areas. This study will evaluate the efficacy of VRH in reducing labor pain.

Materials and Methods: For this prospective, interventional, parallel group, monocentric RCT we included, from March to May 2021, full term women who were planned for an induction of labor. We excluded women with complicated pregnancies and patients with contraindications for VR. Patients were randomized in two arms. In the VRH group, the patients received a 30-minute session of VRH when in active labor, using a digital sedation software (AQUA®, Onfomfort SA) and standard care. The control group received standard care only.

Primary outcome was the post-interventional pain score. Secondary outcomes were the pain score 30 minutes after the intervention, vital signs correlated to pain, satisfaction of the experience, interaction with the midwife and prevalence of side effects. Data were analyzed using the student t-test.

Results and Discussion: We randomized 41 patients during the prenatal visit, 20 patients had spontaneous labor and 7 refused to participate on

the day of delivery. This resulted in 14 women being included in the study, 7 in each group. We found that there was a significant difference in post interventional pain increase (T1-2) between both groups, with no significant pain increase in the VRH group compared to a significant increase in the control group. There was a tendency for some differences in the secondary outcomes (maternal heart rate, nausea) but none were significant.

Conclusion: Compared to standard care alone, VRH is a useful tool to ease labor pain.

6539

An express method for early diagnosis of pre-eclampsia

Plakhotina E.¹, Kuzovlev A.², Belousova T.¹, Kuzina N.¹, Bryancev E.¹, Byadovskaya I.¹

¹Vidnovsky Perinatal Centre - Vidnoe Moscow reg (Russia), ²V. A. Negovsky Research Institute of General Reanimatology, Federal Research and Clinical Center of Intensive Care Medicine and Rehabilitology - Moscow (Russia)

Background and Goal of Study: The aim of the study is to improve the diagnosis of asymptomatic pre-eclampsia (PE) and to exclude this complication in patients with gestational thrombocytopenia (GTP).

PE is a life-threatening complication of pregnancy and requires prompt diagnosis and decision making for mother and fetus. However, diagnosis is difficult in the early development of this complication and the absence of standard symptoms such as increased BP, proteinuria more than 3 g/l, etc. The initial stage in the development of PE is incomplete invasion of the trophoblast into the uterine vessels and impaired remodeling of the spiral arteries. A consequence of this is syncytiotrophoblast (STB) ischemia, which progresses with the course of pregnancy. Ischemia leads to the release of increased amounts of STB microparticles, pro-inflammatory cytokines, reactive oxygen species, which damage the endothelium and activate placental neutrophils. Activation of neutrophils in turn triggers a chain of sequential reactions leading to the release of Neutrophil Extracellular Traps (NETs). Thus, calculation of NETs Level (NETL) may improve the early diagnosis of PE.

Materials and Methods: The relative number of NETs in peripheral blood smears in pregnant women in the second and third trimesters of pregnancy was investigated. A total of 119 patients were included in the study. The diagnosis of PE was made in 43 patients on the basis of clinical, instrumental, and laboratory data. 33 patients formed the GTP-group and the third group (control) consisted of 43 healthy pregnant women. The number of NETL and native neutrophils in the peripheral blood smear was counted according to the developed technique, followed by the calculation of NETL by the formula.

Results and Discussion: The NETL in the PE patient group was 15.2±9.95 and was significantly higher than that in the GTP patient group, 8.5±4.76 (p=0.003), and the control group, 8.7±4.01 (p=0.007).

Conclusion: The NETL count may be an express method for early diagnosis of preeclampsia and exclusion of this diagnosis in patients with gestational thrombocytopenia.

6541 Efficacy of volumetric preoperative autoplasmia donation in the surgical treatment of PAS-disorders

Plakhotina E.¹, Kuzovlev A.², Belousova T.¹, Kulikov I.¹, Pavlyutina K.¹
¹Vidnovsky Perinatal Centre - Vidnoe Moscow reg (Russia), ²V. A. Negovsky Research Institute of General Reanimatology, Federal Research and Clinical Center of Intensive Care Medicine and Rehabilitology - Moscow (Russia)

Background and Goal of Study: Blood loss during surgical treatment of placenta ingrowth varies from 500 to 20,000 ml. Up to 90% of patients need a blood transfusion. Given the high risk of transfusion complications, the search for safe methods of blood loss replenishment is necessary. The purpose of the study is to improve the treatment results of patients with PAS-disorders when performing organ-preserving surgeries and to determine the optimal volume of preoperative harvesting of autoplasmia.

Materials and Methods: 78 patients with the diagnosis of PAS-disorders were randomized into 3 groups. Group No. 1 - 23 patients, with preoperative harvesting of 500-1000 ml of autoplasmia. Group No. 2 - 36 patients, with 1500-2000 ml of autoplasmia harvested. Group No. 3 - 19 patients without autoplasmia preparation (control). Autoplasmia plasmapheresis was performed from 27 to 35 weeks of gestation by membrane plasmapheresis, with a break between sessions of at least 7 days. During one session 500 ml of autoplasmia was prepared. Analysis of blood loss volume, infusion-transfusion media, laboratory parameters, complications were performed. Reliability of the obtained results was reached due to sample volume calculation, distribution into groups by random number generation in Microsoft Office Excel program, mathematical treatment of the material by nonparametric methods; the significance level was assumed to be 0,05.

Results and Discussion: The studied groups were comparable in the volume of blood loss ($p=0,487$), which spread was 501 ml - 8002 ml. There were fewer donor plasma transfusions in group 2 compared with groups 1 and 3 ($p=0,016$, $p=0,0005$, respectively). There were no differences in donor hemotransfusions between groups №1 and №3 ($p=0,227$). Despite no differences in the volume of blood loss, reinfusion and transfusion of erythrocyte suspension, at discharge from the hospital the hemoglobin concentration, erythrocytes and hematocrit were lower in group №2 ($p<0,05$), which may be related to the accumulation of iron deficiency in the pregnant woman. One patient in group 3 (control) developed TRALI syndrome.

Conclusion: Preoperative preparation of autoplasmia in the volume of 1500 - 2000 ml prevents the use of donor plasma in 75% of cases and in the development of massive blood loss - in 43,8% of cases. Preoperative autologous plasma donation in pregnant women requires control of plasma iron levels and its correction.

6552 The effects of maternal blood pressure management with noradrenaline during general anaesthesia for non-obstetric surgery on foetal brain development in the rabbit model

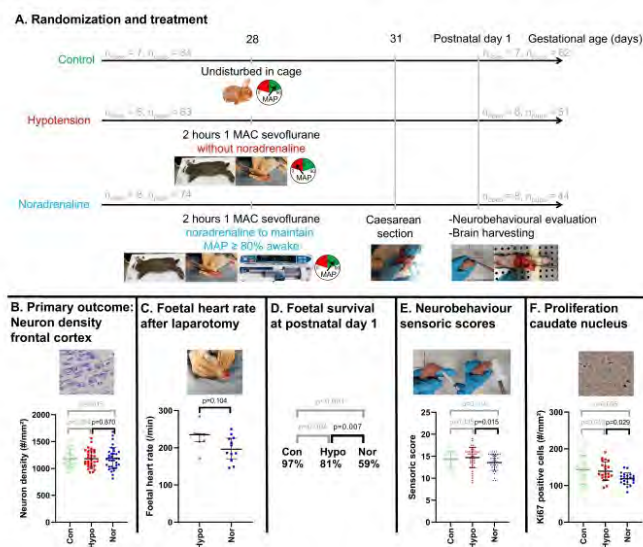
Bleeser T.¹, Van Der Veecken L.¹, Basurto D.¹, Devroe S.¹, Deprest J.¹, Rex S.¹
¹University Hospitals Leuven - Leuven (Belgium)

Background: During general anaesthesia for non-obstetric surgery in pregnant women, maternal blood pressure is commonly maintained around the awake value using vasopressors, with the aim to maintain uterine blood flow by preserving uterine perfusion pressure. The objective of this study was to compare the effects of treatment versus no treatment of maternal hypotension on foetal brain development in the rabbit model. The hypothesis was that treatment of maternal hypotension would improve foetal outcomes.

Materials and Methods: Twenty-one pregnant rabbits were randomized at 28 days of gestation to no treatment (control group), 2 hours of sevoflurane anaesthesia for a laparotomy without treatment of maternal hypotension (hypotension group) or with maintaining maternal mean

arterial pressure above 80% of the awake value using noradrenaline (noradrenaline group). At term, pups were delivered by caesarean section. Twenty-four hours later, neurobehaviour of the pups was assessed and brains were harvested for histology. Primary outcome was neuron density in the frontal cortex, secondary outcomes included other parameters of brain histology and neurobehaviour. A mixed-effects model was used for sample size calculation and statistical analysis.

Results and Discussion: No significant differences were observed for the primary outcome. In the noradrenaline-group, significantly less foetal survival, less proliferation and lower sensoric scores of neurobehaviour were found. Foetal heart rate was non-significantly lower. No significant differences were observed for neuron densities, total cell densities, biometrics and synapses. The observation of an impaired foetal outcome after treatment of maternal hypotension was in contrast with the initial hypothesis but is in line with many older preclinical studies demonstrating a reduced uterine blood flow after noradrenaline administration.



Conclusion: Treatment of maternal hypotension using noradrenaline during general anaesthesia for non-obstetric surgery in rabbits impaired foetal outcome, when compared with untreated hypotension. Clinical observational studies are needed to investigate if this reflects a clinical problem.

6553 Pulmonary arterial hypertension (PAH) during pregnancy – an anaesthetic challenge

Ribeiro J.¹, Nunes J. M. C. R.², Rodrigues F.¹
¹Centro Hospitalar Universitário Lisboa Norte - Lisboa (Portugal),
²Instituto Português de Oncologia de Lisb - Lisboa (Portugal)

Background: Pregnancy is highly discouraged in women with PAH due to the association with high maternal and foetal mortality rates. Interruption of pregnancy should be offered to these women^{1,2}. As the PAH knowledge grows and patients higher life expectancy, there is an increasing amount of experience managing women diagnosed with PAH in pregnancy.

Case Report: 26 years old primigravid woman diagnosed with pre-capillary PAH (mean pulmonary artery pressure 42mmHg), World Health Organization group 1, secondary to systemic lupus erythematosus, since 2014. The disease was controlled with ambrisentan, sildenafil, immunosuppressive drugs and warfarin. Upon refusal of pregnancy termination, teratogenic drugs (endothelin-receptor antagonist and vitamin K antagonist) were suspended and a Hickman catheter was implanted for epoprostenol administration. The patient was assessed in an Anaesthesiology consultation at 29 weeks and 3 days of pregnancy. Multidisciplinary decision for programmed cesarean section was taken. Due to beginning of labour at 36 weeks, an emergent caesarean section was performed under general anaesthesia. Regional technique was not performed because of recent administration of therapeutic dose of enoxaparin. The patient was monitored with ASA standards and a Vigileo® cardiac output monitor. Remifentanyl infusion was used

to limit the cardiovascular response during intubation and anaesthetic emergence. Epoprostenol administration was maintained during the procedure and haemodynamic stability was achieved. The newborn and the mother were then transferred to an intensive unit care in the postpartum period and no complications were reported.

Discussion: Physiological changes in pregnancy significantly alter haemodynamic stability in patients with PAH, which may become catastrophic with onset of labour. Although neuraxial anaesthesia would be the safest approach, the patient was under therapeutic anticoagulation, a contraindication for this regional technique. General anaesthesia with focus on haemodynamic stability was offered and safely performed.

References:

1. Current opinion in anaesthesiology (2016) 273-281
2. European Respiratory Review (2016) 431-437

Learning points: This case highlights the importance of monitoring high-risk pregnancies in a central hospital to minimize morbidity and mortality associated with this disease. Epoprostenol proved to be a useful therapy in the peripartum period, in accordance to medical literature².

6555

Thromboelastography as a safety criterion for regional anesthesia in patients with gestational thrombocytopenia

Plakhotina E.¹, Kuzovlev A.², Belousova T.¹, Kuzina N.¹
¹Vidnovsky Perinatal Centre - Vidnoe Moscow reg (Russia), ²V. A. Negovsky Research Institute of General Reanimatology, Federal Research and Clinical Center of Intensive Care Medicine and Rehabilitation - Moscow (Russia)

Background and Goal of Study: Gestational thrombocytopenia (GTP) is the most common type of thrombocytopenia during pregnancy. Unlike other types of thrombocytopenia, it is not accompanied by impaired cellular hemostasis function. Quantitative platelet reduction in GTP may be a contraindication for neuroaxial blocks, which significantly reduces the quality of care in childbirth. The aim of the study was to improve the quality of anesthetic care for patients with GTP during conservative and operative delivery.

Materials and Methods: The retrospective prospective study involved 70 patients delivered conservatively or operatively depending on obstetric indications. The patients were divided into two groups. The study group comprised 35 patients with GTP. The comparison group consisted of 35 patients with platelet concentrations above 150*10⁹/l. Comparative intergroup analysis of the general blood count, coagulogram, and thromboelastography (TEG) scores with a functional fibrinogen test (FFT) was performed before delivery and 2 days after delivery. A comparative assessment of blood loss during labor and the early postpartum period and the risk of complications from neuroaxial blockade in patients with and without GTP was performed.

Results and Discussion: In GTP in the perinatal period there is no decrease in coagulation potential as assessed by coagulography and TEG with platelet levels above 49*10⁹/l. The studied hemostasis parameters had no significant intergroup differences during pregnancy and labor. In the group of patients with GTP, the amount of blood loss in labor and the postpartum period did not differ from the group without thrombocytopenia regardless of the method of delivery. The median blood loss after natural delivery was 225 ml in the main group, 250 ml in the control group, and 572 ml and 386 ml for abdominal delivery, respectively. There were no complications of neuroaxial blockages in any of the groups in this study.

Conclusion: In patients with GTP, even when platelet concentrations fall below 50*10⁹/l, it is possible to perform neuroaxial blocks in labor, taking into account the clinical picture and the absence of coagulation disorders confirmed by TEG with FFT.

6556

Pneumocephalus, subdural hygroma and hematoma complicating an unintentional dural puncture during labor

Falasca Zamponi H.¹, Al-Taie R.², Filipowski S.¹, Papadopoulou C.¹, Kollmann Camaiora A.¹
¹Akademiska Sjukhuset - Uppsala (Sweden), ²Gävle Sjukhus - Uppsala (Sweden)

Background: Post dural puncture headache (PDPH) is a known complication secondary to unintentional dural puncture (UDP). The incidence of UDP in obstetric anesthesia is 0.15-1.5% and the risk of PDPH after UDP is estimated at 50-88%¹. There are rarer but severe complications to UDP including subdural hematoma, cerebral venous thrombosis and cranial nerve palsy^{1,2,3} and they should be considered in the differential diagnosis¹.

Case Report: A healthy 23 yo. primiparous woman with a spontaneous start of labor. Received epidural analgesia at 4cm cervix dilation. The epidural catheter was placed by an experienced anesthesiologist, with a 18G Tuohy needle at the L2-L3 level using a median approach with the patient on her left side. UDP during the first attempt, the needle was withdrawn and the second attempt at the L3-L4 level was successful. 30 min after the UDP the patient developed a severe (VAS 9) postural headache, frontal and occipital. After delivery the headache continued (VAS 10 sitting position, VAS 6 laying down) and moderate nausea. Due to the unusual presentation of PDPH a CT scan was performed 24h after the UDP: subdural hygromas with parafalcine blood components and along the left hemisphere, and intracranial air above the suprasellar cistern. The anesthesia team together with the neurosurgeon opted for a conservative management with paracetamol, oxycodone, caffeine and ondansetron p.o. with significant clinical improvement. In the control scan 48h after the first one the patient had considerable regress of the subdural hygromas and the air was absorbed. A 1 mm frontal subdural hematoma and a 4 mm parafalcine subdural hematoma remained. The patient continued to improve and was discharged home 7 days after delivery.

Discussion: PDPH is a known complication of UDP but there are other rare and serious complications to UDP that should be considered in the differential diagnosis. Several red flags for postpartum headache have been described (early onset and intensity in our case) and when present, the clinician should obtain brain imaging to rule out severe intracranial causes^{2,4}.

References:

1. Minerva Anestesiologica 2019;85:543-53,
2. Pract Neurol 2017;17:191-202,
3. J Headache Pain 2017;18:106,
4. Curr Opin Obstet Gynecol 2021;33:94-99

Learning points: Although rare, obstetric anesthesiologist must be aware of severe complications and order early brain imaging to detect them. A multidisciplinary approach with the neurosurgeons is recommended.

6584

Non-invasive hemodynamic monitoring during caesarean delivery: incidence of perioperative maternal hypotension and impact on neonatal well-being.

Vasile F.¹, Tigano S.¹, Sanfilippo F.¹, Murabito P.¹, Astuto M.¹
¹University Hospital Policlinico "G. Rodolico" - Catania (Italy)

Background and Goal of Study: Spinal anesthesia (SA) is the most common anesthesiologic technique to perform elective caesarean section (CS). Despite its safety profile, complications such as perioperative maternal hypotension frequently occurs [1]. The aim of our study was to investigate the incidence of perioperative hypotension after SA using a non-invasive continuous hemodynamic monitoring.

Materials and Methods: Observational prospective study in a population of 145 patients with positive preoperative postural change test. In all patients, SA was performed with a combination of hyperbaric bupivacaine 0.5% (according to a predefined weight/height scheme) and fentanyl 20 µg. Hypotension was defined according to two cut-offs of mean arterial pressure (MAP <65mmHg or <60mmHg). We also evaluated the impact

of hypotension on neonatal well-being (according to Apgar score and cord blood gas analyses).

Results and Discussion: Perioperative maternal hypotension occurred in 54.5% of cases considering MAP <65 mmHg, and 42.1% with the more conservative cut-off (<60 mmHg). Severe neonatal acidosis occurred in 1.4% of neonates, while an Apgar score ≥ 9 was observed in 95.9% at 1 minute and 100% at 5 minutes.

Conclusion: Continuous non-invasive hemodynamic monitoring allowed an early detection of maternal hypotension leading to a prompt treatment with satisfactory results considering neonatal well-being.

References:

1. Kinsella, S.M.; Carvalho, B.; Dyer, R.A.; Fernando, R.; McDonnell, N.; Mercier, F.J.; Palanisamy, A.; Sia, A.T.H.; Van de Velde, M.; Vercueil, A.; et al. International consensus statement on the management of hypotension with vasopressors during caesarean section under spinal anaesthesia. *Anaesthesia* 2018, 73, 71–92.

6602

Specific features of spinal anesthesia during cesarean section with severe COVID-19 pneumonia

Oreshnikov E.¹, Oreshnikova S.¹, Vasiljeva E.¹, Denisova T.¹

¹Chuvash State University - Cheboksary (Russia)

Background and Goal of Study: Spinal anesthesia (SA) is the main type of anesthesia for cesarean section (SC). Severe coronavirus pneumonia, which complicates the course of pregnancy, requires some adjuncts to provide SA.

Materials and Methods: The safe conduct of SA was ensured by the temporary discontinuation of the use of heparin or low molecular weight heparins in the perioperative period. SA was performed exclusively in the sitting position, then the patient was transferred to the horizontal position with the head end elevated by 30-45-60 degrees (depending on the needs). Respiratory support was used at all stages of preparation, performance, and administration of anesthesia: insufflation of humidified oxygen, high-flow oxygenation (HFO) through nasal cannula or face mask, and noninvasive mechanical lung ventilation through the face mask. Maintenance of normotension was provided by intravenous boluses of 50 µg phenylephrine.

Results and Discussion: The above-described features of SA were used by us during CS in 30 women in labor with severe coronavirus pneumonia. Compliance with the characteristics of SA caused by coronavirus pneumonia was expressed in the following: 1) sitting position - half sitting at all stages of the perioperative period; 2) constant respiratory support, mainly HFO; 3) early transfer to the prone-position in the postoperative period, accompanied by effective postoperative anesthesia for its provision; 5) a quick return to heparin therapy in therapeutic doses. This approach ensured that there was no need to use general anesthesia with tracheal intubation for CS.

Conclusion: Supplemented with HFO, half-sitting SA is the method of choice for providing CS in labor with severe coronavirus pneumonia.

6640

Repeating an epidural blood patch for a recurring postdural puncture headache: a case report

Lopes Simões Duarte D. F.¹, Gomes N.¹, Sousa M.¹

¹Centro Hospitalar de Entre Douro e Vouga - Santa Maria da Feira (Portugal)

Background: Post-Dural Puncture Headache (PDPH) is an expected complication after perforation of the dura mater¹⁻³. Although the epidural blood patch (EBP) has a high success rate and low incidence of complications¹, it is reported that 17% of patients have recurring symptoms requiring a repeat EBP².

Case Report: A 32-year-old woman, with history of obesity (BMI 40,1), submitted to epidural analgesia in the sitting position for labor. During the technique, CSF was aspirated from the epidural catheter, which was then withdrawn 1cm but still used for analgesia. No other complications were reported.

Later, the patient complained of non-pulsatile fronto-occipital headache, worsened when standing or leaning forward, and relieved in the supine position. She was managed conservatively (fluids, caffeine, acetaminophen and ketorolac), which improved the symptoms, allowing for ambulation the next day. On the 2nd day post-partum, the symptoms relapsed, an EBP was performed with blood administered until pain was reported (14ml) – symptoms relieved and patient was discharged home. Two days later, the patient returned to the hospital complaining of the same symptoms and a new EBP was performed, again administering volume until pain reported (18ml), with resolution of PDPH.

Discussion: PDPH is defined as a headache occurring within 5 days of a lumbar puncture³ and has a substantial incidence in the obstetric population¹⁻³. EBP is the standard against which to evaluate alternative methods of treatment. The technique has a success rate of 70–98% and, in case of failure, a second EBP has similar success¹. Patients who receive an EBP within 24h of PDPH onset are more likely to need a repeat EBP. Inter-patient variability in terms of epidural space anatomy, compliance and pain tolerance influence how much blood can be administered into the epidural space, although increasing the volume of blood administered does not seem to reduce the incidence of recurring PDPH². In this case, despite performing an EBP more than 24h after PDPH onset, the patient needed a repeat EBP to experience complete and long lasting symptom relief.

References: 1. *Br J Anaesth.* 2003;91(5):718–729.

2. *Int J Obstet Anesth.* 2017. Feb;29:10-17.

3. *J Anesth Crit Care Open Access.* 2018;10(3):113–5.

Learning points: Although an EPB is a safe and effective technique to treat PDPH, the ideal timing and volume to be administered is still not completely understood and, in some cases, a second EBP is necessary.

6646

Does dural puncture epidural improve quality of labor epidural analgesia? Randomized single-blinded controlled study

Pazur I.¹, Ozegic O.¹, Lijovic L.¹, Klican Jaic K.¹, Pesic M.¹

¹University Hospital Centre "Sestre milosrdnice" - Zagreb (Croatia)

Background and Goal of Study: Obstetric anesthesiologists are facing with some difficulties in providing adequate epidural analgesia (EA) during the entire labor. To overcome this, dural puncture epidural (DPE) technique was introduced in clinical practice. DPE is modification of combined spinal epidural, but it is devoid of intrathecal drug administration. We hypothesized that DPE would provide faster onset of EA and decrease the need for additional boluses during labor in comparison with standard epidural (EPL). We also compared the incidence of emergent caesarean section and instrumented vaginal deliveries between groups.

Materials and Methods: 55 healthy nulliparous parturients requesting EA, were randomized to receive DPE or EPL. Cervical dilatation was less than 6 cm at the moment of epidural insertion. Epidural space was identified by using loss of resistance technique with syringe containing 10 ml of saline. Afterwards, in DPE group, atraumatic Whitacre needle, 27-gauge, 12 mm of length was inserted through epidural needle until free flow of cerebrospinal fluid was obtained. The spinal needle was then withdrawn without administration of any medication intrathecally. In both groups 10 ml bolus of 0,125% bupivacaine was followed by continuous infusion of 0,06% bupivacaine, 10 ml per hour. The bolus and infusion contained fentanyl (5 mcg/ml) and epinephrine (5 mcg/ml) as analgetic adjuvants. Pain was assessed by numeric pain rating scale (NPRS) scale 10 minutes after first bolus. Additional boluses were also recorded in both groups. The value of NPRS equal or less than 3 in the presence of an uterine contraction was defined as adequate analgesia.

Results and Discussion: Demographic characteristics were comparable. Pain scores at 10 minutes were significantly lower in DPE group, where adequate analgesia was achieved in all patients (100% vs. 85.2%, $p=0.034$). Regarding the administration of epidural top-up, no difference was recorded between groups ($p=0.748$). Concerning secondary outcomes related to the incidence of emergent caesarean section, there was no significant difference between DPE group, with 6/27 patients (22.2%) vs. 8/28 patients (28.6%) in EPL group, $p=0.589$. Similar findings exist regarding vacuum extraction ($p=0.999$).

Conclusion: DPE can be safely used in obstetric population, ensuring faster onset of epidural analgesia, while need for additional boluses remains unchanged. It does not affect the course of labor.

6653 Impact of preoperative oral rehydration on the incidence of maternal hypotension after spinal anaesthesia for cesarean section

Butori R.¹, Lalmand M.¹, Lenoir N.¹, Schartz D.¹, Van Der Linden P.¹
¹CHU Brugmann - Huderf - Brussels (Belgium)

Background and Goal of Study: Hypotension is one of the most common complications following spinal anesthesia for caesarean section (C-section), potentially responsible for maternal and fetal complications. Fasting has been considered by some authors as a contributing factor¹. Our study tests the hypothesis that oral rehydration, 2 hours before a scheduled C-section, would reduce the incidence of hypotension and the use of vasopressor agents.

Materials and Methods: After EC approval, 19 patients, admitted for a scheduled C-section, after an uncomplicated singleton pregnancy, and having given written informed consent, were included in this prospective randomized study. Patients have been fasted since midnight the day before the operation. In the 1st group, the fast was maintained until the intervention (control group); in the 2nd group, the patients received 400 ml of a preoperative rehydration solution, 2 hours before anesthesia (rehydration group). The primary endpoint of the study was the incidence of at least one hypotensive episode occurring between induction of the spinal anesthesia and fetal cord clamping. A hypotensive episode was defined as any decrease in systolic blood pressure (SBP) of more than 20% from the patient's baseline SBP or the use of a 3 mcg bolus of noradrenaline. Secondary outcomes included the number of hypotensive episodes and the total dose of noradrenaline administered. A 5-item satisfaction questionnaire was also submitted to the patient on the 1st postop day. Continuous data were presented and compared according to their distribution (Table). Discontinuous data were analyzed by the Chi² test and presented as percentages.

Results: The two groups were comparable (Table). Incidence of hypotensive episodes, their number and the amount of noradrenaline used were not different between groups. Maternal satisfaction was comparable

Conclusion: Under the conditions of our study, preoperative rehydration does not reduce the incidence of hypotensive episodes during spinal anesthesia for scheduled C-section. These results are to be confirmed after inclusion of the total number of expected patients (50 per group).

Reference: *Arai, Masui, 2016*

	Control group (n=9)	Rehydration group (N=10)	p value
Age (Y)	28 ± 5	33 ± 6	0,118
BMI (kg/m ²)	26 ± 4	28 ± 5	0,610
Gestational age (y)	38 (38-39)	38 (38-39)	0,789
Hypotension (%)	7 (78)	7 (70)	0,700
Hypotension (nb)	2 (1-3)	3 (0-8)	0,488
Noradrenaline (mcg)	12 (3-20)	8 (0-54)	0,772
Maternal satisfaction	5.0 (4.5-5.0)	5.0 (4.8-5.0)	0,514

Continuous data with normal distribution: Mean ± SD; Student t-test
Continuous data with non normal distribution: Median (Q) - Mann-Whitney U-test

6654 Successful Neuraxial Block for a Caesarean Section in a Parturient with Goldenhar Syndrome: First Report

Dabrowska D. M.¹, Greenhalgh S.¹, Haddad S.¹
¹Chelsea and Westminster Hospital NHS Foundation Trust - London (United Kingdom)

Background: Goldenhar syndrome, also known as oculo-auriculo-vertebral dysplasia is a congenital condition characterised by craniofacial, vertebral, and cardiac abnormalities. Of particular concern to the obstetric anaesthetist is the likelihood of difficult airway, access to the epidural space, and the risk of cardiac abnormalities.

Case Report: A 35-year-old patient presented for Caesarean Section in view of macrosomia and polyhydramnios. Her previous surgical history included multiple surgeries for correction of craniofacial abnormalities and past medical history included hypothyroidism and obstructive sleep apnoea. Difficulty in intubation was predicted in view of her limited mouth opening, micrognathia, limited neck extension and a Mallampati 4 score, with the only appropriate intubation approach identified as awake nasal fibre-optic intubation. Furthermore, she had vertebral scoliosis and likely technically challenging neuraxial block, having recently had 7 failed attempts at lumbar puncture by a medical team following admission for headache. She had no known cardiac abnormalities and a normal ECG and echocardiogram. Effective neuraxial block was achieved by a senior obstetric anaesthetist using a combined spinal and epidural technique with 1.8mls of 0.5% Heavy Marcain® and 25mcg fentanyl, supplemented with 3mg of diamorphine via epidural catheter at the end of the procedure. A resident airway specialist anaesthetist was informed of the procedure and was on standby. The baby was 4.6kg and required resuscitation by the neonatal team. The surgery was complicated by postpartum haemorrhage due to uterine atony. Both mother and baby were adequately resuscitated intraoperatively and discharged home 2 days later.

Discussion: Successful endotracheal intubation under general anaesthesia for elective caesarean section has been previously described in a patient with Goldenhar syndrome [1], however to our knowledge this is the first documented case of successful neuraxial obstetric anaesthesia performed in a parturient with this rare syndrome.

References:

1. Lokhande C et al.. The peri-operative management of a caesarean section in a patient with Goldenhar syndrome (GS): A case report. *J Clin Anesth.* 2016 Nov;34:448-51.

Learning points: Obstetric patients with Goldenhar Syndrome represent an anaesthetic challenge in view of difficulty in airway management and potentially difficult neuraxial access.

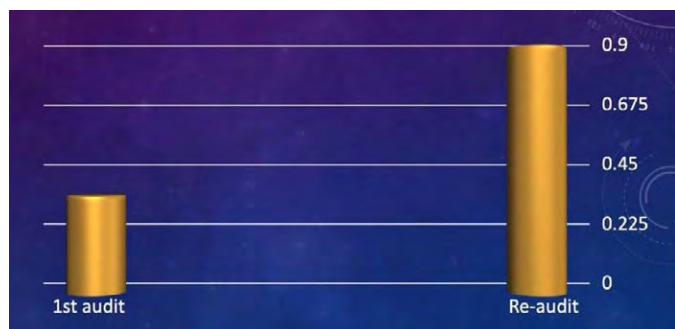
6693 Quality improvement project on thromboprophylaxis following LSCS patients in Scunthorpe General Hospital

Nandar C.¹, Ananth Manohar R.¹, Khalil J.¹
¹Scunthorpe General Hospital - Scunthorpe (United Kingdom)

Background and Goal of Study: Venous thromboembolism (VTE) remains one of the main direct causes of maternal death in the UK. It is also mentioned as the 2nd cause of maternal mortality in recent MBRRACE report 2020. The risk is higher in post-partum period especially in those with the caesarean section. Reports suggests a significant decline in maternal deaths from VTE in the UK by timely thromboprophylaxis. Low molecular weight heparin (LMWH) is the agent of choice for antenatal and post-natal thromboprophylaxis. This QIP has shown an improvement in thromboprophylaxis management in Scunthorpe General Hospital (SGH).

Materials and Methods: We did a prospective audit in mid 2020 followed by re-audit in late 2020 with the suggestion from the first audit. We analysed the data of all the elective and emergency LSCS cases. The data was collected from the trust online patient record system (Web V) and nursing registration book from the delivery suite. Totally, we looked at 35 records in the first audit and 29 records in the second.

Results and Discussion: The first audit in August, 2020 (n=35) showed that only 34.4% of the cases received timely thromboprophylaxis. Our findings was presented in both Anaesthetic and Obstetric audit meetings. Following the discussion, we circulated the message and raised the awareness of checking the timing and prescription of thromboprophylaxis while doing WHO sign-out checklist at the end of the procedure. We also communicated with the lead midwife from the delivery and post-natal ward to avoid any delay in the administration. After 3-week action plan, we did re-audit (n=29) in November, 2020. The result showed 24 out of 29 patients received the timely thromboprophylaxis within the recommended time (86.2%). Our project clearly showed that with our suggestion and changes, there was an improvement in timely thromboprophylaxis from 34.4% to 86.2% (P value < 0.0001).



Conclusion: Our project clearly shows an improvement in thromboprophylaxis management at SGH through good team work and planning from all the concerned teams (midwives, obstetricians and anaesthetists).

6742 Suicide attempt with Ammonium Hydroxide during pregnancy: a case report

Cañamas Catalá M.¹, Reyes I.¹, Garcia C.¹, Alonso E.¹, Guasch E.¹, Brogly N.¹

¹Hospital Universitario La Paz - Madrid (Spain)

Background: Acute poisoning remains a public health problem. Most common causative agents are regular household items (1, 2). We report the case of a pregnant woman admitted in ICU after suicide attempt with alcohol and ammonium hydroxide (AH) poisoning.

Case Report: A 34-year old woman with an uncontrolled gestation at 38 +2 weeks was admitted to the emergency department (ED) after ingesting ethanol and approximately 200 mL of AH. She had a history of various admissions at the ED for cocaine and alcohol abuse. After evaluation by ENT surgeons at admission, an awake fibroscopy was performed, showing arytoids and glottis edema. Given the risk of worsening of lesions in the next hours, the patient was sedated and intubated for a 48-hours period. An oesophageal and gastric fibroscopy showed no major lesions. A treatment with intravenous pantoprazol 40mg /12h, hydrocortisone 200mg and B1 vitamin 100mg, was administered. She was transferred to the maternal ICU, sedated with propofol and remifentanyl. Fetal heart rate was monitored every 8 hours for 30 minutes, showing a progressive decrease of reactivity. After 36 hours under sedation, the patient presented an episode of maintained bradycardia of rapid recovery. The obstetric team decided to perform a caesarean section to finalize gestation, given the advanced term, the risk for the foetus of a prolonged sedation and of failed extubation in a pregnant patient. The intervention went uneventful. After delivery dexmedetomidine 1mcg/kg/h was added to optimize sedation. Tracheal extubation was performed successfully 24 hours after delivery in presence of the ENT surgeon, with no further complications. Later that day the patient was transferred to the ward, and discharged home three days later.

Discussion and Learning points: Caustic ingestion has been widely described especially in children, but little evidence has been published in pregnant women. (3) Only one publication assessed acute poisonings in pregnant and non-pregnant women (1), but this article is not centered on the management of caustic intoxications in pregnant patients. More data would be necessary to make recommendations in the population of pregnant patients.

References:

1. Eyasu, M. et al. Tropical Medicine & International Health, 22(10), 1350–1360
2. Lusong, M. A. A. D. et al. World Journal of Gastrointestinal Pharmacology and Therapeutics, 8(2), 90.
3. Hoffman, R. S. et al., 2020, NEJM, 382(18), 1739–1748.

6744 Postpartum posterior reversible encephalopathy syndrome: A change in the post dural puncture headache pattern.

Arantes A.¹, Alves S.¹, Costa F.¹, Gomes C.¹, Caridade M.¹, Borges J.¹
¹Hospital de Braga - Braga (Portugal)

Background: Posterior Reversible Encephalopathy Syndrome (PRES) is a rare complication of acute hypertensive disorders, manifested by transient neurological signs.^(1,2) It is associated with vasogenic edema of the subcortical white matter in the posterior parietoccipital lobes.⁽¹⁾

Case Report: After a caesarean under epidural anaesthesia, a 37-year-old puerperal woman referred orthostatic headaches since the early postpartum, compatible with post dural puncture headache (PDPH). The patient was treated with acetaminophen, NSAIDs and oral hydration with good response. At the 6th day, the patient recurred to the emergency department with persistent and severe holocranian headache, nausea and hypertension. Assuming the diagnosis of refractory PDPH, a sphenopalatine ganglion block was performed with ropivacaine 1%. Immediately after the block, the patient developed tonic-clonic seizures treated with intravenous midazolam (5mg). The computed tomography revealed bilateral occipital hypodensity and Magnetic Resonance Imaging (MRI) showed bilateral foci of high signal in T2 and FLAIR, concerning the cortico-subcortical transition, involving more widely temporal and occipital lobes, consistent with PRES. Treatment for hypertension (labetalol perfusion, followed by metildopa 500mg tid, nifedipina 90mg id and propranolol 80mg tid.) and seizure prophylaxis (levetiracetam 1000mg bid) was immediately adopted. The patient was admitted to a Level II Unit and discharged to the ward at the 4th day without neurological sequelae.

Discussion: The pathogenesis of PRES remains unclear. It has been associated to several conditions, including Preeclampsia-Eclampsia. An early diagnosis is crucial to start therapy and avoid morbimortality.⁽¹⁾ In this case report the diagnosis was delayed by the previous diagnosis of PDPH, which led the medical team to initially dismiss the change of pattern of headache presented by the patient. Nevertheless, early intervention focused on monitoring vital signs, MRI scanning, along with treatment focused on hypertension control and cerebral edema reduction was successful, preventing permanent neurological damage.

References:

1. Case Reports in Obstetrics and Gynecology, vol.2019, Article ID9527632,2019.
2. Clin Case Rep.2015;3(4):266–270

Learning points: PRES may be associated with Preeclampsia-Eclampsia. Its timely recognition allows an early diagnosis and therapy. PDPH headache pattern changing along with nausea, hypertension and seizures suggested PRES.

6777

Epidural Analgesia for Labor: Comparing the Effects of Continuous Epidural Infusion (CEI) and Programmed Intermittent Epidural Bolus (PIEB) on Obstetric Outcomes

Binyamin Y.¹, Avraham T.², Benamram S.³, Rotem R.⁴, [Ioscovich A.](#)³
¹Soroka University Medical Center - Beer-Sheva (Israel), ²Faculty of Medicine, the Hebrew University Hadassah Medical School - Jerusalem (Israel), ³Department of Obstetric Anesthesia, Shaare Zedek Medical Center, affiliated with the Hebrew University Hadassah School of Medicine - Jerusalem (Israel), ⁴Department of Obstetrics and Gynecology, Shaare Zedek Medical Center, affiliated with the Hebrew University Hadassah School of Medicine - Jerusalem (Israel)

Background and Goal of Study: In the last few years there is a trend of transiting from the Continuous epidural infusion (CEI) method for epidural analgesia to a new method – program intermittent epidural analgesia (PIEB). This change brings a betterment of the quality of epidural analgesia, thanks to an increased spread of the anesthetic in the epidural space and a higher maternal satisfaction. Nevertheless, we must make sure that such change of method does not lead to worse obstetric and neonatal outcomes.

Materials and Methods: A retrospective observational case control study. We compared several obstetrical outcomes between the CEI and PIEB groups, such as the rates of instrumental delivery, rates of cesarean section, duration of first and second stages well as APGAR scores. We further segmented the subjects and examined them in groups of nulliparous and multiparous parturients.

Results and Discussion: 2696 parturients were included in this study, 1387 (51.4%) parturients in the CEI group and 1309 (48.6%) parturients in the PIEB group. No significant difference was found in instrumental or cesarean section delivery rates between groups. This result held even when the groups were differentiated between nulliparous and multiparous. No differences were revealed regarding first and second stage duration or APGAR scores.

Conclusion: Our study demonstrates transition from the CEI to the PIEB method does not lead to any statistically significant effects on neither obstetric nor neonatal outcomes.

6781

Labouring patients with covid-19: did we improve patient care between first and second wave? Survey of quality and satisfaction in a tertiary university hospital.

[Brogly N.](#)¹, [Valbuena I.](#)¹, [Alaez A.](#)¹, [Zembrana P.](#)¹, [Gómez, De Ancos L.](#)¹, [Guasch E.](#)¹

¹Hospital Universitario La Paz - Madrid (Spain)

Background: COVID19 pandemic has provoked profound changes. We aimed to assess the difference of management and repercussion on obstetric patient comfort between the two first waves of COVID19 pandemic.

Material and methods: Between march and December of 2020, consecutive consenting patients diagnosed of COVID-19 at the time of delivery were included in this prospective observational study. Two waves (W) were defined (March to August of 2020, and September to December of 2020) based on epidemiological criteria. We collected data concerning personal history, COVID19 infection, mode of delivery and anaesthetic technique. A survey was conducted 3 months after delivery, assessing maternal wellbeing, breastfeeding and humanization of delivery. Comparisons were performed using X² test or Student test. p<0.05 was considered statistically significant.

Results: COVID-19 affected 102/4183 (2.43%) parturients. Comorbidity was more frequent in the W1 (65.1%) than in W2 (34.9%) (p=0.004). Vaginal birth increased (54% to 86.8%) and caesarean delivery decreased (46% to 13.2%) (p<0.001). 83.3% of COVID19 parturients received a neuraxial block for vaginal delivery and 93.3% for caesarean delivery, with no difference between periods (p=0.26 and p=0.27 respectively). Three months after delivery, 80/102 (78.4%) parturients answered the survey. At one month, exclusive or mixed breastfeeding was achieved in

67.7% (W1), versus 90.9% (W2) parturients (p=0.009). This improvement was maintained after 3 months: 34.5% of breastfeeding in the W1 versus 86.1% in W2 (p<0.001). Patients referred a level of anxiety of 3 [1;5] /5 on a likert scale with no difference between waves (p=0.49). Satisfaction with pain control and delivery care were high (4[1;5] and 5[1;5] respectively) with no difference between periods. The presence of an accompanying person during delivery was higher in the W2 (W2:28.9%; W1: 71.1%, p=0.04). Emotional discomfort affected 33.8% patients during hospital stay, with a sensation of insufficient medical follow up (18.8%), of lack of humanity of healthcare workers (17.5%), and of loneliness (15%). This discomfort decreased along time (W1: 45.7%; W2: 24.4%, p=0.046).

Conclusion: The COVID-19 pandemic obliged obstetric teams to take measures. This study showed that despite the special circumstances, standards of care remained of high quality and improved between waves.

Learning points: Obstetric care improved between the first two waves of COVID19 pandemic.

6784

Implementing Quality-of-Recovery Questionnaire after Caesarean Section -A feasibility pilot study.

[Vestager Jensen M.](#)¹, [Sønderby Pelletier C.](#)¹, [Ekelund K.](#)¹, [Lindelof K.](#)¹
¹Rigshospitalet - Copenhagen East (Denmark)

Background and Goal of Study: Patient reported outcome measures (PROM) is increasingly used in healthcare as a surrogate parameter of patient's wellbeing. In this study a quality-of-recovery questionnaire after caesarean section (CS) was used. It is inspired by ObsQoR-11 (1).

The objective of this project was in a pilot study to explore if the translated ObsQoR-11 could be used in a Danish setting.

Materials and Methods: Ethics approval was obtained. During the period of the pilot study (May to July 2020) at the Copenhagen University Hospital (Rigshospitalet) post CS women, who were able to read Danish, were asked to participate. They filled out the questionnaire 24-48 hours after the CS. The questionnaire was either sent electronically via government platform (e-boks) including an email or handed out in paper or on an iPad. All answers were registered on a 10-point score. In addition, we included two questions regarding per- and postoperatively shivering and pruritus. The reliability was evaluated by asking participants how the question was perceived.

Results and Discussion: 93 women were invited. None of the 10 we contacted via e-mail responded. Only two women declined. In total 81 women filled out the questionnaire (15 (39.5%) acute and 49 (60.5%) elective). None of the questions were found to be ambiguous. The overall 'satisfaction-score' was 73,3(+/-22,3 SD) on a 0-120 scale (12 questions each on a 0-10 scale). 22% of the women reported having experienced severe postoperative pain (Max agree on the 0-10 scale). 19/81 (23.5%) received clonidine for shivering in the operating room (4/49 (8%) and 15/32 (47%) elective and acute CS). During the recruitment period there was 125 elective and 117 acute CS.

The questionnaire was well understood, few minor adjustments were made during the pilot study. Questionnaires sent via e-mail was not feasible due to the very low response rate. The 'filling out' while observed had a very high response rate but was very time consuming. The questions in the questionnaire were well understood, and only minor adjustments were necessary. Surprisingly many were describing having experienced severe pain. And the combined 'happiness' score from the responders was not high indicating room for improvement.

Conclusion: PROM can be used to improve treatment and the ObsQoR questionnaire appears to be a suitable tool in improving the postoperative wellbeing after cesarean section.

Reference:

1. Ciechanowicz et al., BJA, 2019

6896

Prospective observational study to investigate the relationship between sonographic inferior vena cava (IVC) diameter and spinal hypotension in elective cesarean delivery

Greenberger C.¹, Kaplan G.¹, Aptekman B.¹, Baar Y.¹, Ronel I.¹, Weiniger C. F.¹ Division of Anesthesia, Intensive care, and pain Management , Tel-Aviv Medical Center; Tel-Aviv University, Tel-Aviv, Israel

¹Tel Aviv Sourasky Medical Center - Tel Aviv (Israel)

Background and Goal of Study: Prophylactic vasopressors are recommended to avoid hypotension associated with spinal anesthesia for cesarean delivery (CD), however ideally women who will develop hypotension would be identified and specifically targeted with prophylaxis (1). Inferior vena cava (IVC) ultrasound can measure changes in IVC diameter during respiration (caval Index (CI%)), which correlates with central venous pressure and preload status.

We aimed to assess the relationship between measured CI% and occurrence of spinal hypotension during CD.

Materials and Methods: Prospective observational IRB approved study of singleton term pregnancy undergoing elective CD. Excluded: hypertensive disorders, cardiovascular disease and anemia. Prior to CD, sonographic IVC diameter measurements performed in supine and left lateral position. CI% calculated as ((expiration IVC diameter – inspiration IVC diameter)/expiration IVC diameter)* 100. Spinal anesthesia performed using hyperbaric bupivacaine 10 mg, fentanyl 15-25 mcg and 100 mcg morphine during co-load of 1L Ringer’s lactate. Hypotension defined as either < 80% baseline of systolic blood pressure (SBP) or < 100 mmHg SBP. Primary outcome was supine CI (Sup-CI) %, <50 vs ≥50% according to occurrence of spinal hypotension.

Results and Discussion: Between December 2019 – March 2021, 50 suitable women completed the study, mean (standard deviation) age 35.2 (4.0), body mass index 29.1 (5.7). Table 1 presents hypotensive events. Hypotension (< 80% baseline of SBP or <100 mmHg SBP) occurred pre-delivery for 17/30 (57%) women with CI%<50 vs 12/20 (60%) with CI%≥50, p=0.815. Hypotension (<100mmHg SBP) occurred any time for 27/30(90%) women with CI%<50 vs 15/20 (75%) with CI%≥50, p=0.156. Hypotension (< 80% baseline of SBP) occurred any time for 24/30(80%) women with CI%<50 vs 12/20(60%) with CI%≥50, p=0.111.

Table 1: Hypotension events according to definition of hypotension and time:

	Total cohort	Sup CI <50%	Sup CI ≥50%
Before delivery (< 80% baseline SBP)	0 (0-1.3) [0-7]	0 (0-2) [0-7]	0 (0-0) [0-6]
After delivery (< 80% baseline SBP)	2 (0-6.3) [0-18]	3 (1-8) [0-18]	1.5 (0-3.8) [0-15]
Total (< 80% baseline SBP)	3 (0-8.3) [0-25]	4 (1-10) [0-25]	2 (0-4) [0-21]
Before delivery (<100 mmhg SBP)	1 (0-2) [0-13]	1 (0-2) [1-9]	1 (0-2.8) [0-13]
After delivery (<100 mmhg SBP)	5.5 (1-11.3) [0-21]	6.5 (1.8 – 12.3) [0-21]	2 (0-9) [0-19]
Total (<100 mmhg SBP)	7.5 (1.8-13.3) [0-32]	8.5 (2-13.3) [0-28]	3.5 (0.3 – 12.8) [0-32]
Total overall	11 (3-21.3) [0-37]	14.5 (5-23) [0-37]	8 (1-20.3) [0-32]

Key: Data presented median (interquartile range) [range]; SBP – systolic blood pressure.

Conclusion: Spinal hypotension was not associated with Sup CI%, thus may not be a useful tool to identify women who may develop hypotension and require vasopressor prophylaxis.

6942

When Delivery Doesn’t Solve It All: A Case Report to Highlight the Postoperative Management of HELLP Syndrome

Neri M. L.¹, Pires A.¹, Portela F.¹, Freire P.¹, Torrinha S.¹
¹Centro Hospitalar de Lisboa Ocidental - Lisboa (Portugal)

Background: Preeclampsia results in pulmonary edema (PE) in 2.9% of patients with this condition, occurring mostly in the puerperium.¹ Therefore, a cornerstone in the perioperative approach of these hypertension disorders should be placed on its timely identification and management.

Case Report: A 45-year-old, 30 week gestational age woman, ASA IV, was appointed for emergent cesarean section due to HELLP syndrome, under balanced anesthesia. Following resistant hypertension in the postoperative period, she developed orthopnea and hypoxemia, accompanied by fever and elevation of inflammatory parameters three days after delivery. The patient was then transferred to the Intensive Care Unit, where a pulmonary echocardiogram revealed a bilateral B-line pattern. Invasive ventilation, empiric antibiotherapy and diuretics were readily initiated. A clinical recovery was achieved and the patient was discharged by the sixteenth day after delivery, without sequels.

Discussion: Within the two week timing proposed for presentation of preeclampsia related syndromes, PE typically develops 48 to 72 hours after delivery in older or multigravid patients. An inappropriate fluid balance remains as a relevant trigger, mainly when superior to 2000 ml. It should be noted that infusions, such as prophylaxis with magnesium sulfate and tocolytics, as well as the administration of fluids during induction of general anesthesia are often left unnoticed. In an effort to differentiate the diagnosis and target therapeutic measures, echocardiography represents a reliable and multifaceted tool. In our case, cardiac findings were normal, as was thromboembolism, which accounted for HELLP-induced changes in the redistribution of corporal fluids and vascular permeability to blame. With growing knowledge into protective ventilation principles, mechanical methods have been increasingly applied to parturients with respiratory complications. Furosemide has been proposed as the most effective diuretic for the management of postpartum preeclampsia.

References:

1. Stephen Lapinsky. Acute Respiratory Failure in Pregnancy. *Obstetric Medicine*, 2015. 8:126-132.

Learning points: Even though delivery is proposed as the final therapeutic action in a deteriorating HELLP syndrome, postpartum vigilance of severe maternal complications must not be overlooked in the first two weeks and a steady multidisciplinary approach should be implemented, if needed.

6971

Elective caesarian section in sickle cell disease A case report

Machado A.¹, Novo J.¹, Sampaio C.¹
¹Centro Hospitalar de Sao Joao - Porto (Portugal)

Background: Pregnant women with sickle cell disease (SCD) are at increased risk of complications. Physiological adaptations in pregnancy can overburden organs that are already injured by SCD, increasing the rate of complications like anemia, vaso-occlusive crises and acute chest syndromes. Anesthetic management of labor and delivery implies a structured plan before, during and after the procedure to avoid morbimortality.

Case Report: A 25-year-old pregnant (33-week) patient with SCD was admitted to hospital due to a vaso-occlusive crises and treated with oxygen, analgesia, fluids and blood transfusion. On day 3, an acute chest syndrome led transfer to the ICU and proper treatment. After clinical improvement on day after, an elective caesarian section was proposed. The patient had prior splenectomy and cholecystectomy without complications. Preoperatively, one blood-packed unit was given preemptively achieving a hemoglobin of 7.3g/dL. Intraoperatively, ASA standard and invasive blood pressure monitoring was achieved. Antibiotic and nausea prophylaxis were given. A spinal block with a spinal-epidural technique was performed with 10,5 mg of levobupivacaine and 2 mcg

of sufentanil. During the procedure, pulse oximetry >96% with nasal cannula and normothermia were ensured and mean arterial pressure >65 mmHg was maintained with fluidotherapy and 100mcg of phenylephrine. After delivery (Apgar 8, 9, 9), oxytocin was administered and full uterine contraction was observed. Total blood losses were <500mL. Post-operative effective analgesia was ensured with intravenous acetaminophen and ketorolac, and epidural boluses of ropivacaine. Postoperative management has been programmed at the ICU, needing transfusion support on admission. Discharging to the obstetric ward was seen on the day after, where she was five days without complications.

Discussion: This case highlights the major importance of a meticulous anesthetic plan to avoid complications of SCD. It's crucial to minimize hypoxia, hypothermia, acidosis, intravascular volume depletion and pain, which are triggers of complications. Spinal or epidural anesthesia are particularly useful in post-operative pain control.

References: AIN et al, Sick Cell Disease and Pregnancy, *Mediterr J Hematol Infect Dis* 2019

Learning points: The overall increase seen in maternal-fetal morbidity in a pregnant women with SCD emphasizes the importance of careful anaesthetic strategy which extends from pre to postoperative care.

7041

Caesarean section in a patient with portal cavernomatosis. Anaesthetic pearls.

Monge E.¹, Corbella C.², Fernández-Plotka B.², Meschini N.², Palacio F.², Bermejo L.²

¹HGU Gregorio Marañón - Madrid (Spain), ²HGU Gregorio Marañón - Madrid (Spain)

Background: Chronic non cirrhotic extrahepatic portal vein obstruction (EHPVO) with portal cavernomatosis (PC), usually encompasses pancytopenia and risk of bleeding^{1,2}. In pregnancy, it is an extremely rare but challenging disorder for the anaesthesiologist.

Case Report: We present a 36-year-old woman admitted to our hospital for scheduled caesarean section (CS) in the 34 gestational week, due to PC secondary to C/ S protein deficit. She underwent previous CS for placental insufficiency, and oesophageal variceal ligation for isolated bleeding. Throughout pregnancy she was on propranolol treatment, and later on tinzaparin was added. An individual multidisciplinary birth plan was set. Hence, a planned CS was uneventfully performed under general anaesthesia with invasive blood pressure monitoring (BP). Preoperatively two platelet pools were infused (PC 48.000/uL, Htc 34%), any hepatic impairment was evidenced; the team was prepared to cope with massive bleeding. She spent 24h under close surveillance without any relevant complication.

Discussion: Portal hypertension in pregnancy is estimated around 0.07%, mostly from NCPH¹. CP mainly occurs following thrombosis in adults. Pregnancy is high risk, due to potential vascular complications including variceal bleeding and venous thrombosis, with secondary fetal morbidity. If cirrhotic portal hypertension, additional hepatic decompensation may develop. They should be managed in a tertiary care centre with a multidisciplinary approach, including a birth plan with early anaesthesiologist assessment. Splenomegaly and pancytopenia are common, thrombocytopenia being the most frequent². Peripartum blood product replacement therapy must be guided by institutional protocols. Neuraxial techniques are mainly precluded, the anaesthesiologist has to ensure optimal BP control, and timely response to a severe haemorrhage. Surveillance must continue in the puerperium for any additional complication.

References:

1-Keepanasseril A; et al. Maternal-fetal outcome in pregnancies complicated with non-cirrhotic portal hypertension. *Hepatol Int* 2020 Sep;14(5):842-9.

2-Subbaiah M; et al. Extrahepatic portal-vein obstruction in pregnancy. *Taiwan J Obstet Gynecol.* 2015 Aug;54(4):394-7.

Learning points: General anaesthesia is usually required for CS, being strict BP control and close perioperative surveillance of paramount importance. Peripartum main risks are vascular complications: variceal bleeding and thromboembolic events.

7058

Elimination of remimazolam from the milk of intravenously infused lactating sheep is fast and its oral bioavailability in suckling lambs negligible

PESIC M.¹, Schmalix W.¹, Petersen K. U.¹, Onyuro M. T.¹, Stöhr T.¹
¹PAION Deutschland GmbH - Aachen (Germany)

Background and Goal of Study: Remimazolam (RMZ) is an ultra-fast acting benzodiazepine for procedural sedation and general anaesthesia. Ethical considerations impede the direct investigation of anaesthetic drug transfer into milk of lactating mothers. Current guidelines advise to pump and discard milk for 24 hours after the exposure. We have investigated in sheep, as a reliable animal model, the secretion of RMZ into milk and the potential of subsequent drug transfer to the suckling offspring. In particular, the goal of the study was to 1) determine the pharmacokinetic of RMZ in plasma and milk of lactating sheep following continuous intravenous infusion and 2) determine the bioavailability of RMZ in suckling lambs treated orally with RMZ-spiked milk.

Materials and Methods: In the first study, RMZ was intravenously administered to three lactating sheep as an initial bolus of 0.4 mg/kg followed by 4h infusion at a 1-2 mg/kg/h dose rate. Plasma and milk samples were collected at dedicated time points up to 3 days following treatment to determine concentrations of RMZ. In the second study, the oral bioavailability of RMZ was determined in 3 male and 3 female, two- or three-week-old lambs, by comparing plasma profiles following oral or intravenous bolus (2 mg) administration in a crossover design.

Results and Discussion: RMZ was excreted in milk of lactating sheep infused with RMZ and reached concentrations comparable to the ones found in plasma. Upon cessation of infusion, RMZ was eliminated fast from plasma and milk. Although elimination from milk seemed to be somewhat slower than from plasma, no quantifiable levels of RMZ were detected in milk samples collected 24h after the start of infusion. While the 2 mg intravenous bolus administered to milk-fed lambs produced the expected plasma and sedation profiles, oral RMZ resulted in low plasma levels at or below the quantification limit of 2 ng/mL. No sedation was observed in any lamb following oral administration.

Conclusion: These results suggest that the risk for offspring to be exposed to RMZ via breast feeding is minimal due to its fast elimination from milk as well as its negligible oral bioavailability.

Acknowledgements: Aasim Amin

7077

Multiple acyl-CoA dehydrogenase deficiency and obstetric anaesthesia: a case report

Orozco Vinasco A. C.¹, Orozco Vinasco D.², Correa Barrera J. J.¹, Gholamian Ovejero S.¹, Sanjuan Álvarez M.¹, Sánchez Zamora P.¹
¹Hospital Severo Ochoa - Leganes (Spain), ²Clínica Colsubsidio Calle 100 - Bogotá (Colombia)

Background: Multiple Acyl-CoA Dehydrogenase Deficiency (MADD) is a rare autosomal recessive inherited metabolism disorder, resulting from mutations in either Electron-Transferring flavoprotein (ETF) or its dehydrogenase, electron transfer flavoprotein-ubiquinone oxidoreductase (ETFQ-0). Its incidence is of 1:10 000. Pathophysiology is complex; it causes disruption at several points of the fatty acids β -oxidation, in the metabolism of amino acids. Depending on the severity, symptoms may be present at birth, being the most pertinent myopathy, rhabdomyolysis and hypoketotic hypoglycaemia. Other symptoms include hepatomegaly and cardiac function impairment [1].

Case Report: A 31 year-old female was scheduled for caesarean section due to breech presentation. She had a history of MADD (ETFQ-0), diagnosed in the setting of severe recurrent hypoglycaemia. Chronic treatment included oral L-carnitine, riboflavin and vitamin D. She was admitted on eve and an i.v. glucose perfusion of 5 mg/kg/h was maintained throughout fasting, as well as i.v. L-carnitine (2 g per day) and oral riboflavin. A spinal anaesthesia was carried out, surgery and postoperative were uneventful. Oxytocin was administered normally after delivery. Frequent laboratory controls were made during hospital stay.

Discussion: Anaesthetic management is problematic, because of its rarity and the paucity of literature. These patients have risk of metabolic

acidosis with hyperlactatemia, CK elevation, elevation of AST/ALT and hyperammonaemia. Laboratory test should be performed before, during and after anaesthesia; alterations must be treated promptly (fluids, bicarbonate, carbamylglutamate) while maintaining glucose, riboflavin and carnitine intake. There is risk of malignant hyperthermia, so avoidance of triggers is recommended. Propofol may also prompt symptoms, as it can impair fatty acids oxidation, however it has been used for anaesthesia induction and maintenance without complications. We chose a regional technique as it was thought to interfere at least with mitochondrial activity [1].

References:

1.Lilitsis E et al. Anesthetic management of a pediatric patient with Electron Transfer Flavoprotein Dehydrogenase deficiency (ETFHD) and acute appendicitis: case report and review of the literature. *BMC Anesthesiol.* 2017;17(1):116.

Learning points: Anaesthesiologist should be familiar with a general approach of mitochondrial disorders.

7081

Neurocardiogenic syncope type 2B, an obstetric case report

Al-Taie R.¹, Kollmann Camaioira A.², Mulic-Lutvica A.²
¹Gävle Sjukhus - Gävle (Sweden), ²Akademiska Sjukhuset - Uppsala (Sweden)

Background: Neurocardiogenic syncope is defined as a sudden, self-limited loss of consciousness usually leading to collapse¹. Type 2B (cardioinhibitory) has an initial increase in heart rate followed by a drop in ventricular rate <40bpm for >10 seconds or an asystole occurring for >3 seconds with blood pressure rising initially and only falling to hypotensive levels <80mmHg systolic at or after the onset of a rapid and severe drop in heart rate².

Case Report: We report the case of a 31yo. G3P0A2 patient referred to our tertiary university hospital at 38+2 gestational weeks for multidisciplinary evaluation and management. Previous diagnosis of migraine and neurocardiogenic syncope type 2B (cardioinhibitory with asystole with positive tilt test and nitroglycerin provocation); manifested as syncope attacks when experiencing pain, specially during menstruation, and long flights. A multidisciplinary team of gynecologists, cardiologist, obstetric and cardiac anesthesiologists recommended a cesarean section to avoid syncope and possible asystole episodes during vaginal delivery.

The c-section was performed under epidural anesthesia and invasive BP monitoring, a defibrillator inside the operating room and access to ECMO within 15 minutes. The epidural catheter was inserted at L3-L4 level and the patient received 10mcg sufentanil and titrated doses of ropivacain 7.5mg/ml (total dose 15ml, 112.5mg), achieving a T4 level 30 min after the first dose. The patient experienced a 40 seconds period of extreme sinus bradycardia (20 bpm) just before the fetus extraction which reverted to sinus rhythm after 1.5mg atropine. A total dose of 1.5UI oxytocin was slowly administered after the cord clamping. The surgery went uneventful, total blood loss of 700ml. The epidural was removed after 4h, the postoperative period went uncomplicated and discharged home on day 3.

Discussion: There is no evidence that operative delivery is safer³, but since the patients syncopes were triggered by pain, we decided to avoid a vaginal delivery. We opted for an epidural technique to avoid fast hemodynamic changes and the minimum effective oxytocin dose administered to avoid vasodilation.

References:

1. *Anesthesia* 2007;62:79-84,
 2. *Neth Heart J* 2008;16:15-19,
 3. *Korean J Anesthesiol* 2010;59:130-4.

Learning points: It is important that patients with complex cardiac disease be treated in referral centers by experience multidisciplinary teams to reduce the risk of per-operative complications.

7132

Pheochromocytoma and c-section - is regional anaesthesia the solution for this dangerous combination?

Martins T.¹, Montenegro Ledo L. A.¹, Oliveira C.¹, Pereira E.¹
¹Hospital Garcia de Orta - Almada (Portugal)

Background: Pheochromocytoma is a rare cause of hypertension during pregnancy, but it is one of the most threatening medical conditions for mother and fetus. Anaesthetic management for C-section is challenging because it is associated with serious cardiovascular complications. We report a successful case of C-section under epidural anaesthesia in a pregnant patient with a pheochromocytoma.

Case Report: A 32 weeks pregnant women was referred to hospital with uncontrolled hypertension. An abdominal MRI revealed a right-sided suprarenal mass suggesting pheochromocytoma and increased plasma and urine metanephrines confirmed the diagnosis. At a multidisciplinary consultation was decided to do surgical resection of pheochromocytoma after elective C-section at 36th week. Preoperative medical preparation included α -blockade (doxazosin), beta-blockade (propranolol) and normalization of intravascular volume (high sodium diet). Before induction, a central vein and artery were cannulated for hemodynamic monitoring. An epidural catheter was inserted at L3-L4 vertebral space. Sequential bolus of 5 mL of lidocaine 2% was administered via epidural catheter until an adequate anaesthesia level was achieved. Rapid co-filling with 1 l of ringer lactate, under pressure, was administer. Patient remained hemodynamically stable, without need of vasoactive drugs. No interurrences were recorded. Multimodal analgesia was prescribed for post-operative period with epidural patient control analgesia.

Discussion: There are few cases of pheochromocytoma diagnosis during pregnancy. When diagnosis is only on third trimester, medical treatment is commenced until fetal maturity is achieved, and then, a C-section with concurrent or delayed adenectomy is performed. The primary anaesthetic goal is avoiding hemodynamic fluctuations. Neuraxial anaesthesia for C-section is an attractive option since it avoids sympathetic stimulation associated with tracheal intubation. However, hypotension associated with these techniques may be catastrophic too. So, the gradual block achieved by epidural top-ups seems to be an attractive option. On postoperative, we should guarantee a good analgesia in order to avoid hypertensive crises triggered by pain.

Learning points: Meticulous anaesthetic management is crucial and the choice of anaesthetic technique plays a decisive role in outcome of patient.

7158

Prevention of Maternal Hypotension During Cesarean Section With Norepinephrine Infusion. Does Time and Type of Administered Fluids Matter?

Theodoraki K.¹, Hadzilia S.², Valsamidis D.², Kalopita K.², Stamatakis E.²
¹Aretaieion University Hospital, National and Kapodistrian University of Athens - Athens (Greece), ²Alexandra General Hospital of Athens - Athens (Greece)

Background and Goal of Study: Spinal anesthesia for cesarean section can be frequently complicated by hypotension, with untoward effects for both the mother and fetus. Recently, norepinephrine has been shown to be effective in maintaining blood pressure in obstetric patients. Another technique widely used to prevent hypotension is fluid administration. Current evidence suggests that the combination of fluid administration and vasoconstrictive medications should be the main strategy for prevention and management of hypotension. The aim of this randomized study was to investigate the combination of a norepinephrine infusion and colloid preloading versus the combination of a norepinephrine infusion and crystalloid co-loading for the prevention of maternal hypotension during elective cesarean section under combined spinal-epidural anaesthesia

Materials and Methods: One hundred parturients were randomized to receive either 6% hydroxyethyl starch 130/0.4 5 mL/kg before spinal anesthesia (colloid preload) or Ringer's Lactate solution 10 mL/kg starting with intrathecal injection (crystalloid co-load). Both groups were also administered norepinephrine 4 μ g/min, starting simultaneously with

the administration of the subarachnoid solution. The primary outcome was the incidence of maternal hypotension (SBP<80% of baseline). The incidence of severe hypotension (SAP<80 mmHg), total dose of ephedrine administered as well as maternal side-effects and the acid-base status and Apgar score of the neonate were also recorded

Results: There were no significant differences in the incidence of hypotension (13.7% vs. 16.3%, $p=0.933$ or severe hypotension (0% vs. 4%, $P=0.238$) between colloid preload and crystalloid co-load groups, respectively. The median [range] ephedrine dose was 0[0–15] mg in the colloid preload group and 0 [0–10] mg in the crystalloid co-load group ($P=0.807$). There were no significant differences in maternal side-effects or neonatal outcomes between groups

Conclusion: The incidence of hypotension during elective cesarean section is low and comparable when a norepinephrine infusion is used in combination with either colloid preload or crystalloid co-load, with perhaps a marginal superiority of colloid preload in the prevention of severe hypotension. It appears that the optimal regimen for prevention of maternal hypotension is a combination of fluids and a prophylactic vasopressor like norepinephrine

References: Fitzgerald JP, et al. *Anaesthesia* 2020, 75:109–21

7186

Primary hyperfibrinolysis in Amniotic Fluid Embolism: an illustrated case-report

Ducloy-Bouthors A. S.¹, Gonzalez Estevez M.², Jeanpierre E.³, Gibert R.², Gilliot S.⁴, Lebuffe G.⁵

¹CHU de Lille, Hopital Jeanne de Flandre, Univ. Lille, ULR 7365 - GRITA - Lille (France), ²CHU de Lille, Hopital Jeanne de Flandre - Lille (France), ³CHU de Lille, Biology and Pathology center - Lille (France), ⁴Univ. Lille, ULR 7365 - GRITA - Lille (France), ⁵CHU de Lille, Hopital Claude Huriez - Lille (France)

Background: Early diagnosis of amniotic fluid embolism (AFE) coagulopathy could be crucial in its management.

Case Report: A 32-year-old second-parous woman was admitted in a tertiary care obstetric unit for an elective cesarean section for anterior praevia insertion of the placenta under combined spinal-epidural anesthesia. Arterial pressure was maintained by a prophylactic norepinephrine tartrate infusion, and cardiac output was measured with an impedance cardiography monitor. Two minutes after hysterotomy, the patient suddenly complained about blurred vision and fell unconscious, with significant hypotension and low cardiac output. After repeated norepinephrine boluses, neurologic and hemodynamic state was quickly restored. Despite estimated blood loss was only 200mL, amniotic fluid embolism (AFE) was suspected, and viscoelastic test ROTEM® (Werfen®, Germany) was performed. A major fibrinolytic profile and a flat amplitude on FIBTEM were observed. Simultaneous standard Lab tests confirmed the coagulopathy without anemia or thrombopenia.

Intravenous sulprostone was initiated, and intrauterine tamponade balloon was inserted. Point-of-care thromboelastometry resulted in a total administration of 2g tranexamic acid, 9g fibrinogen concentrate and 5 fresh frozen plasma units. In recovery room, norepinephrine infusion was stopped, and total EBL was limited to 1580mL. ROTEM fibrinolytic profile disappeared, and Lab coagulation parameters and FIBTEM amplitude were almost restored. Postpartum recovery was uneventful, and both mother and child were discharged from hospital in healthy conditions.

Discussion: Aggressive goal-directed management guided by viscoelastic tests, with adapted doses of tranexamic acid and fibrinogen concentrate were able to limit massive life-threatening postpartum hemorrhage.

Learning points: This case report highlights uncommon early hyperfibrinolysis and massive consumption of fibrinogen in AFE before significant bleeding occurred.

7245

Atrial flutter with rapid ventricular response within a couple weeks of delivery!

Lopes L.¹, Afonso J. P.¹, Pires A.¹, Moura F.¹, Cardoso H.¹, Teixeira S.¹
¹Centro Hospitalar Tâmega e Sousa - Penafiel (Portugal)

Background: Arrhythmias are among the most common cardiac complications encountered during pregnancy. Severe ones are rare, with a prevalence of atrial fibrillation and flutter of 2 in 100 000 hospital admissions, initiating mainly at the end of the second trimester. The mechanism of increased arrhythmia burden during pregnancy is linked to the combination of hemodynamic, hormonal, and autonomic changes.

Case Report: A 30-year-old pregnant woman, healthy, primigravida, at a routine consultation, with 36 weeks of gestation, presented with nonspecific complaints of slight increased tiredness, tachycardia, with no murmurs and with an innocent physical examination. The cardiococography and TA ultrasound were normal and the evaluation of cervix described as normal. The electrocardiography detected atrial flutter with RVR and she was admitted to the obstetric service. The transthoracic echocardiogram revealed mitral valve prolapse with mild mitral insufficiency; remaining structures without appreciable changes, normal bi-ventricular global function. Anemia, electrolyte imbalance and hyperthyroidism were excluded. She was submitted to a TT echocardiogram that excluded intracavitary masses or thrombi and confirmed discreet prolapse of mitral valve leaflets. Hypocoagulation with enoxaparin in therapeutic dosage and heart rate control with intravenous metoprolol was initiated. Posteriorly, a 50J sync electrical cardioversion was performed, followed by a second attempt at 70J, without reversing to sinus rhythm. No signs of fetal distress were seen. **Results:** The procedures were performed after propofol sedation, maternal and fetal hemodynamic and oxygenation monitoring, with cardiology, anesthesiology, obstetrics and neonatology team present. Later, intravenous adenosine was administered, unsuccessful. Oral metoprolol was initiated every 12 hours and the anticoagulation was stopped. A new cardioversion was performed with 200 J synchronous biphasic shock. A period of asystole occurred and later the atrial tachycardia reentered. At discharge, she went home with 36 weeks and 4 days of gestation, asymptomatic, normotensive and normocardial, rhythmic without murmurs, and with a normal fetal cardiococographic evaluation. At 41 weeks of gestation, was submitted to emergency caesarean by non-tranquilizing fetal status, giving birth to a healthy boy.

Learning points: Cardioversion can be safe and an effective treatment for maternal arrhythmia, when rate control fails or the episode is poorly tolerated.

7269

Hyponatraemia complicating hypertensive disorder of pregnancy

Tsaroucha A.¹, Tympa Grigoriadou A.¹, Tomara E.¹, Apostolidou S.¹, Paraskeva A.¹, Melemeni A.¹

¹Aretaieion University Hospital, National and Kapodistrian University of Athens - Athens (Greece)

Background: Preeclampsia is a two-stage disorder. The asymptomatic first stage occurs early in pregnancy while the second, symptomatic stage, occurs after 20 weeks' gestation.^[1] Pregnancy predisposes to mild hyponatraemia; further reductions in sodium concentration may significantly complicate or even delay the diagnosis of severe preeclamptic toxemia.

Case Report: A 30-year-old para 1, gravida 2 woman was scheduled for elective caesarean section at 35+6 weeks of gestation due to fetal growth restriction and pregnancy-related hypertension. Her past medical history included well controlled hypothyroidism and childhood acute myeloid leukaemia. Upon admission, she was found to have hyponatraemia 124mmol/L and oedema. Her blood pressure was 140/85 mmHg with the patient on methyl dopa 250mg per os twice per day. Nephrology consultation was arranged to rule out renal disease. The parturient was empirically prescribed human albumin 20g twice per day; she was also on fluid restriction (3L of normal saline 0.9%/day). Gestational GFR was 102.9 mL/min/1.73 m² (normal values: 120–135mL/min/1.73m²). The next morning, she had generalized oedema, hypertension (maximum

of 160/90 mmHg), plasma sodium level 121mmol/L, osmolality 260 mOsmol/Kg and 24-hour urine protein 1867mg. Her mental status was also altered with confusion and aggressiveness. An emergency caesarean section under epidural anaesthesia was performed. A healthy male with an Apgar Score of 8/10 and no signs of hyponatraemia was born. On the first postoperative day, over 4L of urine were collected from the urinary catheter and oedema subsided. Hypertension was well controlled with enalapril 10mg twice per day and plasma sodium level was back to normal on the second postoperative day.

Discussion: Severe hyponatremia complicating preeclampsia is extremely rare, with only 21 cases reported in the literature.^[2] Differential diagnosis includes eclampsia, syndrome of inappropriate antidiuretic hormone secretion and nephrotic syndrome.

References:

1. ACOG Practice Bulletin No. 202: Gestational Hypertension and Preeclampsia (2019). *Obstet Gynecol* 133 (1):e1-e25.
 2. Pu Y, et al. Severe hyponatremia in preeclampsia: a case report and review of the literature. *Arch Gynecol Obstet*. 2021 Apr;303(4):925-931
- Learning points:** Symptomatic severe hyponatraemia worsens the clinical state of preeclampsia and jeopardizes maternal and neonatal health.

7281

Remifentanil patient-controlled analgesia (PCA) in labour: the importance of repeating the audit cycle to maintain a safe service.

Angelov S.¹, Murphy C.¹

¹The Rotunda Hospital - Dublin (Ireland)

Background and Goal of Study: The role of remifentanil in labour analgesia is well documented, albeit controversial¹. Unsupervised or inappropriate use risks significant adverse maternal outcome². In a busy maternity hospital of over nine thousand deliveries per year, a limited remifentanil PCA service is offered when regional anaesthesia is contraindicated. We present the findings of our audit cycle.

Materials and Methods: A retrospective audit of electronic health records (EHR) of all patients who received remifentanil PCA for labour analgesia in 2020 was conducted. This follows preceding audits of the remifentanil service paper charts for 2016, and EHR for 2018. Each audit collated data to review adverse outcomes, recorded observations, anaesthetist prescribing and documentation.

Results and Discussion: Full adherence to patient safety measures was demonstrated in each audit (one-to-one midwifery, O2 nasal prongs, dedicated intravenous cannula and pump). No significant maternal or neonatal adverse events were recorded in any audit. Maternal adverse events continued to decline over each audit cycle. The 2016 audit revealed inadequate paper prescribing and no sedation or pain scores. Education and training to improve compliance was addressed. Whilst the 2018 audit demonstrated improvement in documented vital signs (RR, SpO2) and prescribing by anaesthetists, the introduction of EHR has also presented new usability issues, particularly when navigating the system to record sedation and pain scores. This audit supports the safety of remifentanil analgesia. Adverse outcomes remain low. Whilst EHR has resulted in full compliance with prescribing guidelines, usability issues present separate challenges. In 2020, online education sessions on both remifentanil and EHR navigation commenced to facilitate remote learning in a COVID-19 era. Future audits will include postpartum patient satisfaction scores.

Conclusion: In conclusion, regular audit is required to ensure continued patient safety on the labour ward. It serves as a valuable tool to identify areas for improvement.

References:

1. Melber, A.A., Jelting, et al. Remifentanil patient-controlled analgesia in labour: six-year audit of outcome data of the RemiPCA SAFE Network (2010–2015). *IJOA* 2019; 39:12-21.
2. Van de Velde, M., Carvalho B. Remifentanil for labour analgesia: an evidence-based narrative review. *IJOA* 2016;25:66-74

7290

Successful perioperative management of a pregnant patient with Hereditary Angioedema: a case report

Duarte A.¹, Castro M. D. L.¹

¹Centro Hospitalar Lisboa Central, EPE (CHLC,EPE) - Polo de Santa Marta - Lisboa (Portugal)

Background and Goal of Study: Hereditary angioedema (HAE) is a rare disorder manifested by sudden episodes of subcutaneous and mucosa edema, caused by a decrease in plasma level or variations in functional capacity of C1 **Materials and Methods:** Perioperatively, measures are required to avoid an acute attack. Pregnancy has been shown to have a variable effect on HAE attacks. This case report describes a successful C-section performed on a patient with type II HAE. A 27-year-old ASA III, 40 weeks primigravida, obese (BMI 31,1 kg/m² – 70kg, 1,50m) with HAE, underwent an elective C-section.

Results and Discussion: During pregnancy, patient had 6 angioedema episodes. A perioperative management plan was outlined by multidisciplinary team of obstetric, anesthesiology, allergy and immunology staff. 2 months before C-section, prophylaxis with 1000U/week of IV C1-INH concentrate was initiated. The last dose was administered 1 hour before surgery. Rescue doses of C1-INH concentrate were available. ASA standard monitoring was established. 8mg dexamethasone, 4mg ondansetron and antibiotic were administered. Combined spinal-epidural anesthesia (CSEA) was induced (7,5 mg levobupivacaine, 2.5mcg sufentanil and 100mcg morphine). Patient received a bolus of 1g of TXA acid followed by infusion of 1g during 6h. Patient remained hemodynamically stable during the uneventful intraoperative period and was transferred to Intermediate Care Unit (IMCUs), where another 500U of C1-INH concentrate was administered. Patient made a good recovery and was discharged 72h later. Prophylaxis is considered to be the most appropriate approach for this pathology. Short-term prophylaxis ahead of surgery with antifibrinolytics and C1-INH concentrates has been successful in preventing HAE attacks. C1-INH is considered first-line therapy for prophylaxis in high-risk patients. Danazol was discontinued prior to pregnancy. During emergencies, fresh frozen plasma may be administered if other medication is unavailable⁴. Corticosteroids, antihistamines and adrenaline are ineffective in HAE. NSAID's drugs were avoided due to inhibition of prostaglandin synthesis, leading to skin mast cell degranulation and possibly triggering angioedema. To avoid airway manipulation, a CSEA was elected. Although unviable in this case, vaginal delivery is preferred for HAE patients.

Conclusion: In conclusion, although rare, anesthesiologists should be familiar with the pathophysiology of HAE, as planning is essential.

1Moellman JJ et al. Diagnosis and management of hereditary angioedema. *J Emerg Med* 43 2012

7329

Colloid co-hydration and vasoconstrictor infusion for prevention of postspinal hypotension during elective cesarean section. A comparative study

Masourou Z.¹, Theodoraki K.¹

¹Aretaieion University Hospital, National and Kapodistrian University of Athens - Athens (Greece)

Background: This study aimed to investigate whether the addition of a fixed rate phenylephrine infusion or noradrenaline infusion to a colloid co-hydration regimen results in better maternal hemodynamic status or in a more favorable metabolic profile in the newborn as compared to the administration of colloids alone without any vasoconstrictor during elective cesarean section under combined spinal-epidural anesthesia

Materials and Methods: 120 parturients were randomized to either phenylephrine 50 µg/min (group P) or noradrenaline 4 µg/min (group N) or placebo (group C). All infusions had been prepared in identical syringes and the infusion rate was 30 mL/h. As soon as the spinal injection started, all groups were administered 10 mL/kg of hydroxyethyl starch (HES) solution simultaneously with the onset of vasoconstrictor infusion. The primary end-point of the study was the incidence of maternal hypotension (SAP<80% of baseline). Additionally, maternal hemodynamics at specific time-points were recorded using non-invasive technology (Edwards Lifesciences ClearSight System) as well as the incidence of reactive hypertension, bradycardia, the requirement for bolus vasoconstrictor administration and the fetal acid-base status and Apgar score

Results and Discussion: The incidence of maternal hypotension was higher in group C than in both groups P and N (p=0.024 and 0.073, respectively). The incidence of bradycardia was higher in group P than in group N (p=0.018). The incidence of reactive hypertension was higher in group P than in both groups N and C (p=0.029 and 0.005, respectively). The need of modification of the infusion rate was higher in group P than in both groups N and C (p<0.001 and p=0.002, respectively). The fetal pH of the umbilical vein was higher in groups N and P than in group C (p<0.001) and the fetal pO₂ of the umbilical vein was higher in group N than in group C (p=0.023). Higher systematic vascular resistance index (SVRI) and higher SAP were observed at specific time-points in group P versus the other two groups. Post-delivery Apgar scores were similar in all groups

Conclusion: The combination of a fixed-rate infusion of noradrenaline with the co-administration of colloid seems to be the most effective in the management of the parturient during cesarean section, being superior to either a combination of colloid co-administration with a fixed rate of phenylephrine or to the administration of colloid alone without any vasoconstrictor agent

7334

From suspected pulmonary thromboembolism to Tocilizumab: A diagnostic dilemma A case report on severe maternal SARS-CoV-2

Munasinghe M.¹, Athauda A.², Perera R.³, Kumara S.³, Dilrukshi K.³

¹DGH Mannar - Mannar (Sri Lanka), ²Teaching Hospital - Anuradhapura (Sri Lanka), ³District General Hospital - Mannar (Sri Lanka)

Background: SARS-CoV-2 outcomes in pregnancy had been devastating. The following is a case of a severe SARS-CoV-2 in a maternal patient which presented a diagnostic challenge, ultimately managed successfully.

Case Report: A 41-year old in her third pregnancy (37 weeks), presented with cough and shortness of breath. She was tachypnoeic and hypoxaemic. Rapid antigen test (RAT) for SARS-CoV-2 was negative. High flow nasal oxygen therapy was commenced. Six hours later, with worsening respiratory distress, therapeutic enoxaparin was administered in view of suspected pulmonary embolism. Worsening respiratory distress warranted a Chest-X-ray (out of order earlier) which was suggestive of severe SARS-CoV-2. Repeated RAT was positive. Intravenous dexamethasone was instituted. An emergency caesarian section was performed and a healthy baby was delivered. The mother was transferred to a tertiary care center for advanced investigations and oxygen therapy. Pulmonary thrombosis was excluded. Persistently elevated C-reactive protein levels and low procalcitonin levels warranted

intravenous Tocilizumab. She was intubated 24 hours later and slowly weaned off and extubated 5 days later.

Discussion: Effects of SARS-CoV-2 on the maternal group had been crippling with higher mortality, increased pregnancy-related complications, and lengthier hospital stays [1]. RAT as a point of care testing for the diagnosis is considered to have an acceptable sensitivity albeit false-negative results. RT-PCR is still unavailable in peripheries in most low-resource countries with delays in laboratory confirmation of the disease. The affected maternal cohort carries an inherently increased risk of pulmonary thrombosis [2].

References:

- Villar J, Ariff S, Gunier RB, et al. Maternal and Neonatal Morbidity and Mortality Among Pregnant Women With and Without COVID-19 Infection: The INTERCOVID Multinational Cohort Study. *JAMA Pediatr.* 2021;175(8):817–826. doi:10.1001/jamapediatrics.2021.1050
- Singhania N, Bansal S, Nimmatoori DP, Ejaz AA, McCullough PA, Singhania G. Current Overview on Hypercoagulability in COVID-19. *Am J Cardiovasc Drugs.* 2020;20(5):393–403

Learning points:

It is prudent to suspect and initiate therapy for SARS-CoV-2 and/or concurrent pulmonary thrombosis in maternal patients presenting with severe hypoxaemia in the current set up, when biochemical diagnosis is delayed. Operative or non-operative delivery when indicated and multidisciplinary protocols improve outcomes.

7336

Spontaneous liver rupture secondary to HELLP syndrome. Case report

Correa Barrera J. J.¹, Sánchez Zamora P.¹, Gómez Del Pulgar Vázquez B.¹, Orozco Vinasco A. C.¹, Enjuto Martínez D. T.¹, Miyagi Yonamine A. M.¹

¹Hospital Universitario Severo Ochoa - Leganes (Spain)

Background: Spontaneous hepatic rupture (SHR) is a major uncommon but potentially very serious, of the pre-eclampsia. It is frequently associated with the development of HELLP syndrome (HS). The incidence of SHR during pregnancy is estimated between 1 / 45,000–250,000 deliveries. Mortality attributable to SHR is highly variable and it depends on whether the patients receives conservative or surgical management; while the fetal mortality, ranged from 10-78%, depends on how fast the diagnosis is made and on its treatment.

Case Report: A 27-year-old woman at the 36th week of her first pregnancy. She was admitted to the Gynecology Emergency Room due to an abdominal pain of several hours. Blood tests did not show significant alterations. After an episode of hypotension and clouding, with a positive fetal heartbeat and emergent cesarean section was decided. During surgery, a massive hemoperitoneum was found and the fetus, which did not survive, extracted. The general surgeon was notified, who saw decapsulation of the right hepatic lobe and friable liver after laparotomy. An hepatic packing was placed and massive bleeding protocol was activated. Two surgical revisions were performed in subsequent days with bleeding control, and after 6 days in the critical care unit, she was discharged to the ward.

Discussion: SHR due to HS is a rare complication. Abdominal pain is the first sign. CT-scan is indicated, although diagnosis is usually performed intraoperatively. Given the suspicion of SHR, an emergent cesarean section should be performed, with volume replacement and correction of coagulopathy. Maternal mortality has been associated with development of disseminated intravascular coagulation, pulmonary edema or acute renal failure. Non-surgical management is only considered in cases not associated with coagulopathy. Surgical techniques vary depending on organ viability. The management requires the support of obstetricians, general surgeons, vascular radiologist and anesthesiologists.

References: Poo J.L., Gongora J. Hepatic Haematoma and hepatic rupture in pregnancy. *Ann. Hepatol.* 2006;5:224–226.

Learning points: SHR is an exceptional complication with fatal consequences associated with HS. The diagnosis of SHR is clinical and it should be taken into account in the setting of abdominal pain and hypertensive disorder of pregnancy. Half of deaths from SHR are preventable, hence the importance of early diagnosis and effective treatment of severe forms of preeclampsia or HS.

7355

A systematic review and meta-analysis on the safety and effectiveness of remifentanyl in pregnant women and their neonate during induction of general anesthesia for cesarean section

Mendoza M. J.¹, Mendoza M.¹, Masuda L.¹¹Cardinal Santos Medical Center - San Juan City (Philippines)

Background and Goal of Study: Opioids are usually absent from rapid sequence induction for cesarean delivery due to adverse effects to the neonate, however, remifentanyl as an ultrashort-acting μ 1-receptor agonist, may blunt the maternal hemodynamic effects with limited neonatal side effects. The objective of this study is to determine the effectiveness and safety of remifentanyl during induction and intubation of general anesthesia for cesarean delivery.

Materials and Methods: Published literature searched were comprised of randomized controlled trials that compared remifentanyl during induction for general anesthesia to the standard in pregnant women undergoing cesarean delivery under general anesthesia. Measurement of data included maternal systolic blood pressure and heart rate, Apgar score at 1 minute and 5 minutes, umbilical artery pH and base excess, and resuscitation events such as mask ventilation, naloxone use or tracheal intubation. Risk of bias and statistical analysis were performed using RevMan 5.4 software.

Results and Discussion: Eight studies included were published between 2006 to 2019 with a total of 476 singleton term pregnant patients with or without preeclampsia. Maternal systolic blood pressure was lower in the remifentanyl group with $p < 0.0001$ (standard mean difference (SMD) -1.08, 95% confidence interval (CI) -1.62, -0.53). Maternal heart rate was also lower in the remifentanyl group with $p < 0.00001$ (SMD -0.98, 95% CI -1.23, -0.72). Neonates who had Apgar scores lower than 7 at 1 minute were higher in the remifentanyl group favoring the control group with $p = 0.001$ (Odds ratio (OR) 2.55, 95% CI 1.45, 4.51). However, neonates who had Apgar scores lower than 7 at 5 minutes did not show any significant difference with $p = 0.23$ (OR 1.87, 95% CI 0.68, 5.13). Limitations of the study may have affected part of the results of this study which include lack of blinding in one study, heterogeneity, different induction techniques and maintenance of anesthesia, and lack of information on anesthetic induction to delivery time.

Conclusion: Remifentanyl is effective for induction of general anesthesia for pregnant patients for cesarean delivery as it is associated with good control of hemodynamic response. Even though safety for neonate could not be established, individualized treatment with remifentanyl can be recommended to pregnant patients especially if they are severely hypertensive.

7368

Type II quadratus lumbur block versus transverse abdominis plane block in abdominal hysterectomy: a prospective observational study

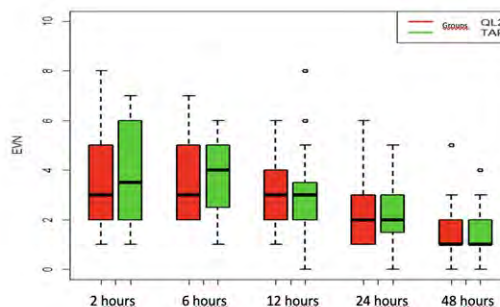
Gasalla Cadorniga A. M.¹, Baeza Álvarez L.², Jiménez Gómez B. M.³,Dominguez Suárez E.¹, López Álvarez S.⁴, López González J. M.⁴¹Hospital Universitario Lucus Augusti - Lugo (Spain), ²HospitalUniversitario Central de Asturias - Oviedo (Spain), ³HospitalUniversitario San Agustín - Avilés (Spain), ⁴Complejo Hospitalario

Universitario A Coruña - A Coruña (Spain)

Background and Goal of Study: Abdominal hysterectomy causes moderate to intense pain. The aim of this study was to evaluate the effectiveness and reduction of opioid use when incorporating fascial blocks in a strategy of multimodal analgesia.

Materials and Methods: We performed a prospective observational study of an abdominal hysterectomy cohort of patients. We compared the effectiveness and reduction of opioid use between eco-guided QL-II and TAP blocks. Postoperative pain was the main variable evaluated, using a numerical rating scale (NRS). To compare the two blocking techniques, were used bivariate tests. The Student's T test was used for comparisons of different baseline parameters between both groups, as well as scores on the pain scale over 48 hours of the postoperative. For a reliable contrast of these values, a non-parametric ANOVA analysis was

carried out, with which it can be contrasted the effect of time and if there is interaction time-analgesic technique, that is, to determine if there is a different evolution of pain between the two comparison groups.



Results and Discussion: 59 patients were included in the study; 30 in TAP's group and 29 in QL-II's group. Analgesic effectiveness was similar in both, although in QL-II's group a higher sensitive level was reached. There were no significant differences in requirement of additional analgesia. There were no differences, neither side effects nor complications. The 80% of TAP blocks were done without difficulty vs the 38,5% in the QL-II group (a significant difference). Almost all patients were satisfied with the analgesia received.

Conclusion: In a multimodal strategy context, both blocks provide good analgesia before abdominal hysterectomy. There are no differences in the quality of it or in the rescue needs. The QL-II block reaches a higher dermatomeric level but its performance is more difficult.

7373

Involving a Dedicated Epidural-Caring Nurse into Labor Ward Practice Improves Maternal Satisfaction towards Childbirth: A Retrospective Study.

Jen-Fu T.¹¹Taichung Veterans General Hospital, Taiwan - aichung City (Taiwan)

Background and Goal of Study: Women attempting vaginal delivery suffer from labor pain. Neuraxial analgesia is one of the best options in pain scale reduction, and it should be readily available when requested. In real-world practice, however, the anesthesia team sometimes fails to perform catheter insertion or manage breakthrough pain immediately. To improve care quality, a dedicated nurse for labor epidural analgesia was recruited. This study aims to evaluate whether the involvement of a dedicated nurse in epidural care results in an improvement in maternal satisfaction.

Materials and Methods: This retrospective cohort study was conducted in a single tertiary center. Medical records of women with singleton pregnancies above 36 gestational weeks who were admitted for vaginal delivery and received neuraxial analgesia between July 2020 and December 2020 were reviewed. The primary outcomes were maternal pain scores and satisfactory scores. Maternal pain scores were measured before catheter placement and 15 minutes after the epidural analgesia loading dose with the standard VAS. The satisfactory scores were obtained during labor and 24 hours postpartum by a group of anesthesia nurses taking routine postoperative rounds. The secondary outcomes were maternal, neonatal, and epidural-related complications.

Results and Discussion: 377 medical records were extracted. The dedicated nurse was involved in 107 (30%) women's epidural care. The group with the dedicated nurse had a lower pain score before epidural catheter placement (4.5 ± 2.0 versus 5.1 ± 2.2 , $p = 0.032$). Pain scores after injection were even between the two groups (1.7 ± 2.0 versus 1.8 ± 2.6). The satisfactory scores were significantly higher in the intervention group before epidural injection (4.7 ± 0.5 versus 4.5 ± 0.6 , $p = 0.001$), during epidural usage (4.7 ± 0.6 versus 4.5 ± 0.6 , $p = 0.002$), and at 24 hours postpartum (4.7 ± 0.5 versus 4.5 ± 0.5 , $p = 0.001$). No difference was found in maternal outcomes, neonatal outcomes, and epidural-related complications. Multiple regression analysis demonstrated that involvement of the dedicated nurse was independently associated with higher postpartum satisfaction, while headache and re-insertion of the epidural catheter were associated with less satisfaction.

Conclusion: Allocating a dedicated nurse in epidural labor analgesia care resulted in a significant increase in satisfactory scores and no difference in epidural-related side effects.

7398

Force-plate posturography assessment of balance in parturients with labor epidural analgesia in comparison to non-laboring pregnant women.

Küllmar M.¹, Huprich A. F.², Massoth C.¹, Wenk M.²
¹University Hospital Muenster - Muenster (Germany), ²Florence-Nightingale-Hospital - Duesseldorf (Germany)

Background and Goal of Study: Although low-dose epidural analgesia for labor pain is commonly referred to as "walking epidural" it remains controversial whether ambulation following regional anesthesia can be considered safe. The objective of this study was to assess postural stability in parturients with low-dose epidural analgesia compared to non-laboring pregnant women using the Wii™ Balance Board, a portable, inexpensive and reliable tool for force-plate posturography.

Materials and Methods: This study was conducted as a prospective observational trial. 64 parturients with implemented low-dose epidural analgesia (epidural group) and 64 non-laboring pregnant women (control group) underwent posturography and were clinically assessed for motor function and muscle strength. Primary outcome was the center of pressure (COP) sway area, a posturographic parameter of balance function.

Results and Discussion: Participants in both groups had comparable clinical characteristics, although women in the control group were less advanced in pregnancy due to the precondition of not being in labor. In the epidural group 5 parturients developed unilateral motor block and were excluded from the primary analysis. The COP sway area differed not between both groups (9.8 cm² (7.2-13.7) vs (10.3 cm² (6.8-14.3) p=0.992) and still remained comparable after including women with motor block in the analysis (10.7 cm² (6.9-15.3) p=0.728).

Conclusion: Low-dose epidural analgesia is not associated with impaired balance function and should not restrict mobilization in labor.

7403

Arnold-Chiari malformation in pregnant woman: choosing the best anaesthetic option for caesarean delivery

Freitas R.¹, Pedroso V.¹
¹Centro Hospitalar Lisboa Ocidental - Lisboa (Portugal)

Background: Arnold-Chiari malformation is a serious neurological disease characterized by the descent of the cerebellum through the foramen magnum into the spinal canal. There is scarce literature on the anaesthetic approach in pregnant women with this malformation. If there are no concrete guidelines defined, what anaesthetic technique should be performed for an elective caesarean section?

Case Report: A 42-year-old full-term pregnant woman, was admitted for a caesarean delivery. She had an Arnold-Chiari type 1 malformation surgically corrected in March 2019, presenting as sequelae a left cranial nerve VI paresis and transient episodes of neurological dysfunction. After discussion with the neurology team, it was clarified that there was no contraindication for neuraxial anaesthesia. Under standard ASA monitoring, spinal anaesthesia was performed with the patient in a sitting position, using a 27G pencil point subarachnoid needle in the L4-L5 space. Slowly and at constant rate, 10 mg of hyperbaric 0,5% bupivacaine and 0,1 mg of morphine were administered in the intrathecal space. The intervention was uneventful, and there were no complications or worsening of previous symptoms.

Discussion: Currently, there is no consensus regarding the anaesthetic approach to pregnant women with Arnold-Chiari malformation. While it is prudent to avoid a vaginal delivery, with all the changes in intracranial pressure associated with the strain of labour, it is also necessary to think about the risks of either general or neuraxial anaesthesia to perform a caesarean section. Concerns are related to the transient increase in intracranial pressure that accompanies general anaesthesia, but also the differential between the pressure of the cerebrospinal fluid above the foramen magnum and in the spinal canal, which can worsen after puncture in the subarachnoid space, leading to amygdala herniation with consequent strangulation of the brainstem. In individuals who have already undergone surgical correction and have no residual disease, a

neuraxial approach is considered harmless.

References: Teo, M. *Spinal neuraxial anaesthesia for caesarean section in a parturient with type I Arnold Chiari malformation and syringomyelia*. SAGE Open Medical Case Reports, volume 6:1–3

Learning points: A multidisciplinary approach and an individual anaesthetic plan should be carried out, considering the parturient's factors, available equipment and the anaesthesiologist's experience.

7423

Surgical removal of a knotted epidural catheter by a neurosurgeon - A rare complication

Nisar Soomro¹, Abdel Rahman Hammad², Hussein AlEnazi³, Abdullah AlRaffa⁴, Andrew Norris⁵, Soomro N.¹
¹King Faisal Specialist & Research Center - Riyadh (Saudi Arabia)

Background: Insertion and removal of epidural catheters are inevitably prone to failure. Conventional issues include coiling, knotting and fracturing of catheters. Generally, they are easy to remove in entirety, but in some case may prove problematic due to coiling or breaking during withdrawal. First broken epidural catheter was reported by Bonica et al¹.

Case Report: 40-year female, gravida four, BMI 35, requested epidural for labor analgesia. Under aseptic technique, sitting position space located at 6 cm with loss of resistance to air between lumbar 2 - 3 vertebrae. Teleflex Arrow Flexi Tip Plus® catheter inserted through a Tuohy needle initially 20 cm without resistance, needle removed and catheter withdrawn 11 cm at skin, after bolus test dose, Bupivacaine 0.1% in fentanyl 2 mcg/ml infusion commenced as per hospital policy. She delivered vaginally pain free after 9 hours.

One hour post-delivery, three members of hospital staff attempted to remove epidural catheter using different techniques but failed, internal wires of catheter were damaged and plastic part of catheter eventually broke down leaving about 7 cm inside (Fig.1). X-ray and CT scan of the lumbosacral spine revealed a residual broken catheter inside the spine with no neurological deficit.

Discussion: We believe full insertion of catheter through Tuohy needle could have resulted in knot formation and recommend to feed the catheter 3-5 cm inside dural space by calculating at hub of Tuohy needle. The average force required to remove an epidural catheter is 2.04 N (~0.459 lb. force) where 1 N equals 0.225 lb. of force².

Intraoperative findings demonstrate fully knotted catheter which could only be removed by surgical intervention³.

Learning points: Incidence of epidural catheter breakage is (1 in 20,000 - 60,000). There is no universally method to remove entangled epidural catheters. This abstract endeavours to raise awareness, hence necessitating importance of establishing a universal guideline.

References:

1. Bonica JJ, Analysis of 3637 cases and a review. *Anesthesiology* 1957; 18:723-84
2. Boey SK, Carrie LE (1994) With drawl forces during removal of lumbar extradural catheters. *Br J Anaesth* 73(6):833-835
3. Tina M Yu, Mastoor Nasiri, Solmaz P Manuel (2018) Surgical management of retained epidural fragment. *J Anest & Inten Care Med* Volume 5 Issue 2-February 2018

7493

Comparing pain catastrophizing, acute pain, and sub-acute pain outcomes between primary and repeat cesarean delivery

Sng B. L.¹, Yeo K. W.¹, Tan H. S.¹, Tan C. W.¹, Cheng S. M.¹, Sultana R.² KKH Women's Anaesthesia
¹KK Women's and Children's Hospital - Singapore (Singapore),
²DukeNUS Medical School - Singapore (Singapore)

Background and Goal of Study: Postnatal pain and psychological outcomes have significant maternal impact, but the influence of primary versus repeat cesarean delivery is uncertain. Hence, we compared primary and repeat cesarean delivery in their associations with pain catastrophizing (primary outcome), postoperative pain and analgesic use, and subacute pain.

Materials and Methods: This was a secondary analysis of a prospective cohort study investigating factors associated with maternal emesis following cesarean delivery. Pain Catastrophizing Scale (PCS), Hospital Anxiety and Depression Scale (HADS), Central Sensitization Inventory (CSI), and Edinburgh Postnatal Depression Scale (EPDS) were assessed pre-operatively. Pain score, analgesic requirement, PCS, and HADS were assessed at 24- and 48 hours, and sub-acute pain, HADS, CSI, and EPDS were evaluated at 6-10 weeks. Univariate and multivariable analyses were performed to identify factors associated with primary versus repeat cesarean delivery.

Results and Discussion: Data from 220 parturients were analyzed. Higher pre-operative PCS helplessness subscale scores (adjusted OR 1.10, 95%CI 1.03 to 1.17) and absence of medical comorbidity (adjusted OR 1.87, 95% CI 1.00 to 3.50) were independently associated with primary cesarean delivery.

Conclusion: Higher PCS total, rumination and magnification scores, higher 48-hour resting pain score, and higher EPDS score at 6-10 weeks were associated with primary cesarean delivery only in univariate analysis. There was no significant difference in the incidence of subacute pain.

7531

Postural orthostatic tachycardia syndrome: anesthesia for cesarian delivery

Conde R.¹, Ferreira M.¹
¹Centro Hospitalar Lisboa Norte - Hospital Santa Maria - Lisbon (Portugal)

Background: Postural Orthostatic Tachycardia Syndrome (POTS) is an autonomic disorder that mostly affects young women. It is defined as the development of symptoms of orthostatic intolerance associated with excessive tachycardia (heart rate (HR) increase of at least 30bpm or exceeding 120bpm) within the first 10min of standing or head-up tilt¹. Etiology is not fully understood. During labor there is a concern about triggering a tachycardic response and subsequent symptoms resulting from the pain and stress of labor. Furthermore, peripheral vasodilation and hypotension from regional block may also be a trigger. These changes may affect fetal oxygen uptake.

Case Report: A 31 years old G3P1 parturient, 38 weeks and 2 days gestation, with a diagnose of POTS, presented for a cesarean section (CS). An arterial line revealed a basal blood pressure of 120-140/50-60mmHg and a HR of 90-100bpm. After a co-load of lactated Ringer's solution (500mL) and with the patient in a lateral decubitus position, an epidural catheter was placed at the L2-3 level and gradually bolused with ropivacaine 0.75% until a sensory level up to T4 was achieved. During the procedure an episode of hypotension related to sympathetic block was addressed with norepinephrine infusion (maximum dose 4mcg/min) and crystalloid solution bolus. No symptoms developed during the CS. Postoperative period was uneventful.

Discussion: There are just a few reports of anesthesia in patients with POTS, some in pregnant women for spontaneous labor or CS^{2,3}. The best anesthetic management is still unknown. Avoidance of the stress of labor, use of epidural catheter with slow titration, avoidance of sudden changes in position, adequate IV hydration and invasive BP monitoring seem to be important goals in the management of this patients³.

References:

1. Rabbitts J. A. et al; Postural orthostatic tachycardia syndrome and general anesthesia: a series of 13 cases; *J Clin Anesth*; 2011; 23(5): 384-392
2. Motiaa Y. et al; Postural orthostatic tachycardia syndrome: Anesthetic management in the obstetric patient; *J Obst Anaesth and Critical Care*; 2016; Vol 6 Issue 2
3. Corbett, W. L. et al; Anaesthetic management of a parturient with the postural orthostatic tachycardia syndrome: a case report; *BJA*; 2006; 97(2): 196-9

Learning points: Autonomic dysfunction associated with POTS can cause haemodynamic instability during perioperative period. Epidural anesthesia with slow top-up seems to be a safe choice for the management of CS.

7538

Postdural Puncture Headache (PDPH): Any News About Its Treatment?

P. M. Pereira A.¹, Mendes Morais D.¹, Sampaio J. C.¹, Rêgo S.¹, Caramelo S.¹, Cunha S.¹
¹Centro Hospitalar Tras os Montes e Alto Douro - Vila Real (Portugal)

Background: Pregnant women are at increased risk for the development of postdural puncture headache (PDPH) with an incidence of accidental dural puncture of around 1.5%¹ and a risk of PDPH up to 80%. PDPH is an important cause of morbidity and can lead to long-term consequences: headache, chronic neck pain and depression.

Case Report: A 38yo pregnant woman, 41 weeks of gestation, G4P1, with no relevant history, was admitted for induction of labor and underwent epidural analgesia. Epidural space identification was made with 18G Tuohy needle at L3-L4, median puncture, with loss of resistance to saline at 5cm, sitting position. The technique was uneventful and without aspiration of liquor through the catheter before each drug administration. 5 hours after delivery, the patient developed neck pain with bi-frontal and occipital irradiation, triggered by standing up and improving with decubitus, without other symptoms. Rest, water and caffeine intake was encouraged, and conventional analgesia was prescribed. 48 hours later, due to persistent complaints, she underwent sphenopalatine ganglion block (SPGB) with ropivacaine 0,75%. Notwithstanding, 24 hours later a blood patch was needed. It provided symptomatic relief and no recurrence of complaints.

Discussion: In this case, PDPH appears after an apparently uncomplicated epidural analgesia technique, which demonstrates that this diagnosis requires a high index of suspicion and active screening. Our hospital has a PDPH approach protocol that was followed. SPGB has been described as an effective therapeutic option in PDPH. However, recent meta-analyses have questioned its effectiveness when compared to conventional treatment (with paracetamol or epidural blood patch).² Epidural blood patch remains the gold standard of treatment and should be performed 48h after the onset of symptoms (as it was done). However, not even this technique seems to protect against long-term complications.³

References:

- DOI:10.1111/anae.15390
 DOI:10.1016/j.bja.2020.10.005
 DOI:10.1016/j.bja.2020.07.061

Learning Points: A high index of suspicion for PDPH, is needed particularly in the obstetric population. PDPH is associated with short and long-term complications, the latter often refractory to treatment, including blood patch. SPGB is a recent therapeutic approach. However, its effectiveness is still questionable. Whenever possible, local standards of clinical care at each institution should be followed, in order to standardize the treatment.

7554

Perioperative considerations of a pregnant patient with hereditary angioedema submitted to a cesarean section: case report

Fidalgo A.¹, Marques P.², Rodrigues A.², Pratas M.², Ferreira L.²
¹Centro Hospitalar de Leiria - Leiria (Portugal), ²Centro Hospitalar e
 Universitário de Coimbra - Coimbra (Portugal)

Background: Hereditary angioedema (HAE) is an autosomal dominant disease characterized by sudden and recurrent episodes of angioedema of the airway, skin and gastrointestinal tract.¹ The disorder is caused by a low plasma or altered function of C1 inhibitor leading to an unregulated increase of bradykinin levels and vascular permeability, resulting in edema formation. Prophylaxis should be carried throughout the pregnancy and perioperative management employed by a multidisciplinary team to avoid serious complications. We present a successful case of a pregnant patient with hereditary angioedema type 1 submitted to a cesarian section.

Case Report: A primigravida with type 1 HAE presents with spontaneous amniotic membrane rupture in obstetric urgency department. Elective cesarian section was proposed because of breech presentation. After pre-anesthetic assessment, she was premedicated with C1 inhibitor concentrate 6 hours before procedure. After informed consent, a combined spinal-epidural was done with levobupivacaine plus sufentanil. The surgery course went uneventfully. She was shifted to the recovery room with opioid analgesia bolus via epidural catheter. The patient remained asymptomatic and 72h later she was discharged from hospital without any complication.

Discussion: There is scarce literature on HAE progress during pregnancy and delivery. This case reports the perioperative management for a cesarian section. Careful prophylaxis is mandatory because both surgical trauma and anesthesia can be potential triggers of HAE attacks.² Regional anesthesia should be preferred, as it avoids airway manipulation.¹

References:

1. Williams AH, Craig TJ. Perioperative management for patients with hereditary angioedema. *Allergy Rhinol (Providence)*. 2015 Jan;
2. Teresa Maria Ramos Nunes Estevens, Angel Serrano, Solange Amaro, João Ribeiro, Peri-operative management of a pregnant patient with hereditary angioedema submitted to a cesarean-section: case report, *Brazilian Journal of Anesthesiology (English Edition)*, 2020

Learning points: Albeit a rare disorder, is important for the anesthesiologist to know the physiopathology to plan properly the anesthetic procedure once it can also be a possible trigger for an acute HAE attack. A multidisciplinary team is required to optimize perioperatively, preventing that way any complication. As regional anesthesia prevents airway manipulation, it should be chosen instead of general anesthesia for patient safety.

7593

Acute amphetamine consumption presenting as eclampsia - case report

Dias M.¹, Oliveira S. M.¹, Ormonde L.¹
¹Centro Hospitalar Universitário Lisboa Norte - Lisboa (Portugal)

Background: Pre-eclampsia is a multisystemic disorder that usually occurs after 20 weeks of pregnancy. It is characterized by high blood pressure, in an otherwise normotense women, and damage to another organ, most often the kidney, with edema and proteinuria. Eclampsia is preeclampsia in a convulsive condition. (1,2) Acute amphetamine toxicity (sympathomimetic agents) may present as agitation and confusion accompanied by tachycardia and hypertension (2,3)

Case Report: We present a case of a 17 years old primiparous woman, with 34 weeks of gestation supervised pregnancy that was admitted in maternity emergency room with an history of seizures. At the observation, the patient was disoriented, with an aggressive behaviour and slurred speech as well as tachycardia and hypertension. The seizures described by the family were not observed in the medical facility. A peripheral venous access, urinalysis and blood test were immediately performed. Treatment with magnesium sulphate 2g was initiated. Fetal bradycardia was reported and an emergency c-section under general anesthesia was performed. After the induction, the patient kept the tachycardia but normal

tensional values. Blood tests had normal platelets and liver enzyme levels. Proteinuria was not found. A toxicology test was performed and it showed high volumes of amphetamines. Neurological evaluation showed no other alterations.

Discussion: Although eclampsia is the most common cause of seizures and new onset hypertension in pregnancy, other causes cannot be ignored such as neurological conditions and drug abuse. This patient was an healthy young women with a normal supervised pregnancy and we were confused about a story of seizures reported by the family who were not healthcare professionals. The behaviour of the patient, laboratorial findings inconsistent with eclampsia and clinical signs such as sustained tachycardia with normal tensional values after the delivery lead us to suspect other causes.

References:

1. Longnecker, David E. (2018) *Anesthesiology*, 3rd edition, McGraw Hill.
2. Hofmeyr R, et al., *Preeclampsia in 2017: Obstetric and Anaesthesia Management*, Elsevier, 2017
3. Elliott R H, et al. *Amphetamine ingestion presenting as eclampsia*, *Canadian Journal of Anaesthesia*, 1990

Learning points: Although eclampsia is the most frequent cause of seizures accompanied by high blood pressure in pregnancy, other causes should not be ignored, especially when there are findings inconsistent with this diagnosis.

7594

Ultrasound-guided epidural anaesthesia for Caesarean section for a woman with pregnancy complicated by medulloblastoma

Harha A.¹, Grizhymalskyi I.¹, Zukin V.¹
¹Maternity Hospital Leleka - Kiev (Ukraine)

Background: Medulloblastoma is an embryonic malignant brain tumour more prevalent in children than adults. The incidence is as low as 0.62 cases per million adult population [1]. We are presenting a rare case of pregnancy complicated by medulloblastoma with an accent on the anaesthetic management of Caesarean section following brain surgery.

Case Report: A 27-year-old pregnant woman was diagnosed with malignant medulloblastoma at the 26th week of gestation. She presented to our clinic for early Caesarean birth 17 days following tumour resection. There were no signs of raised ICP on MRI, and we decided to conduct US-guided epidural anaesthesia. The epidural space was catheterised, and a total amount of 16 ml 0,75% ropivacaine was injected incrementally after an obstetric test dose. The course of operation and anaesthesia were unremarkable. The patient was ambulated in 4 hours and discharged 3 days postoperatively without complications for further radiotherapy. Unfortunately, a baby died 4 days after birth from newborn RDS.

Discussion: There are no RCTs or guidelines on the medulloblastoma management for pregnant patients and recommendations on anaesthesia features for Caesarean section in this population. The standard approach is resection of the tumour followed by delivery and craniospinal radiotherapy [1]. An obstetric anaesthetist should balance anaesthesia risks related to intracranial lesions against specific obstetric anaesthetic risks such as failed intubation and aspiration. Our patient had no absolute contraindications to epidural anaesthesia as raised ICP [2], and we conducted epidural anaesthesia without complications. Pre-procedural ultrasound can increase the safety of the procedure.

References:

1. Nabors LB, Portnow J, Ahluwalia M, et al. *NCCN Clinical Practice Guidelines in Oncology: Central Nervous System Cancers*. Version 2.2020
2. Kingsley C, McGlennan A. The labour epidural: the basics. *J World Fed Soc Anaesth*. 2019 Sept; 34:26-9s

Learning points: Neuraxial anaesthesia is a method of choice for Caesarean section and should be used in all possible cases. It reduces the risks of maternal mortality related to the complications associated with general anaesthetic. Epidural anaesthesia can be safely conducted for a patient with medulloblastoma after brain surgery, provided there are no signs of raised ICP. Pre-procedural ultrasound is a simple and cost-effective method to reduce the risk of complications of neuraxial anaesthesia.

7626

Management of Obesity Hypoventilation Syndrome during Labor

Shiba S.¹¹Hawler Hospital - Erbil (Iraq)

Background: Obesity hypoventilation syndrome(OHS)is a disorder in which patients with a BMI≥30kg/m² develop hypercapnia with a P_aCO₂≥45mm Hg,in the absence of other diseases that may produce alveolar hypoventilation.The diagnostic criteria for OHS that the patient did not possess (S.bicarbonate ≥27 mEq/L,PaO₂ <70 mm Hg,&Hb>16g/dL)can explained by physiologic changes associated with pregnancy.

Case Report:A 33-year-old woman was admitted to the hospit with a 35-week gestational pregnancy, morbid obesity& type2 DM,HBA1C 6%.S.creatinine1.6mg/dL.A diagnosis of preeclampsia superimposed upon chronic hypertension baseline systolic BP of 130–145 mmHg&Bp164/92mmHg. The patient's chronic hypertension was treated with 200mg bid labetalol &10 mg amlodipine.She has history of previous admission 2years ago with MI&uncontrolled Bp. During that admission, the patient's serum bicarbonate ranged between 27 and 33mmol/L, consistent with OHS.Her medical history mild asthma,anemia &moderate extrapulmonary restrictive lung disease(FEV1 68%,FVC 65%,TLC78%). In this case,with presumed OHS developed acute respiratory acidosis as a result of multiple physiologic challenges during induction of labor,including increased CO₂ production,a blunted respiratory response to hypercarbia.CPAP therapy was initiated,but the patient continued to have hypercapnia. It was determined that cesarean delivery may help the patient the patient regain acid-base homeostasis;thus,cesarean delivery was successfully completed with general endotracheal anesthesia and epidural analgesia.

Discussion:The diagnosis of OHS in pregnancy is not straightforward. The diagnosis of OHS in non-pregnant patients have low sensitivity in patients with physiologic changes associated with pregnancy.We described a case of hypercapnic respiratory failure in a pregnant woman with presumed OHS,who required general endotracheal anesthesia for cesarean delivery.Highlighting the need for early diagnosis and treatment with PPV in these patients.

References:

J. F. Masa,J.-L.Pépin,J.-C. Borel, B. Mokhlesi, P. B. Murphy, and M.Á.Sánchez-Quiroga, "Obesity hypoventilation syndrome," *European Respiratory Review*,vol.28,no.151,Article ID 180097, 2019.

Learning points: OHS because it is often undiagnosed and the diagnosis in pregnancy is not straightforward due to the physiological change during pregnancy and labor. Cesarean delivery is recommended under general anesthesia& epidural analgesia may help the patient hemeostasis.

7633

Skin to skin contact and neonatal hypothermia: influence of maternal hypothermia at delivery. A retrospective study

Vieira Carlos R.¹, Bernardi R.², Vasconcelos A.², Soares A.², Shimura E.², Mathias L.²

¹Instituto da Crianca do Hospital das Clinicas - Sao Paulo University Medical School - Sao Paulo (Brazil), ²Maternidade Pro Matre Paulista - Sao Paulo (Brazil)

Background and Goal of Study: Inadvertent perioperative hypothermia (IPH) has harmful physiological effects during perioperative period. The aim of study was to evaluate the incidence of hypothermia in newborns (NBs) given skin-to-skin care (SSC) from normothermic or hypothermic mothers immediately after caesarean delivery.

Materials and Methods:This is a retrospective study. Three hundred and ninety three patient records submitted to scheduled caesarean delivery were enrolled. Standard regional anesthesia technique was used in all patients. The primary outcome measured was neonatal hypothermia incidence at delivery and at the end of the surgery. Secondary outcome measured included the incidence of maternal intraoperative hypothermia.

Results and Discussion:There was a significant decrease in maternal temperature median among the patient's arrival in the OR (36.5 [36.53-36.61]°C) and immediately after birth (36.0 [35.90-35.95]°C) and at the

end of the surgery (35.8 [35.77-35.83]°C). The temperature median of the NBs at delivery was 36.5 [36.47-36.54]°C and was 36.5 [36.41-36.59]° C at the end of the surgery; these results were not significantly different. Maternal hypothermia at delivery was observed in 121 (30.8%) of the included patients (HT group). Maternal normothermia at delivery was observed in 272 (69.2%) of the included patients (NT group). The incidence of neonatal hypothermia between the 2 groups (HT and NT) was not different at delivery or at the end of the surgery.

Conclusion:The maternal hypothermia occurred at delivery and at the end of the surgery and our findings suggest that maternal hypothermia at delivery is not a contraindication for SSC immediately after delivery for healthy and stable NBs.

7666

Placenta previa: a clinical case of major obstetric hemorrhage

Marques Franco R.¹, Dias C.², Lareiro N.¹, Vasconcelos L.¹

¹Centro Hospitalar do Baixo Vouga - Aveiro (Portugal), ²Centro Hospitalar do Baixo Vouga - Aveiro (Portugal)

Background: The management of major obstetric haemorrhage requires a multidisciplinary approach. Treatment may be delayed due to failure to recognize this entity and hemorrhage remains an important cause of maternal death.

Case Report: We report the case of a 44-year-old pregnant woman, with no relevant personal history, with 37 weeks and 5 days of gestation, gestation 3 to 1. During pregnancy she developed anemia, treated with oral iron, and gestational diabetes controlled by diet. She underwent elective cesarean for total placenta previa. Upon removal of the placenta, major hemorrhage occurred, and the postpartum hemorrhage protocol was initiated. After the cesarean, she maintained significant vaginal bleeding, despite the confirmation of a well-formed uterine globe, for which an intrauterine balloon was placed. In the surgical recovery, due to a deterioration in the state of consciousness, orotracheal intubation was chosen. Total hysterectomy with bilateral salpingectomy was performed to control bleeding, during which it was necessary to administer 8 units of red cell concentrate.

Conclusion: She needed a new transfusion of blood products during hospitalization. The condition resolved and the patient was discharged after 8 days of hospitalization.

7676

Metoclopramide induced acute dystonic reaction during labor

Vaz Rodrigues L.¹, Raquel Gonçalves Ribeiro S.¹, Poiarez C.¹, Amorim P.¹

¹CHUP - Centro Hospitalar Universitário do Porto - Porto (Portugal)

Background:Extrapyramidal effects due to metoclopramide have a reported incidence of 1:500 patients in general population.

Case Report:A 28-years-old, ASA II, 41-week pregnant woman, with no known drug allergies, was admitted for vaginal delivery. Epidural catheter for analgesia and patient controlled epidural analgesia with ropivacaine 1% and sufentanil 0.25 mcg/ml was prescribed. Six hours after, the medical team was called due to sudden onset of generalized involuntary movements. Vital signs were stable. Eclampsia was excluded due to absence of impaired consciousness and no history or signs suggesting pre-eclampsia. Drug chart revealed tramadol 100mg and metoclopramide 10mg intravenous (IV) administration, thus a metoclopramide induced acute dystonic reaction was considered. Following multidisciplinary discussion including Neurology, Diazepam 5mg and Biperiden 5mg were administered, with a reduction of dystonic movements amplitude. Due to sustained fetal bradycardia an emergent C-section was performed under epidural anesthesia. Nuchal cord was identified and relieved, with the newborn having an Apgar score of 9/10. Metoclopramide 10mg was erroneously readministered, provoking perioral twitching. Complete recovery was noted within two hours. The patient was informed about the clinical situation and instructed to avoid metoclopramide. Discharge occurred three days after the delivery.

Discussion: Risk factors for development of dystonic reactions due to metoclopramide are female gender, young adults and patients receiving high doses of metoclopramide.² Recently, it has been suggested that pregnancy may render patients more susceptible to metoclopramide induced acute dystonia.³ Reversal after biperiden administration supported our diagnostic hypothesis of an acute dystonic reaction induced by metoclopramide. Still, the case reflects the importance of multidisciplinary approach and good communication for minimizing mistakes, especially in emergency scenarios.

Learning points: Extrapyramidal effects due to metoclopramide are not rare and should be considered in the differential diagnosis of movement disorders. Management of acute dystonic reactions involve discontinuation of metoclopramide and early administration of anticholinergic drugs. Good communication is essential, especially in emergency scenarios.

Paediatric Anaesthesiology

6479

Performance time for cricothyroid membrane identification and characteristics of cricothyroid membrane in pediatric patients using ultrasonography

Kim E.¹, Cho S. A.², Kang P. Y.³, Song I. S.³

¹Seoul National University College Of Med - Seoul (South Korea),

²Konyang University Hospital - Daejeon (South Korea), ³Seoul national university hospital - Seoul (South Korea)

Background and Goal of Study: Although pediatric patients are vulnerable to hypoxemia-induced "cannot intubate cannot oxygenate" situations, performing front-of-neck access remains difficult, and the identification of the cricothyroid membrane is essential for front-of-neck access procedures. This study evaluated the usefulness of cricothyroid membrane identification in pediatric patients using ultrasonography by inexperienced trainee anesthesiologists and collected anatomical data on cricothyroid membrane and its surrounding airway structures in children.

Materials and Methods: This prospective observational study included children aged <18 years scheduled to undergo general anesthesia and trainee anesthesiologists. After anesthetic induction, trainee anesthesiologists identified cricothyroid membrane in five sequential patients using ultrasonography. A pediatric anesthesiologist confirmed the accuracy of the identified cricothyroid membrane and recorded the performance time. The primary outcome was cricothyroid membrane identification performance time. The secondary outcome was the characterization of cricothyroid membrane and its surrounding structures.

Results and Discussion: Totally, 150 pediatric patients and 30 trainee anesthesiologists were analyzed. The success rate in identifying cricothyroid membrane using ultrasonography was 100% in all attempts via a transverse approach. The mean (standard deviation) performance time was 27.2 (18.6) and 31.0 (23.8) s via transverse and longitudinal approaches, respectively; a decreasing pattern of performance time was observed with repeated attempts ($P=0.005$ and $P=0.003$ for transverse and longitudinal approaches, respectively). Cricothyroid membrane length was mostly correlated with patients' height ($r=0.75$, $P<0.001$), and blood vessels around cricothyroid membrane were observed in 95.9% of patients.

Conclusion: Naïve anesthesiologists successfully identified cricothyroid membrane in pediatric patients using ultrasonography. When performing emergency front-of-neck access in pediatric patients, ultrasonography is effective for identifying cricothyroid membrane and avoiding damage to surrounding structures.

6483

Paediatric pain management after emergency fracture reduction and orthopaedic surgery – a retrospective audit

Martin T.¹, Rawlinson I.¹, Crawford M.¹, Desmond F.¹

¹Austin Health - Heidelberg (Australia)

Background and Goal of Study: At our metropolitan tertiary hospital there was a concern from nursing staff that paediatric pain was being insufficiently treated after fracture reduction in the emergency department (ED) and orthopaedic surgery. Our aim was to examine the quality and safety of paediatric analgesia, with a view to implementing decision support tools and guidelines for junior medical staff if we identified poor analgesia prescription.

Materials and Methods: We conducted a retrospective cohort study of all children under 16 years old admitted over four months in 2019. Patients were included in two groups; the first after fracture reduction in ED and the second after orthopaedic surgery. Patients were included in both if appropriate. We identified the highest pain score (HPS) recorded during a child's admission through the routinely collected numerical rating scale (NRS) of 0-10. We determined the NRS at 1-2, 3-5, and 6-12 hours after the HPS. We excluded time spent in ED, recovery and post-discharge.

Results and Discussion: We identified 61 patients with a mean age of 10 years old. A total of 94 care episodes were included, with 35 in the post-ED group and 59 in the post-operative group. Mean HPS was 3.6 for post-ED group and 3.5 for post-operative group. 4 (4%) patients had a NRS, which did not improve over 12 hours, all post-operative. 48 (51%) patients were prescribed and 26 (28%) received PRN immediate-release oxycodone. 2 patients received fascia-iliaca blocks out of 3 with femur fracture. 3 (3%) children had medication prescribed based on an estimated weight and 1 child was prescribed a 29mg/kg paracetamol overdose.

Conclusion: This was a reassuring audit which identified only 4 children who had no improvement in pain, good use of the WHO analgesic ladder, and a low use of estimated weight to dose medication. Areas for improvement include offering fascia-iliaca block to all patients with femur fracture and using FLACC or FACES pain scales. We did not identify a need for new decision support tools or guidelines for junior medical staff.

6487

Duration of inhalation versus intravenous anaesthesia induction in paediatric patients: prospective observational trial

Klabusayova E.¹, Klucka J.¹, Musilova T.¹, Skrisovska T.¹, Vafek V.¹, Stourac P.¹

¹University Hospital Brno and Faculty of medicine, Masaryk University - Brno (Czech Republic)

Background and Goal of Study: In the paediatric patients, apart from the standard intravenous anaesthesia induction, the inhalation induction is also possible and could be preferred, mainly due to possible fear of the painful venipuncture. The aim of this prospective observational trial was to compare the duration of inhalation and intravenous anaesthesia induction in paediatric patients undergoing elective surgical or diagnostic procedures.

Materials and Methods: The trial was approved by the Ethics Committee by the University hospital Brno (date of approval 09/09/2020), registered on clinicaltrials.gov (identifier: NCT04527757) and designed as prospective observational trial. The trial is ongoing in the term from 09/2020 until 06/2021. The duration of inhalation and intravenous anaesthesia induction, defined as the time since the beginning of vital functions monitoring until the first ETCO₂ wave (after securing the airway with laryngeal mask or intubation) was measured in patients undergoing elective surgical or diagnostic procedure.

Results and Discussion: We present preliminary data from the first 8 months of data collection. Overall 422 patients (09/2020-04/2021) were included. The mean length of the duration of inhalation induction was 06 minutes 52 seconds, the mean length of the duration of intravenous induction was 06 minutes 39 seconds. The incidence of adverse events during anaesthesia induction was 19,9 % in the inhalation induction, 9,3

% in the intravenous induction.

Conclusions: The preliminary data show that the duration of inhalation and intravenous anaesthesia induction was comparable. The inhalation induction was associated with a higher number of adverse events during the anaesthesia induction.

Acknowledgements: This work was supported by Specific University Research provided by MŠMT (MUNI/A/1153/2020, MUNI/A/1178/2020), supported by MH CZ - DRO (FNBr, 65269705) and supported by funds from the Faculty of Medicine MU to the junior researcher (Jozef Klučka, Martina Kosinová, ROZV/28/LF/2020).

6488

Incidence of emergence delirium in the PACU: prospective observational trial

Klabusayova E.¹, Klucka J.¹, Musilova T.¹, Skrisovska T.¹, Srouac P.¹, Brazdil D.²

¹University Hospital Brno and Faculty of medicine, Masaryk University - Brno (Czech Republic), ²Faculty of medicine, Masaryk University - Brno (Czech Republic)

Background and Goal of Study: Emergence delirium (ED) is a serious postoperative complication in paediatric anaesthesia. It is characterised by psychomotor and perception disorder and has negative impact on morbidity and mortality. The aim of this trial was to determine the incidence of ED in paediatric patients after general anaesthesia, using PAED (Paediatric Anaesthesia Emergence Delirium) score in the PACU (post-anaesthesia care unit).

Materials and Methods: The trial was approved by the Ethics Committee by the University hospital Brno (date of approval 09/09/2020), registered on clinicaltrials.gov (ID: NCT04531020) and designed as prospective observational trial. The trial is ongoing in from 09/2020 until 06/2021. PAED score, WATCHA score and Richmond agitation and sedation scale (RASS) were measured in 0., 5., 10., 15., and 20. minute after PACU admission and after obtaining RASS ≥ -2 (the first eye contact with the caregiver). ED was (according to recommendation) defined as PAED score >10 points. In case ED developed, the duration of ED, the number of therapeutic interventions and the cumulative dose of administered sedatives was recorded. The average PAED, WATCHA, RASS scale, the incidence of postoperative nausea and vomiting, the cumulative dose of administered antiemetics, the type of anaesthesia induction (inhalation, intravenous), type of anaesthesia (TIVA, combined, inhalational), length of the surgery, type of the surgery was reported.

Results and Discussion: We present preliminary data from the first 6 months of data collection. In sum 858 patients (09/2020-02/2021) were included, 752 patients were included in the preliminary data analysis. The overall incidence of ED was 87.23 %. The incidence of ED measured after obtaining RASS ≥ -2 was 34.97 %. The overall average PAED score was 8.24 points. The average PAED score measured after obtaining RASS ≥ -2 was 7.75.

Conclusions: According to the preliminary data the overall incidence of ED in the PACU was 87.23 %. The incidence of ED measured after the first eye contact with the caregiver (obtaining RASS ≥ -2) was 34.97 %.

Acknowledgements: This work was supported by Specific University Research provided by MŠMT (MUNI/A/1153/2020, MUNI/A/1178/2020), supported by MH CZ - DRO (FNBr, 65269705) and supported by funds from the Faculty of Medicine MU to the junior researcher (Jozef Klučka, Martina Kosinová, ROZV/28/LF/2020).

6490

Hypocalcemia management in paediatric thyroid surgery over a period of twenty years

Romera A.¹, Barragán L.¹, Álvarez-Baena L.¹, Sanjuán E.¹, Lema M.¹, Sanz M.¹

¹HOSPITAL GREGORIO MARANON - madrid (Spain)

Background and Goal of Study: Paediatric post-thyroidectomy hypocalcemia management varies widely in the literature. The adoption of a standard approach to predict, identify and treat this condition would help reduce morbidity. Our study has two aims: Presenting the epidemiological parameters in all the paediatric patients submitted to thyroid surgery over a period of twenty years. Assessing the implementation of a multidisciplinary protocol and updating it according to ongoing experience.

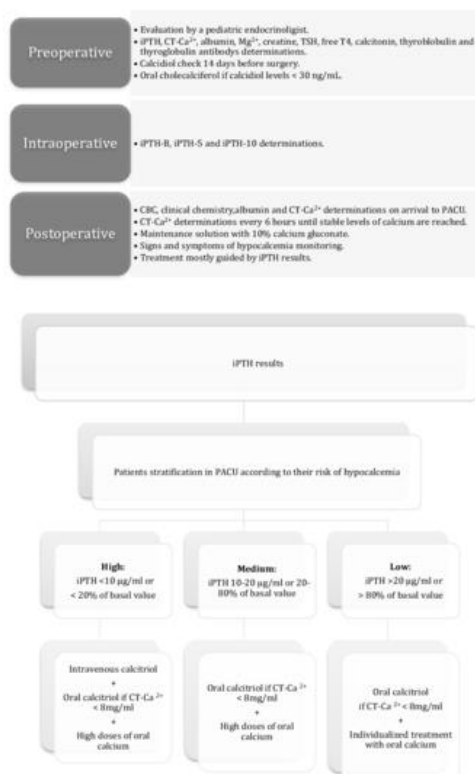
Materials and Methods: This is a retrospective and descriptive study of all patients from 0 to 16 years old who underwent thyroid surgery from 2000 to 2020 in our tertiary hospital.

Results and Discussion: From 2000 to 2020, 47 paediatric patients were submitted to thyroid surgery. 29 of them were female. The median age was 9 years. All patients were healthy ASA-I or II and had a hospital stay < 48 hours. We observed 29 cases of Multiple Endocrine Neoplasia Type 2 (MEN 2) A, 1 case of MEN 2B, 5 papillary carcinomas, 5 follicular adenomas, 4 multinodular goiters, 1 follicular carcinoma, 1 thyroglossal duct papillary carcinoma and 1 Graves-Basedow syndrome. Total thyroidectomy was performed in 41 patients. 4 follicular adenomas and 1 multinodular goiter were submitted to hemithyroidectomy. There were no intraoperative complications. From 2000 to 2016, electrolyte management had no standard approach (33 patients). In 2017, a multidisciplinary protocol was developed (13 patients). It was updated after a case of severe hypocalcemia (1 patient). We registered 8 asymptomatic hypocalcemia and 1 case of symptomatic hypocalcemia. 2 of them have permanent hypoparathyroidism.

Conclusion: All the cases of hypocalcemia submitted to the protocol were early identified by iPHT measurements. However, correct identification of patients at risk of hypocalcemia was not enough to prevent it. Measuring and optimizing the preoperative levels of vitamin D, using intraoperative intact PTH results to foresee which patients are likely to develop hypocalcemia and giving high doses of calcitriol and calcium carbonate to high risk patients shall improve the outcomes.

Figure 1. Updated protocol.

iPHT: intact PTH. CT-Ca²⁺: corrected total calcium. Mg²⁺: magnesium. iPHT-B: basal intact PTH. iPHT-5: intact PTH 5 minutes after the thyroid's removal. iPHT-10: intact PTH 10 minutes after the thyroid's removal. CBC: complete blood count. PACU: post-anaesthesia care unit.



6499 Perioperative Management of Wilms' Tumor with Intravascular Extension.

Sharma A.¹, Lee S.¹, Kim M.¹

¹New York Presbyterian Hospital - New York (United States)

Background: Wilms' tumor (WT) is second most common pediatric solid tumor. WT tends to invade blood vessels as tumor thrombus, into renal veins, inferior vena cava (IVC), and rarely the right atrium (RA). Most case reports with thrombus extension beyond hepatic veins utilize cardiopulmonary bypass (CPB). We present a WT with high IVC thrombus and unusual management involving multidisciplinary teams and partial clamping of the RA, highlighting important anesthetic implications.

Case Report: A 2-year-old-child presented with hematuria and palpable flank mass. Doppler abdominal ultrasound and CT revealed 12.6 cm R renal mass with WT features and occlusive IVC thrombus extending to cavo-atrial junction (CAJ). On preoperative TTE, the thrombus also appeared to end at CAJ without extension into the RA. Weight 13.8kg, BP 109/78, HR 99, abdominal distension, no peripheral edema. Intraoperative ultrasound: Caval thrombus extending to hepatic veins but could not prove the supra-hepatic cava was thrombus-free. Intraoperative TEE: Also equivocal that infra-atrial, supra-hepatic cava was tumor-free, with sufficient room to land a clamp. Modification of the Surgical Plan: Pediatric cardiothoracic surgery was consulted to perform a sternotomy. The supradiaphragmatic IVC was dissected circumferentially and controlled with umbilical tape and tourniquet. Clamps were placed at the infrarenal cava, left renal vein, and a Pringle maneuver was performed. A clamp was placed at the RA/IVC junction without compromising hemodynamics, thought partially due to good collateralization. A longitudinal cavotomy was performed along the retro-hepatic cava. The superior aspect of thrombus removed easily, and right renal vein was removed en bloc with adherent thrombus. Total clamp time 41 minutes.

Discussion: Intraoperative considerations: CPB on standby. Upper extremity vascular access due to IVC thrombus blocking venous return. Careful monitoring with CVP and arterial line. Readiness for massive blood transfusion, vascular clamping, tumor embolization, and dysrhythmias. Liver ischemia/reperfusion. Post-operative pain control.

References: Lall A et al. Wilms' tumor w intracaval thrombus in the UK Children's Cancer Study Group UKW3 trial. *J Pediatr Surg* 2006; 41: 382-387.

Learning points: Have a preoperative huddle to discuss plans with backup help available. Communicate and adapt when the intraoperative course changes. In the right patient, the associated morbidities of CPB can be avoided.

6515 Accidental overheating of a child during ear surgery

Tinoco J.¹, Eloy A.², Costa G.³, Candeias M. J.³

¹Hospital São Bernardo - Setúbal (Portugal), ²Hospital São Bernardo - Setúbal (Portugal), ³Centro Hospitalar Lisboa Central - Lisboa (Portugal)

Background: Inadvertent hyperthermia during anesthesia is a rare but a possible life-threatening complication and to prevent this event it is crucial to monitor body temperature. There are different forms of monitoring, but each one has its own limitations. Possible causes are iatrogenic passive overheating, fever, malignant hyperthermia, neuroleptic malignant syndrome, anaphylactic reaction, sepsis, pheochromocytoma, thyrotoxic storm and cerebral ischemia. It is often difficult to differentiate between these various causes.

Case Report: A 3-years-old boy, 15kg, ASA I, without relevant personal history or medication, underwent a mastoidectomy with type III tympanoplasty. The child was monitored according to ASA standards, including a reusable skin temperature sensor. After sevoflurane induction, a balanced general anesthesia was performed with a continuous perfusion of remifentanyl. The patient was warmed with 3M Bair Hugger® forced-air warmer programed to 40°C. The intervention lasted 4 hours and was uneventful until the last 30 minutes, when the patient presented with tachycardia but normotensive. Possible causes had to be excluded in that moment. According to temperature monitoring he was normothermic and the etCO₂ was normal. Pain and urinary retention were excluded. Only when the child was uncovered, we saw the temperature sensor

dislodged from the skin but under the forced-air warmer. The child was warm, diaphoretic and then became hypotensive. The tympanic temperature was evaluated (41.5°). Cooling was started promptly with wet compresses and boluses of fluids were made. After 30 minutes it was possible to gradually lower the child's temperature to 38.6°C. The patient woke up and was transferred to PACU, where the normothermia was regain without further complications.

Discussion: This case highlights the importance of choosing the most appropriate temperature monitoring method, which in this case has failed. Also, the need to quickly perform a differential diagnosis and management.

Learning points: Be aware that the choice of the type of temperature monitoring can affect the perioperative outcomes. Keep in mind the differential diagnoses facing a hyperthermia.

6560 Hickman-Broviac catheters:Indications and outcomes in Tunisian university hospital.

Hend K.¹, Anouar J.², Saloua A.², Kamel K.²

¹Hopital Habib Bourguiba - sfax (Tunisia), ²Hopital Hedi Chaker - sfax (Tunisia)

Background and Goal of Study:The aim of this study was to assess the indications and the outcomes of Broviac catheterization in our institution and to look for risk factors for complications.

Materials and Methods: In this prospective observational study, we collected data of children scheduled for Broviac catheter insertion. Then patients were divided into 2 groups:

- Group I : patients who had no complications
- Group II: patients with complicated Broviac catheter or who had catheter removal within the 7 first days after insertion.

The comparaiso of the 2 groups allowed us to detect risk factors of Broviac complications.

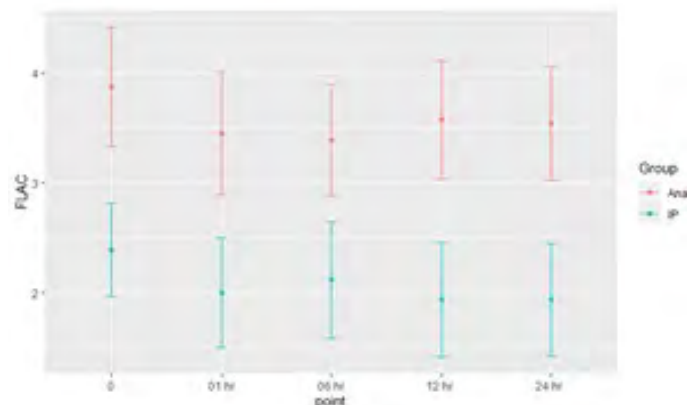
Results and Discussion:In this study, we included 36 patients. 36.1% were admitted from neonatal unit and 33.3% from pediatric intensive care unit. The most common indication for catheter insertion was the administration of antibiotics found in 61.1 % patients. The majority of the patients are premature babies (69.4%). 25% had respiratory diseases and 19.4 % patients had neurological problems. Catheter-related complications occurred in 52.8% of the patients (Group 2). The most common complications were infections and catheter malfunction with an incidence rate of 27.8% and 16.7 % respectively. The comparison of the 2 groups showed that the circumstances of the pose, previously intubated patients, low blood pressure and necessity of catecholamine may be a risk factor for complications

Conclusion: In this study we showed that we experienced high rate of complicated Broviac catheters and its early removal. This may be due to large indications, hemodynamic state of the patient, and the underlying diseases.

6567 Comparison of intraperitoneal instillation of magnesium sulphate and bupivacaine versus intravenous analgesia in laparoscopic surgeries in pediatrics

Ahmed Ibrahim Walsh I.¹, Eldin Sultan W.²
¹menoufiya university hospitals - shebin elkom (Egypt), ²Menofya University Hospital - Menofia (Egypt)

Background and Goal of Study: Administration of magnesium sulphate via different routes has been used in anaesthetic practice for decreasing perioperative pain. It is N-methyl d-aspartate (NMDA) receptor antagonist and suppresses these receptor induced inflammation and hyper responsiveness. The antinociceptive effect of magnesium sulphate is not only useful in chronic pain, but it also determines in part, the duration and intensity of postoperative pain. These effects are due to calcium antagonism and decrease influx of calcium into the cell and antagonism of NMDA receptor. As these receptors regulate neuronal signalling and are involved in pain processing, magnesium sulphate by blocking this receptor, decreases postoperative pain as well. Aim of the work studying analgesic efficacy of intraperitoneal instillation of a combination of Magnesium sulphate with bupivacaine versus ordinary parenteral analgesics for pain relief after laparoscopic surgeries in pediatrics.



Columns	66	33	33	P
n	66	33	33	
type = IP (%)	93 (50.0)	0 (0.0)	33 (100.0)	<0.001
Gender = Male (%)	58 (57.6)	17 (51.5)	21 (63.6)	0.455
Operation (%)				0.877
Appendectomy	27 (40.9)	14 (42.4)	13 (39.4)	
Cholecystectomy	13 (19.7)	7 (21.2)	6 (18.2)	
Hiatus hernia	9 (13.6)	3 (9.1)	6 (18.2)	
Inguinal hernia	6 (9.1)	3 (9.1)	3 (9.1)	
Undescended testis	11 (16.7)	6 (18.2)	5 (15.2)	
NO.S (mean (SD))	5.14 (1.56)	5.88 (1.54)	2.39 (1.20)	<0.001
K1 hr.S (mean (SD))	2.73 (1.66)	3.45 (1.58)	2.00 (1.41)	<0.001
K6 hr.S (mean (SD))	2.76 (1.59)	3.39 (1.43)	2.12 (1.46)	0.001
K12 hrs.S (mean (SD))	2.76 (1.70)	3.58 (1.52)	1.94 (1.48)	<0.001
K24 hrs.S (mean (SD))	2.74 (1.66)	3.55 (1.46)	1.94 (1.46)	<0.001
pre_Hr (mean (SD))	102.61 (9.17)	104.39 (6.93)	100.82 (10.78)	0.114
Post_Hr (mean (SD))	110.76 (11.71)	114.85 (8.70)	106.67 (17.03)	0.002
K1 hr_Hr (mean (SD))	108.59 (12.44)	114.24 (8.76)	102.94 (15.10)	<0.001
K3 hr_Hr (mean (SD))	106.43 (10.75)	110.15 (8.24)	102.78 (11.77)	0.004
K6 hr_Hr (mean (SD))	106.09 (11.06)	109.67 (8.13)	102.52 (12.49)	0.008
K12 hr_Hr (mean (SD))	104.42 (11.00)	108.18 (8.27)	100.67 (12.17)	0.005
K24 hr_Hr (mean (SD))	103.54 (10.35)	107.27 (7.91)	99.95 (11.29)	0.001
pre_SBP (mean (SD))	91.74 (7.10)	91.67 (7.03)	91.80 (7.27)	0.932
post_SBP (mean (SD))	95.98 (8.42)	97.12 (7.50)	94.85 (9.21)	0.276
K1 hr_SBP (mean (SD))	95.83 (8.07)	96.82 (7.89)	94.85 (9.24)	0.323
K3 hr_SBP (mean (SD))	94.70 (7.44)	94.70 (6.84)	94.70 (8.10)	1
K6 hr_SBP (mean (SD))	94.32 (7.59)	94.24 (7.19)	94.39 (8.08)	0.956
K12 hr_SBP (mean (SD))	93.64 (7.62)	93.79 (7.18)	93.48 (8.15)	0.873
K24 hr_SBP (mean (SD))	93.48 (7.49)	93.18 (7.27)	93.79 (7.81)	0.745
pre_DBP (mean (SD))	48.48 (5.61)	47.58 (5.32)	49.39 (5.83)	0.19
post_DBP (mean (SD))	51.24 (6.15)	51.97 (5.98)	50.52 (6.89)	0.341
K1 hr_DBP (mean (SD))	51.44 (5.46)	52.42 (4.86)	50.45 (5.91)	0.144
K3 hr_DBP (mean (SD))	50.13 (6.07)	50.43 (5.21)	49.85 (6.90)	0.689
K6 hr_DBP (mean (SD))	50.33 (6.02)	50.43 (5.56)	50.61 (6.70)	0.92
K12 hr_DBP (mean (SD))	50.61 (6.59)	50.43 (5.84)	50.76 (7.51)	0.854
K24 hr_DBP (mean (SD))	49.89 (5.82)	49.85 (5.25)	49.85 (6.43)	1
cat (mean (SD))	98.50 (0.50)	96.44 (0.51)	98.52 (0.51)	0.809
ana_req_firsthour (mean (SD))	6.41 (4.45)	8.24 (3.23)	9.97 (3.92)	<0.001
ana_req_totalincent (mean (SD))	97.79 (54.72)	143.94 (25.79)	51.32 (31.80)	<0.001
adverse = NO (%)	46 (100.0)	33 (100.0)	33 (100.0)	NA

Materials and Methods: Groups: Group1: will receive ordinary analgesics via intravenous route as paracetamol (7.5- 10 mg/kg) and ketorolac (0.5 mg/kg). Group2: will receive (Magnesium sulphate 40 mg/kg and bupivacaine 4mg/kg) in 30 ml of isotonic 0.9%N.S intra peritoneal at the end of surgery.

Results and Discussion: Statistically significant difference according to FLACC. Highly statistically significant difference between the groups according to time to first analgesic administration and total analgesic requirement in the first 24h postoperative.

Conclusion: The intraperitoneal administration of combination of magnesium sulphate and bupivacaine is a safe and effective method in the management of postoperative pain after laparoscopic surgeries more than intravenous administration of ordinary analgesics in laparoscopic surgeries in pediatrics.

6581 Perioperative management of a congenital norepinephrine secreting neuroblastoma

Sanjuan E.¹, Romera A.², Lema M.³, Alvarez-Baena L.³, Ordoñez J.³, Mora M.³

¹Hospital Universitario Gregorio Marañon - Madrid (Spain), ²Hospital Universitario Gregorio Marañon - Madrid (Spain), ³Hospital Universitario Gregorio Marañon - Madrid (Spain)

Background: Neuroblastomas can be catecholamine secreting tumors but they rarely cause symptoms. Hypertension, resulted from the catecholamine secretion and/or the compression of the renal artery is, indeed, very uncommon. We present an infant with prenatal diagnosis of neuroblastoma and confirmed asymptomatic norepinephrine secretion at birth who developed severe sudden hypertension. His high pressure levels required multidrug treatment and long-term careful blockade.

Case Report: A two-month-old boy, with an abdominal metastatic neuroblastoma and no symptoms despite his high norepinephrine levels, was submitted to general anaesthesia for a biopsy procedure. No preoperative treatment had been conducted. He developed severe hypertension and tachycardia during induction and was then admitted in our post-anaesthesia care unit (PACU), where he remained until haemodynamic stability was reached. Increasing doses of oral phenoxybenzamine and oral labetalol were started and adjusted as the date for surgery approached. On day 21 he was scheduled for resection of his abdominal mass. Esmolol, sodium nitroprusside and dopamine were needed during the intervention. Epidural analgesia and adequate volume repletion were also used for intraoperative blood pressure management. The patient was transported to the PACU extubated and in a stable condition at the end of surgery.

Discussion: In this clinical scenario, several dilemmas emerged. Firstly, assessing correct pressure percentiles and finding a target blood pressure at this age, considering the differences observed in literature. Secondly, deciding which drug would be our first-choice alpha-adrenergic blocker and how long we should keep our child on it before considering surgery, with substantial gaps regarding the use in children. Furthermore, whether to maintain phenoxybenzamine right until surgery or change it for a shorter half-life drug, like prazosin or doxazosin, 24 hours before the intervention, was also a tough question we had to deal with.

Learning points: There is no standard protocol for neuroblastomas with hypertension. Therefore, the management of this patients is an anaesthetic challenge and varies widely according to the center involved. Although it is well known that alpha blockade should be established before beta blockade, many issues regarding perioperative approach remain unclear, specially in infants.

6597

Retrospective Audit examining The the Incidence of Unexpected Paediatric Difficult Airway in a General Tertiary Hospital: A Retrospective Audit

Xin A.¹, Cogan R.¹, Desmond F.¹
¹Austin Health - Melbourne (Australia)

Background and Goal of Study: The unexpected paediatric difficult airway, defined as two or more failed attempts by an experienced airway operator, is associated with severe complications. In Australia, paediatric anaesthesia is commonly administered by general anaesthetists, outside the main tertiary paediatric centres. Our objective was to investigate the incidence of unanticipated paediatric difficult airway and any associated complications in our general tertiary referral centre, Austin Health.

Materials and Methods: We retrospectively examined the anaesthetic records of all children aged 16 years and under, who underwent adenotonsillectomy or tonsillectomy at Austin Health between 2016 and 2018. Data on airway assessment and management were collected. Data analysis were performed using STATA/IC15.1 and Fisher's exact test was performed when indicated.

Results and Discussion: A total of 475 cases were reviewed for the time period 2016-2018. The average age was 6.8 years old (range 1-16) years. 98% of patients had a mallampati of 1 or 2, and 99.8% of children had no other difficult airway features identified. Intubation was the most common choice (78%) of airway management. From documented Cormack- Lehane laryngoscopy grades there were only 1 (0.35%) grade 3 and 1 (0.35%) grade 4 view. Age was not associated with laryngoscopy views ($p=0.56$). There were 2 cases (0.54%) of 2 or more failed intubation attempts. The reasons for failure included the incorrect laryngoscope blade size/type and an anterior larynx. Only one failed intubation (0.3%) was encountered, and the procedure was abandoned without complication. One difficult BMV was recorded, but ventilation was easily achieved with LMA insertion. Desaturation occurred in 3 cases (0.6%) with 2 episodes of laryngospasm that quickly resolved without sequelae. 1 episode from tonsillar tissue lodgement in left main bronchus, resulted in pulmonary collapse, requiring prompt transfer to a tertiary paediatric hospital. There were no cases of "can't intubate, can't oxygenate" airway emergencies.

Conclusion: Unexpected paediatric difficult airway and its' associated complications were exceptionally rare at our tertiary hospital where healthy children (generally over the age of 2 years old) undergo tonsillectomies and adenoidectomies. This is reassuring that we are comparable to other large international centres with reported 0.18-5.8% of difficult intubations.

6606

Anaesthesia management of De Barys Syndrome in a series of interventions: case report

Martínez Domingo A.¹, Sargatal Borell N.¹, Hernández Aguado C.¹
¹Hospital Universitari Dr Josep Trueta - Girona (Spain)

Background: De Barys syndrome (DBS) is a rare autosomal recessive disorder characterized by cutis laxa, ophthalmic opacification, skeletal malformations, as well as mental and growth retardation. Less than 100 known cases are documented in the literature. Affected patients often require surgical correction of ophthalmic and orthopaedic abnormalities [1].

Case Report: We present a case of a male patient with DBS who has required three ophthalmic interventions at different ages in our center. In his physical evaluation he had motor and cognitive delay, atypical facial features, and a mouth opening of 3 cm was seen. A preoperative transthoracic echocardiogram reported only a minimal aortic insufficiency and the lab tests were between normal limits. His status was ASA II. **Case 1:** Patient was 7 years old and 11kg, was scheduled for goniotomy surgery. Premedicated with iv midazolam 0.03mg/kg, following the induction with 3mg/kg propofol and 2mcg/kg fentanyl, a laryngeal mask of size 2.5 was placed. Maintenance with sevoflurane. The laryngeal mask was taken out with no complications. **Case 2:** He was 9 years old and 20kg, scheduled for ophthalmic review. In this case, under general anaesthesia with endotracheal intubation through direct laryngoscopy with Macintosh blade 3. Muscle relaxation

was provided by rocuronium 0.6mg/kg. Extubation without any incidents. **Case 3:** He was 11 years old and 25kg, scheduled for a new review, which was done under sedation with 2mg/kg propofol, and oxygen therapy with venturi mask. In all interventions the patient's vital signs were stable and was not reported postoperative problems.

Discussion: There is a paucity of literature about DBS and, to the authors' knowledge, only a single article has addressed anaesthesia case outcomes and management strategies [2]. In our series of experiences we perform different types of anaesthesia managements without reporting airway control problems or other complications. However, the microphephaly malformations suggest caution with regard to airway manipulation.

References:

1. Kivuva EC, et al. De Barys syndrome: a review of the phenotype. Clin Dysmorphol 2008;17:99-107
2. Aponte EP, et al. Anaesthesia considerations for patients with de Barys syndrome. J Clin Anesth 2010; 22:499-504

Learning points: There is no single way to cope with the patient with a rare disease and initial and backup strategies should be considered to ensure safe induction of anaesthesia and correct airway control.

6665

Flow-decoupled anesthesia machines in the pediatric operating room, Should we care?

Nour S.¹, Chernishof V.¹, Bushman G.¹
¹Children's Hospital of Los Angeles - Los Angeles (United States)

Background and Goal of Study: Over the past few decades, the conventional anesthesia machine has evolved into an advanced care station. The "fresh gas decoupling" mechanism is a novel feature that can be found on some of the newer workstations. This specific design feature was implemented to improve accuracy and consistency when delivering smaller tidal volumes. It also offers protection against barotrauma when using an oxygen flush. Overall, this design can enhance conservation of volatile anesthetics. However, with the introduction of this new technology, unanticipated limitations have been exposed and are often magnified when caring for pediatric patients

Materials and Methods: In our free standing pediatric anesthesia setting, we asked experienced and senior pediatric anesthesiologist who worked with old generations anesthesia machines and also with different manufactures modern anesthesia workstations to list their observations if any on the flow decoupled anesthesia machines and its behavior during induction and maintenance of anesthesia.

Results and Discussion: Summary of the observation are: Slower than expected inhalational induction and emergence from anesthesia when using volatile agents. This can often result in significantly prolonged wake-up times. Exaggerated hypercarbia detected by capnography in spontaneously breathing patients, Failure of the capnograph tracing to return to baseline of zero in spontaneously breathing patients when LMAs are used. Delay in observed changes in patients' SaO₂ after adjustments in the FIO₂, most notably observed in the cardiac ORs. Failure of the monitored end-tidal volatile agent concentration to correlate with clinical assessment of the patient's level of anesthesia. A different protocol from the manufacturer needs to be adopted for machine preparation for use in patients susceptible to malignant hyperthermia. As a result of our observation and cumulative experience, we can conclude that understanding the mechanism behind flow-decouple technology in newer workstations is of paramount importance to practicing safe pediatric anesthesia. To validate our observations and an IRB approved survey is designed and awaiting approval of research committees of different pediatric anesthesiologist societies to explore national and international pediatric anesthesiologists experience using workstations equipped with flow-decoupling technology

6704

Evaluation of Atelectasis Formation with Electrical Impedance Tomography during deep sedation for MRI in children

Riva T.¹, Pascolo F.¹, Theiler L.², Greif R.¹, Berger-Estilita J.¹, Riedel T.¹
¹Inselspital, University Hospital Bern - Bern (Switzerland), ²Kantonsspital Aarau - Aarau (Switzerland)

Background and Goal of Study: At induction and emergence of anesthesia, high fractions of inspired oxygen are commonly used to prevent hypoxemia. Recruitment maneuvers and the use of PEEP seem to protect against high-FiO₂-related atelectasis in prolonged ventilation in children. Children undergoing general anaesthesia or procedural sedation, may have the closing volume exceeding the FRC, which expose them to airway collapse (1) and atelectasis generation. The evidence is lacking for the impact of deep sedation, not requiring intubation. This study investigates the variation of poorly ventilated lung units in young children during and after procedural deep sedation by electrical impedance tomography in a day-hospital setting.

Materials and Methods: This prospective, single center study, evaluated 25 children between 1 and 6y, ASA I-III, scheduled for a cerebral MRI under deep sedation. All children needing an intubation or LAMA, with contraindication for propofol and with congenital heart or lung disease were excluded. After premedication, ASA standard monitoring, placement of an i.v.-line, low-flow oxygen was administered via a cannula that provided etCO₂ measurement and i.v. propofol (10 mg/kg/h) was infused. We assessed the proportion of poorly ventilated lung regions and the global inhomogeneity index (GI) at 5 different time points: 1) before induction, 2) before and 3) after the MRI, 4) at the end of the sedation before transport to the PACU, and 5) before discharge at home from PACU. p<0.05 was considered significant.

Results and Discussion: Full measurements at all time points could be achieved in 23 children. The median [Q1-Q3] proportion of silent spaces at the different time points were 5% [2-14%], 10% [7-14%], 12% [5-23%], 16% [7-24%] and 5% [2-14%] respectively. We found no difference in silent space between before induction and before discharge from PACU but a significant increase during sedation. Mean [95% CI] global inhomogeneity index at the different time points was 0.57 [0.56-0.58], 0.56 [0.55-0.57], 0.56 [0.55-0.57], 0.57 [0.55-0.58] and 0.56 [0.55-0.58] respectively and showed no significant difference between time points

Conclusion: Deep sedation with low-flow oxygen in spontaneous breathing children results in significant increase of poorly ventilated lung areas during the sedation without affecting ventilation homogeneity. This effect is fully resolved before discharge from PACU.

6762

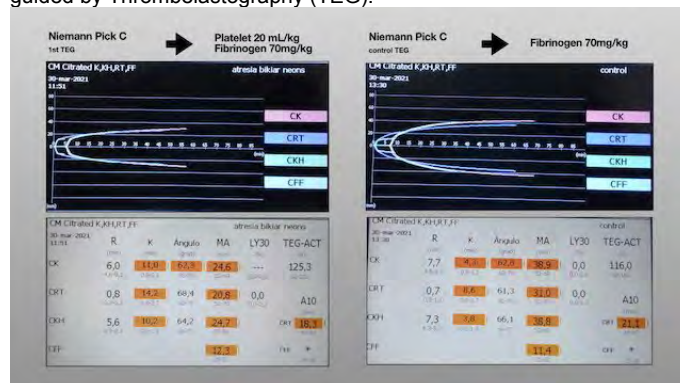
It's not biliary atresia, it's Niemann-Pick C disease! Intraoperative TEG in an infant with liver failure.

Rodríguez Lago M.¹, Prada-Hervella G. M.¹, Doldán Pérez P. N.¹, Vazquez Tojo S.¹, Francisco Iglesias C.¹, Álvarez Escudero J.¹
¹Hospital Clínico Universitario de Santiago de Compostela - SANTIAGO DE COMPOSTELA (Spain)

Background: Cholestatic jaundice in infancy is always pathologic and indicates hepatobiliary dysfunction. Biliary atresia is the most common cause followed by an expanding list of monogenic disorders, among them lysosomal storage diseases. Niemann Pick (NP) disease is a group of them (types A-B-C) that may present liver involvement or CNS degeneration.

Case Report: A 27-day-old male newborn, 2730g, was admitted to the hospital due to cholestatic jaundice. After screening for more frequent metabolic diseases and abdominal MRI, biliary atresia was suspected. Clinical course was complicated by abdominal sepsis, ascites, massive hepatosplenomegaly, thrombopenia ($7 \times 10^9/L$) and liver failure. He was proposed for cholangiography, liver biopsy, and possible portohepatoentereostomy despite poor clinical situation owing to medical treatment ineffectiveness. The patient got to the theatre on CPAP. Under standard monitoring, frontal NIRS, central T⁸ and diuresis control uneventfully modified rapid sequence induction and balanced GA was performed. Fluid therapy was based on P-lyte, parenteral nutrition

50% baseline and albumin 20% 3g. Dopamine 5-10 mcg/kg/min was titrated. Platelets 20 mL/kg and fibrinogen 130 mg/kg were transfused guided by Thrombelastography (TEG).



The liver was non-cirrhotic and intraoperative cholangiography ruled out biliary atresia. Hepatic biopsy suggested lipid storage disease and the patient was diagnosed with NPC based on genetic analysis. Early postoperative period was uneventful but the patient was deceased, secondary to the progressive worsening of his liver disease on postoperative day 33.

Discussion and learning points: Neonatal presentation is a rare form of NPC, its early diagnosis may be difficult. In this case, intraoperative exploration led to rule out the initial suspicion of biliary atresia, and the biopsy and genetic study ensured the definitive diagnosis. Anesthesia for infants with liver failure may be challenging, TEG may be useful to guide blood product transfusion.

References:

Gumus E et al. Niemann-Pick disease type C in the newborn period: a single-center experience. *Eur J Pediatr.* 2017 Dec;176(12):1669-1676. PMID: 28951965

6808

Anesthetic technique in a child with Rothmund-Thomson Syndrome. A case report.

Méndez Martínez E.¹, Yepes Temiño M. J.², López Lede A.³, López Olaondo L.²

¹Hospital Universitario Donostia - San Sebastian (Spain), ²Clínica Universidad de Navarra - Pamplona (Spain), ³Hospital Universitario Gregorio Marañón - Madrid (Spain)

Background: Rothmund-Thomson Syndrome is a rare autosomal recessive disease that appears during childhood. It can be associated with or without a mutation in the RECQL4 gene, with a predisposition to the appearance of osteosarcomas when this is present. Regarding their clinical characteristics, these patients may also present dental alterations, growth alterations, skeletal alterations, both cranial and of long bones, and an increased risk of developing osteosarcomas.

Case Report: We are presented with a 7-year-old woman with osteosarcoma in the right femur. He is treated with intra-arterial chemotherapy and the tumor is resected with allograft reconstruction. The evolution of the patient is favorable. Two years later, his 5-year-old brother came with a tumor in the right tibia. He is diagnosed with osteosarcoma and genetic tests are requested due to the suspicion of Rothmund-Thomson syndrome. The diagnosis is positive for both brothers. Surgery for osteosarcoma resection and allograft reconstruction is scheduled for the younger brother. General anesthesia was performed, presenting no difficulty with orotracheal intubation. ASA standard monitoring, with invasive blood pressure monitoring and pediatric BIS. The surgery was uneventful, with a favorable postoperative period. Ten months later, new pulmonary damage is evinced, so he is scheduled again for intervention by Thoracic Surgery Team. General anesthesia is performed with intravenous induction, without intubation difficulties. TET No. 5'5 and bronchial blocker No. 5 are placed and the bronchial blocker is guided with a fibroscope. ASA standard monitoring, with invasive blood pressure monitoring. An epidural catheter is placed for postoperative pain control. The surgery was again uneventful, with good tolerance to one-lung ventilation and a favorable postoperative period.

Discussion: This syndrome does not seem to be associated with

problems from the anesthetic point of view, nor is there anything published to date about it.

References:

1. Rothmund-Thomson syndrome. *Orphanet J Rare Dis.* 2010;(34 Pt 2) 2:593-4.
2. Rothmund-Thomson syndrome. *Ryoikibetsu Shokogun Shirizu.* 2001;(34 Pt 2):593-4.

Learning points: We must be familiar with the syndromes that affect the pediatric population, especially those that interfere with our daily clinical practice. It is essential to remember the need to document procedures in rare syndromes to facilitate the work of our colleagues in the future.

6816

Anesthetic technique in a child with Schinzel-Giedion Syndrome. A case report.

Méndez Martínez E.¹, Catalán Escudero P.², Martínez García E.²
¹Hospital Universitario Donostia - San Sebastian (Spain), ²Hospital Infantil Universitario del Niño Jesús - Madrid (Spain)

Background: Schinzel-Giedion Syndrome is a rare disease characterized by multiple malformations, severe neurological conditions, and increased risk of tumor malignancy. These patients present facial characteristics that make them easily recognizable. Microcephaly stands out in 2/3 of these patients. It is important to note that in up to 50% of patients, structural cardiac alterations appear. We have also noticed that these patients present breathing and swallowing difficulties, which are due both to structural alterations in the airway and to the high susceptibility of these patients to present respiratory infections. Most patients with this syndrome die during childhood, the most common cause being pneumonia.

Case Report: We are dealing with a 4-year-old woman with Schinzel-Giedion Syndrome, with a history of paroxysmal episodes mixed with regular treatment with Levetiracetam, microcephaly, facial alterations (midface retraction, wide mouth, protruding tongue, short neck), mild motor delay, cognitive delay. She does not present cardiac involvement after being studied. We are requested a control cranial MRI. Once again we performed inhalational general anesthesia, performing induction with Sevoflurane. A 22G venous route is cannulated and a supraglottic device (laryngeal mask No. 2) is placed and the patient remains under spontaneous ventilation. The patient remains stable throughout the procedure. The waking up of the patient and the removal of the laryngeal mask are uneventful and she is transferred to the resuscitation unit.

Discussion: With Schinzel-Giedion Syndrome we must bear in mind that we may find ourselves facing a difficult airway and we must always have a plan B. Being patients who die during childhood, there are no described cases of patients who have required anesthesia.

We must be familiar with the syndromes that affect the pediatric population, especially those that interfere with our daily clinical practice.

References: [1]Schinzel-Giedion syndrome: a novel case, review and revised diagnostic criteria. Wei-Liang Liu et al. *Journal of Genetics.* March 2018. [2] Schinzel-Giedion syndrome. H Touge, T Fujinaga, M Okuda, H Aoshi. *International Journal of Urology.* 2001.

Learning points: To date, there is no research about anesthesia in this syndrome; it is essential to remember the need to document procedures in rare syndromes to facilitate the work of our colleagues in the future.

6819

Anesthetic technique in a child Perrault Syndrome. A case report.

Méndez Martínez E.¹, Ahijado Agudo J. M.², Martínez García E.²
¹Hospital Universitario Donostia - San Sebastian (Spain), ²Hospital Infantil Universitario del Niño Jesús - Madrid (Spain)

Background: Perrault Syndrome has a very low prevalence, with only 100 confirmed cases in the world. It is mainly characterized by ovarian dysgenesis in women, among other symptoms, which means that it can go unnoticed in men and that can be considered a probably underdiagnosed disease. The main clinical manifestation in both sexes is sensorineural deafness, which can be accompanied by cerebellar ataxia, intellectual disability, and sensory and motor peripheral polyneuropathy. The syndrome should be suspected based on the symptoms and family history of the patients. Confirmation will be carried out through genetic testing, although it may not be confirmed in all cases.

Case Report: 11-year-old man, transferred from another center, proposed for surgical intervention for cavus feet that produce gait alteration. The patient was studied by Neurology due to bilateral sensorineural deafness, symptoms of ataxia associated with a doubtful dysmetria. An electromyogram was performed, showing predominantly axonal polyneuropathy with associated demyelination in the lower extremities. Genetic tests were requested resulting positive for Perrault Syndrome. With these antecedents, it was decided to perform a balanced general anesthesia without associated locoregional anesthesia, managing only with intravenous analgesia, taking into account the results of the electromyogram. The patient remained stable throughout the intervention, also maintaining good pain control in the immediate postoperative period.

Discussion: The presence of neurological deficits in the distribution territory of a nerve block is a classic contraindication for locoregional anesthesia, so when we are faced with a patient with this syndrome, we must take into account the polyneuropathy associated with this syndrome and the possibility to perform a previous electromyogram. As in other polyneuropathies, the sensitivity to local anesthetics could be increased, increasing the blockade time or the toxicity threshold could be lowered.

References:

1. Perrault Syndrome. William G Newman, MD, PhD et al. *Gene Reviews.* September 25, 2014.
2. Perrault syndrome with neurological features in a compound heterozygote for two TWNK mutations: overlap of TWNK-related recessive disorders. María Domínguez-Ruiz et al. *Journal of Translational Medicine.* 2019.

Learning points: We must be familiar with the syndromes that affect the pediatric population, especially those that interfere with our daily clinical practice.

6878

Successful management of aortic thrombosis in a newborn with thrombolytic therapy

Zhuk A.¹, Kopunova A.¹, Nazarova V.¹, Kovaleva K.¹, Zamareev A.¹, Garipov A.¹
¹RSPC for Pediatric Surgery - Minsk (Belarus)

Background: Aortic thrombosis is extremely rare condition in paediatric population. The risk factors for aortic thrombosis are: the presence of umbilical artery catheters, thrombosed aneurysm of the ductus arteriosus, sepsis and different states of inherited thrombophilia. [1] In paediatric population, limited options to treat aortic thrombosis are available, reported with high risk of fatal complications.

Case Report: A healthy female newborn from mother with protein S deficiency was born on 41 week of gestation with induced labour. During the first 21 hours of life severe hypoxemic respiratory failure developed due to bacterial sepsis, patient was transferred to the ICU. During next 48 hours patient suffered SVT, then VF, and was successfully resuscitated. First signs of aortic thrombosis appeared 2 days after the resuscitation. Patient was transferred to our center to be evaluated for surgical treatment. On admission aortic thrombosis distal to renal arteries and bilateral iliac thrombosis found on ultrasound. There was no surgical option to treat this patient. We also found no contraindications

to thrombolytic therapy. Our team proceed with thrombolysis in loading dose regimen: 0,1 mg/kg alteplase over 10 minutes followed by an intermittent infusion of 0,3 mg/kg/hour infusion for 3 hours. Patient was started on unfractionated heparin following alteplase infusion. By the end of thrombolysis patient's condition slightly improved. Full aortic and partial iliac recanalisation was achieved on 7th day of therapy, however blood flow distal to common femoral arteries stayed subcompensated. Later patient developed inferior vena cava thrombosis, treated conservatively and was discharged after 30 days of hospital stay. Although patient's factors activity were affected by provided treatment, follow-up showed increased level of factor VIII (170%), Von Willebrand (190%), protein S activity (127%) with corresponding decreased level of protein C activity (50%). No genetic mutations were found.

Learning points and discussion: Misbalanced coagulation status in septic patient may result in major vessel thrombosis. Thrombolytic therapy can be succesfully used in newborn population to treat aortic thrombosis.

References: Krause U, Schneider HE, Webel M, Paul T. Thrombosis of the aorta abdominalis in infants--diagnosis and thrombolytic therapy. *Klin Padiatr.* 2012 Apr;224(3):179-82. doi: 10.1055/s-0031-1295421. Epub 2012 Feb 29. PMID: 22377739.

6946

Endotracheal intubation in simulated normal pediatric airways: systematic review and meta-analysis with preliminary results.

Merola F.¹, La Via L.,¹ Messina S., Tigano S., Scalisi R., Sanfilippo F., Astuto M.

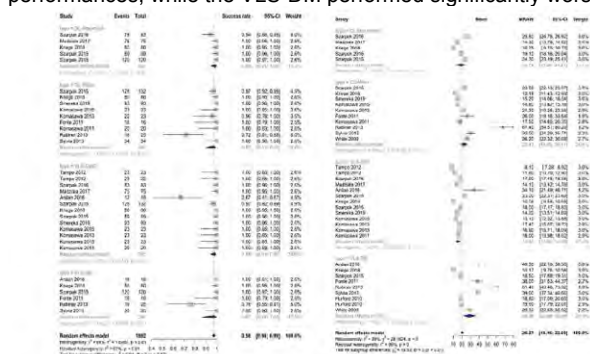
¹Azienda ospedaliera universitaria policlinico vittorio emanuele catania - CATANIA (Italy)

Background and Goal of Study: Pediatric airway management requires ongoing training and continuous exposure. Several devices are available for endotracheal intubation (ETI) in the pediatric patient. Simulation is valuable for training and maintenance of skills. Considering that designing randomized studies in the setting of pediatric airways would be complex. Simulation studies may help evaluating device performances. We conducted a metanalysis to evaluate device performances for simulated pediatric airway in normal scenario.

Materials and Methods: We searched relevant articles in MEDLINE and EMBASE databases until February 2021. We included data from simulation studies performing ETI with direct laryngoscopy (DL, Miller blade or Macintosh) and/or video laryngoscope (distant monitor VLS-DM, or screen on device, VLS-SoD). Primary endpoints were intubation time (TTI) and overall success rate (SR). Data are reported as weighted mean and confidence interval (95%CI), and heterogeneity (I2).

Results and Discussion: We found data from 19 studies with ETI data divided in 4 subgroups according to device used (DL-Miller, DL-Macintosh, VLS-DM, VLS-SoD). As shown in Figure 1, the mean SR was 98% [95%CI: 96-99%] with no differences between subgroups (p=0.82, I2=66%). The mean TTI was 20.3 sec [95%CI: 18.5-22.1], with differences between subgroups (p<0.01, I2=99%). In particular, the VLS-SoD showed shorter TTI (15.5 sec [95%CI: 13.0-18.0]), while VLS-DM had longer TTI (29.0 sec [95%CI: 22.0-35.9]).

Conclusion: Although with intrinsic limitations of a proportional meta-analysis and the inclusion of simulation studies with high heterogeneity, our study showed the equivalence between devices for pediatric ETI with regard to SR. As for the TTI, the VLS-SoD showed significantly better performances, while the VLS-DM performed significantly worse.



6985

Anesthetic management in emergency surgery in a patient with duchenne muscular dystrophy. About a case.

Lara-Jiménez A.¹, Marchante-Sánchez M.², Sánchez-Quirós B.³, Garcés-Sánchez S.², Vicent-López M.², Argente-Navarro P.²

¹Clinica Universidad de Navarra - Pamplona (Spain), ²Hospital Universitario y Politécnico La Fe - Valencia (Spain), ³University Clinical Hospital of Valladolid - Valladolid (Spain)

Background: Duchenne muscular dystrophy is the most serious form of childhood muscle disease. It is due to a mutation in the dystrophin gene. It makes its debut in early childhood, with death occurring over the age of 25 from heart failure or pneumonia.

Case Report: Child, 8 years old, diagnosed with Duchenne under treatment with Deflazacort. History of myringotomy and two episodes of rhabdomyolysis with creatine kinase (CK)> 40,000U/L. He went to the hospital for abdominal pain reminiscent of previous episodes of rhabdomyolysis. The analysis showed an increase in liver enzymes with CK 22500U / L (baseline 15000U / L), normal kidney function and ionogram. The abdominal ultrasound showed signs of acute appendicitis. Due to the anesthetic risk, conservative treatment with antibiotic therapy was performed. Two months later he returned with a similar clinic. Laboratory tests showed CK levels lower than baseline and ultrasound was compatible with acute appendicitis. The appendectomy was performed in a closed operating room for 24 hours free of anesthetic gases under general intravenous anesthesia. ECG, SaO2, NIBP, core temperature, BIS and neuromuscular relaxation were monitored. Induction with fentanyl, propofol and rocuronium. Maintenance with PC of propofol and remifentaniol, avoiding inhaled anesthetics. The surgery was uneventful, with a maximum temperature of 37.3°C and extubation in the operating room. He was transferred to the PICU spontaneously, hemodynamically stable and with good pain control. The immediate postoperative period passed favorably with a maximum CK of 17504U/L, for which he was discharged to the ward at 24 h.

Discussion: General anesthesia poses a great risk for these patients, since they have a high risk of rhabdomyolysis and malignant hyperthermia, which is why certain drugs such as succinylcholine or inhaled anesthetics are contraindicated. In our case we used rocuronium since non-depolarizing muscle relaxants have not been shown to increase the risk of these crises. In addition, they present a high risk of arrhythmias, kidney damage, and aspiration due to decreased laryngeal reflexes and intestinal hypomotility. During the postoperative period, good pain control is important, since this can also be a trigger for seizures, so locoregional anesthesia plays an important role in these children.

References:

White RJ, et al. Myotonic dystrophy and paediatric anaesthesia. *Paediatr Anaesth* 2003.

Learning points: Anesthetics in Duchenne.

6995 right aortic arch with disconnection of the right pulmonary artery of the pulmonary trunk. about a case.

Lara-Jiménez A.¹, Garcés-Sánchez S.², Sanchez-Quirós B.³, Marchante-Sánchez M.², Cortell-Ballester J.², Argente-Navarro P.²

¹Clinica Universidad de Navarra - Pamplona (Spain), ²Hospital Universitario y Politécnico La Fe - Valencia (Spain), ³Hospital Clínico Universitario de Valladolid - Valladolid (Spain)

Background: The right aortic arch is one of the most frequent anomalies of the aortic arch, with a prevalence between 0.05-0.1%. Its importance lies in a possible association with genetic syndromes, cardiological abnormalities and the formation of symptomatic vascular rings.

Case Report: 2-month-old, term infant, diagnosed with right aortic arch with disconnection of the right pulmonary artery from the pulmonary trunk and moderate pulmonary hypertension at 14 days of life. In the first week of life, a ductal stent was installed, complicated in the postoperative period with sepsis due to *Proteus Mirabilis*, reperfusion syndrome of the right lung, and contralateral atelectasis. Due to the significant clinical deterioration, Surgical intervention under cardiopulmonary bypass was scheduled for ligation of the left ligamentum arteriosum and section of the right ductus together with reconstruction of the right pulmonary artery with a Gore-Tex® conduit. ECG, SaO₂, NIBP and cerebral oximetry were monitored. Induction with midazolam, fentanyl, sevoflurane, and rocuronium. The CVCs and the left femoral artery were cannulated. Maintenance with sevoflurane, 20ppm nitric oxide, milrinone PC, remifentanyl, rocuronium, and tranexamic acid. Gasometric controls were performed with the need for transfusion of blood products and platelets. He left extracorporeal circulation in sinus rhythm, with milrinone PC at 0.8mcg/kg/min and adrenaline 0.05mcg/kg/min. He was transferred intubated to the P-ICU, hemodynamically stable with inotropic support, maintaining a TAM of 50-60mmHg and HR of 110-130bpm. Feverish and good diuresis rhythm. At 24 hours, he was extubated without incident.

Discussion: Prenatal ultrasound diagnosis of this entity is possible during the first trimester of pregnancy. The association of the right aortic arch with other types of vascular alterations is frequent, as in our case. In the right aortic arch, the left subclavian is the last branch to emerge from the aorta, originating from an aneurysmal dilation known as Kommerell's diverticulum. These branches constitute a "vascular ring" that can cause tracheoesophageal compression or vascular rupture. It is important to suspect children with recurrent respiratory or digestive symptoms exacerbated by feeding and chronic cough, cyanosis, or dyspnoea.

References:

P Kanne,J.,et al. Right aortic arch and its variants. J Cardiovasc Comput Tomogr. 2010

Learning points: Right aortic arch. Aberrant left subclavian artery.

7000 Endotracheal intubation in pediatric difficult airway simulation scenario: a systematic review and meta-analysis with preliminary results.

Merola F. ¹, La Via L. ¹, Messina S., La Via L., Fallico G., Sanfilippo F., Astuto M.

¹Azienda ospedaliera universitaria policlinico vittorio emanuele catania - CATANIA (Italy)

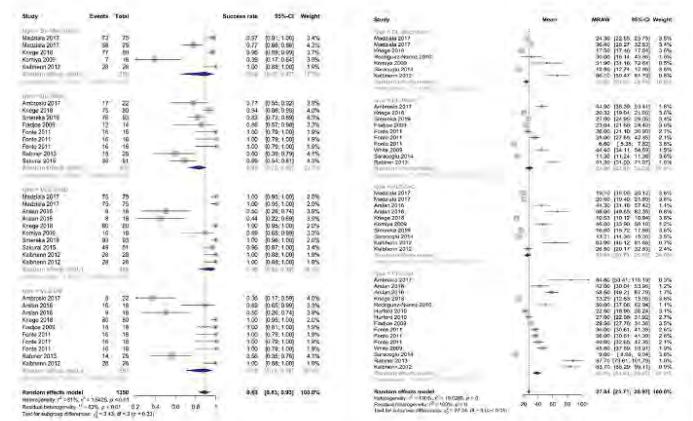
Background and Goal of Study: Management of difficult pediatric airway requires training and maintenance of skills. Different devices are available for the management of difficult airways in the pediatric patient requiring endotracheal intubation (ETI). Simulation could be a very valuable tool in training operators to difficult airways scenarios, also in consideration that performing a randomized controlled study in the setting of difficult pediatric airways would be challenging. We conducted a meta-analysis to evaluate performances of device for simulated pediatric airway in difficult scenario.

Materials and Methods: Relevant articles were systematically searched in MEDLINE and EMBASE until February 2021. Simulation studies performing ETI with direct laryngoscopy (DL, Miller blade or Macintosh) and/or video laryngoscopy (distant monitor VLS-DM, or screen on device, VLS-SoD) were included. Primary endpoints were intubation time (TTI)

and overall success rate (SR). Data are reported as weighted mean and confidence interval (95%CI), and heterogeneity (I²).

Results and Discussion: Data on difficult airway management in pediatric patients was reported by 17 studies with ETI data divided in 4 subgroups (DL-Miller, DL-Macintosh, VLS-DM, VLS-SoD). As shown in Figure 1, the mean SR was 89% [95%CI: 83-93%] with no differences between subgroups (p=0.33, I²=81%), albeit with a trend towards lower SR using the DL-Miller (83% [95%CI: 73-90%]). The TTI was 27.3 sec [95%CI: 25.7-29.0], with differences between subgroups (p<0.01, I²=100%). In particular, the VLS-DM had a longer TTI (38.5 sec [95%CI: 33.7-43.2]) while the DL-Macintosh had a shorter TTI (23.6 sec [95%CI: 20.4-26.8]).

Conclusion: Although with limitations of proportional meta-analysis and the inclusion of simulation studies with high heterogeneity, our meta-analysis suggests the possibility that DL-Miller has a lower probability of ETI success in pediatric difficult airways. Furthermore, the DL-Macintosh performs significantly faster, whilst the VLS-DM seems slower in achieving ETI.



7027 Preoperative fasting in the paediatric population – experience of a paediatric centre

Almeida C.¹, Cortez M.¹, Borges J.², Cenicante T.¹

¹Centro Hospitalar Lisboa Central - Lisbon (Portugal), ²Hospital do Divino Espírito Santo de Ponta Delgada - Ponta Delgada (Portugal)

Background:Preoperative fasting aims reducing the aspiration risk. It is recommended for all children able to take clear fluids, to be encouraged to have them up to 1 h before elective general anaesthesia, breast milk up to 4 hours, formula milk up to 6 hours and solids up to 6 hours. However, many studies have shown these recommendations aren't followed, resulting in perioperative complications and discomfort for both children and parents. This study aims to verify the instructions of fasting times in our hospital.

Methods: Surveys were performed in 50 children submitted to elective procedures between 9th of July and 20th of August 2020. In this survey, age, procedure, medical specialty, origin ward, fasting instructions made to parents, time of last meal, time of the arrival at hospital, time of scheduled procedure and time of the beginning of the anaesthesia, causes for delays, presence of post-operative nausea or vomiting and other complications were recorded.

Results and Discussion: 50 children were included in this study, 16 had less than 2 years of age, 18 were aged between 3, and 10 and 16 between 11 and 18. As for instructions regarding the fasting times for clear fluids 7 children (20,6%) were allowed to have them 2 hours prior to surgery, 3 children were instructed to have a fasting time of 4 hours, 30 children of 6 hours and 8 individuals of 8 hours. As for breast milk , 3 children (100%) aged 5, 6 and 17 months were instructed to fast for 4 hours. Regarding formula milk, 34 out of 47 (72,7%) were instructed on a 6 hour-fasting and 13 children 8 hour-fasting. As for solid meals, 34 out of 47 (72,7%) were instructed on a 6 hour-fasting and 14 out of 47 were instructed on a 8 hour-fasting. To note, that only 8 children (16%) received the correct recommendations. In children with less than 2 years of age, the average fasting time was 7 hours and 53 minutes. Between the ages of 3 and 10,

the average was 9 hours and 34 minutes and between the ages of 11 and 18, the average was 10 hours and 34 minutes. The maximal fasting time reached 15 hours and 50 minutes in a 16 year-old teenager due to incorrect fasting instructions and delay of the previous surgery.

Conclusions: Preoperative fasting times far exceeded the times recommended in international guidelines. It is essential to optimise these times through education of staff so to adopt simple measures such as offering children a drink on the ward and improve information-giving to parents.

7062 Perioperative stress level evaluation during sevoflurane low-opioid anesthetic management for prolonged pediatric dental procedures in private ambulatory practice

Teplova I.¹, Sorokina O.¹
¹Dnepropetrovsk State Medical Academy - Dnepropetrovsk (Ukraine)

Background and Goal of Study: The evaluation of perioperative stress markers is important in different fields of anesthesiology. Pediatric dental procedures for massive teeth damage under general anesthesia always have long duration with many painful stages both from anesthetic management and dental manipulations and required more precise understanding of its influence on the stress hormones levels dynamics.

Materials and Methods: With ethic committee approval and written informed consent, we included 25 healthy pediatric patients (ASA 1-2, age 2-6 years, estimated time of a procedure more than 2 hours) under general anesthesia for elective dental therapeutic procedures. We provided the evaluation of blood intraoperative stress markers such as cortisol, ACTH, insulin, glucose and leucocyte formula and their dependencies on 4 main levels of anesthetic management: 1) induction, 2) 5 minutes after the intubation (as one of the most traumatic phases of the whole procedure), 3) 1 hour 30 minutes after the beginning, 4) in the end of the procedure before the extubation. The blood right after the sampling was delivered to laboratory and analysed. During the whole procedure measurement of heart rate, ECG, non-invasive arterial pressure, temperature (Drager Gamma X XL) and BIS (Aspen) were provided. Standard anesthetic technique applied.

Results and Discussion: During the procedure we registered glucose levels elevation on stage of intubation - 6,49 mmol/l (SD±1,06) vs induction 4,64 mmol/l (SD±0,587) p<0,001, cortisol increase 294 nmol/l (SD±133) vs 264 nmol/l (SD±128) p<0,04; the level of glucose remaining high during all the procedure and didn't come back to the initial level, further cortisol changes depends on dental painful stimuli and varies, but remains in normal references limits for children (101-535 nmol/l). ACTH levels are controversial and shows the quantity lesser than detectible level of the analyzing machinery (5 pg/ml). Insulin levels were low both in initial sample and in the end of the procedure - 2,05 µU/ml (SD±1,0) and 2,72 µU/ml (SD±1,26) respectively (p<0,05), HOMA index in all samples were in the reference interval for the age group.

Conclusion: The level of the intraoperative stress during the prolonged dental procedures is rather high, not always can be detected by the standard non-invasive monitoring and could be underestimated by the providers.

7066 Pediatric endotracheal intubation performed during chest compressions for ongoing cardiopulmonary resuscitation: a systematic review and preliminary meta-analysis of simulation studies.

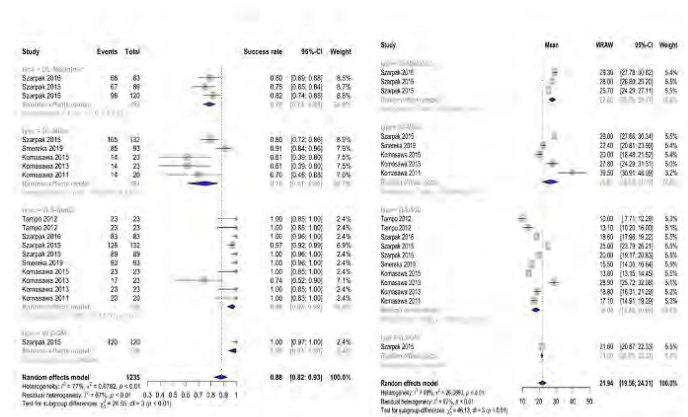
Messina S.¹, La Via L.¹, Merola F., Morgana A., Minardi C., Sanfilippo F., Astuto M.
¹Azienda ospedaliera universitaria policlinico vittorio emanuele catania - CATANIA (Italy)

Background and Goal of Study: The European Resuscitation Council guidelines for pediatric advanced life support state that endotracheal intubation (ETI) is the gold standard for airway management during resuscitation, but also that it is important minimize interruptions in chest compression. Performing direct laryngoscopy (DL, Miller or Macintosh blade) is more complex during ongoing chest compressions. In this case, video-laryngoscopy (with distant monitor VLS-DM, or with screen on device, VLS-SoD) could represent a valid alternative. Simulation, in addition to support training and continuing education, can be valuable for evaluating the performance of airway devices. We conducted a meta-analysis analyzing performances of several ETI devices during uninterrupted chest compressions in pediatric simulation studies.

Materials and Methods: We evaluated articles from MEDLINE and EMBASE databases (until February 2021). Our primary outcomes were the time to intubation (TTI) and overall success rate (SR). Analysis was conducted according 4 subgroups (DL-Miller, DL-Macintosh, VLS-DM, VLS-SoD). Data are reported as weighted mean and confidence interval (95%CI) and heterogeneity (I²).

Results and Discussion: Pediatric airway management data during chest compressions were reported by 9 studies. As shown in Figure 1, the mean SR was 88% [95%CI: 82-93%] with differences between subgroups (p<0.01, I²=77%). In particular, both DL methods were superior to both VLS approaches (DM and SoD). The TTI was 21.9 sec [95%CI: 19.6-24.3], with differences between subgroups (p<0.01, I²=99%) with both DL methods reporting significantly longer TTI, while VLS-SoD showed significantly shorter TTI.

Conclusion: Despite numerous limitations typical of simulation studies with high heterogeneity, our proportional meta-analysis suggests that during pediatric CPR and uninterrupted chest compressions, DL devices have the greatest chance of success in ETI. However, such devices have significantly longer TTI than VLSs, and in particular as compared to VLS-SoD.



7094

The evaluation of the caudal block performance in 0-8 year-old children using FLACC scale: A retrospective analysis

Turan Akar E. B.¹, UZUMCUGIL E.¹, Akca B.¹
¹Hacettepe University School of Medicine - Ankara (Turkey)

Background and Goal of Study: The evaluation of postoperative pain in pediatrics is a true challenge. We aimed to evaluate the immediate postoperative pain management using FLACC scale after caudal block.

Materials and Methods: The anesthesia records of 0-8 year-old children receiving caudal block under general anesthesia prior to surgery between 1st February-1st August 2020 were evaluated. The record of intraoperative and postoperative use of opioids were obtained, as well as, the FLACC scale scores.

Results and Discussion: Seventy-eight children out of a total 87 receiving caudal block were included. The drug of choice was learned from the anesthetic records as 2mg/kg bupivacaine at 0.25% concentration for the caudal block without any adjuvants. The patients were evaluated in two groups according to ages of 1-24 (n=37) and 24-96 months (n=41). Intraoperative requirement for opioid was observed in 7.7% (n=6) of patients. Nine patients (11.5%) required fentanyl in the immediate postoperative period with FLACC ≥ 4 . Only 1 patient required opioid both in the intraoperative and immediate postoperative period suggesting a success rate of caudal block of 98.7%. The patients were observed to receive single dose opioid, despite FLACC scores ≥ 4 in the following postoperative 1st, 2nd and 3rd hours. The groups were similar in terms of FLACC scores and the changes in these scores within the postoperative 3 hours. There were no urinary retention or motor block recorded. However, paresthesia was recorded in 4 patients at age of 24-96 months, whereas, in none of the patients at age of 1-24 months. The uncomfortable numbness, which could not be described at age of 1-24 months may have caused the difference, as well as, leading to high FLACC scores without any opioid use.

Conclusion: Our study supported that the anesthetists consider FLACC scale as a part of pain assessment to administer opioid analgesics, not as a sole indicator.

References: Merkel S, et al. *Amer J Nurs*, 2002, 102(10): 55-58

7105

Anesthetic management in pediatric patients 6 months after declaration of a pandemic. What changed?

Rebelo P.¹, Leite Silva A.¹, Pé D'Arca S.¹, Pinto C.¹, Pereira C.¹
¹Hospital Pedro Hispano - Matosinhos (Portugal)

Background and Goal of Study: The anesthetic management in pediatric patients changed drastically in the first month of pandemic with recommendation to do an intravenous induction to avoid aerosolization. The objective of this work is to determine the anesthetic management in the North of Portugal 6 months after the first lockdown.

Materials and Methods: A questionnaire was elaborated by our team in Hospital Pedro Hispano and in September 2020 was sent to the institutional e-mail of Anesthesiologists practicing pediatric anesthesia in the north of Portugal. The data was then analyzed in SPSS.

Results and Discussion: We obtain 30 responses, from those 6 (20%) were consultant for less than 5 years and 24 (80%) were for more than 5 years. In every hospital all children were screened for Covid-19 before surgery and 76.7% (n= 23) of parents were also tested. Only in 40% of the institutions, parents were allowed to be present during induction.

Before the pandemic, the inductions were inhalation in 83.3% (n=25) of children younger than 6 years and 40% in older than 6 years. At the time of the questionnaire, 6 months after the beginning of the pandemic, most of the consultants (63.3%) had returned to their usual practice in children younger than 6 years. The same was seen in children older than 6 years (60% of anesthesiologists).

Conclusion: Even though, there were a lot of fear of the unknown in the beginning and the recommendations were strict to avoid inhalation inductions, 6 months after the declaration of a pandemic most of consultants were doing their usual practice, which was what they thought

was best for the patient. This was done because they knew they were protected by the negative covid-19 test and the use of personal protective equipment.

7154

Massive haemorrhage and severe coagulopathy during paediatric liver transplant – a case report

Oliveira J.¹, Lanzaro C.¹, Oliveira D.¹, Neves S.¹
¹Centro Hospitalar e Universitário de Coimbra - Coimbra (Portugal)

Background: Paediatric patients undergoing liver transplant are at significant risk of bleeding and thrombotic complications, due to the complex nature of rebalanced haemostasis in liver disease. We describe a case report of paediatric liver transplant complicated by massive haemorrhage and severe coagulopathy, and the utility of ROTEM guiding resuscitation.

Case Report: 5-month-old boy (weight 5 kg), with secondary biliary cirrhosis was proposed for living donor liver transplant. A balanced general anaesthesia was performed. ASA standard monitoring, urine output, invasive blood pressure, central venous pressure and esophageal doppler were used. Administration of blood products was clinically and ROTEM guided. He remained hemodynamically stable until anhepatic phase. Reperfusion and neohepatic phases were complicated by post-reperfusion syndrome, severe coagulopathy, and massive haemorrhage. Intraoperative echography showed permeability of vascular anastomoses. The surgical intervention lasted 15 hours, during which period were administered 320 ml/kg of crystalloids, 145 ml/kg of albumin, 140 ml/kg of packed red blood cells (PRBC), 44 ml/kg of platelets, 94 ml/kg of fresh frozen plasma (FFP), 600 mg/kg of fibrinogen and 10mg/kg of tranexamic acid. Vasopressor support: norepinephrine and dopamine. At the end of the intervention, the child maintained hemodynamic instability and coagulopathy, and was transported intubated and ventilated to the Paediatric Intensive Care Unit (ICU). Postoperative period was marked by coagulopathy and delayed graft function, requiring multiple transfusions until the 7th day post-transplant. He was discharged from the ICU on the 32nd day, and to home on the 58nd day, with good graft function.

Discussion: Coagulopathy during liver transplant is multifactorial and can be worsened by massive haemorrhage. During resuscitation we need to be aware of the thrombotic risk and their consequences on the graft. Although viscoelastic tests direct effective resuscitation in adult surgical patients, paediatric data are lacking. They can reduce transfusion of blood products during liver transplantation surgery, but the effect on outcome remains unclear. We believe that viscoelastic tests are the best way to evaluate haemostasis during liver transplant.

Learning points: Coagulopathy during paediatric liver transplant can be a challenge and resuscitation must be balanced against thrombotic risk. Viscoelastic tests can be a useful tool.

7210 Anaesthetic management in Apert's Syndrome

Sánchez Vázquez U.¹, Ruiz-Hernandez A. S.², Hernandez-Perez Y. I.³, Albuérne-Estrada I.³, Malja-Aguirre M. E.³

¹Centro Médico ABC - Ciudad de México (Mexico), ²American British Cowdray Medical Center - Mexico City (Mexico), ³American British Cowdray Medical Center - Mexico City (Mexico)

Background: Apert's Syndrome (incidence 1:160000) features craniosynostosis, midface hypoplasia and extremity syndactyly. Tracheal cartilage alterations, tracheal stenosis and deviation make the airway particularly difficult¹. Limb malformations complicate IV placement².

Case Report: 6-year-old female was admitted for upper right arm syndactyly release surgery under general anesthesia. Evident Apert's craniosynostosis, depressed nasal bridge, maxillary retraction, and syndactyly. Airway evaluation revealed limited oral aperture, Mallampati grade III and high-arched palate. Premedication consisted of oral midazolam 5mg, followed by inhalational induction with sevoflurane, and fentanyl 50mcg and propofol 30mg delivered by IV line secured on upper left limb. C-MAC videolaryngoscopy showed partially closed vocal cords; lidocaine 30mg was administered topically, allowing for subsequent insertion of 6mm endotracheal tube. Anesthesia was maintained with sevoflurane 2%. The procedure was uneventful, and extubating was complication-free.

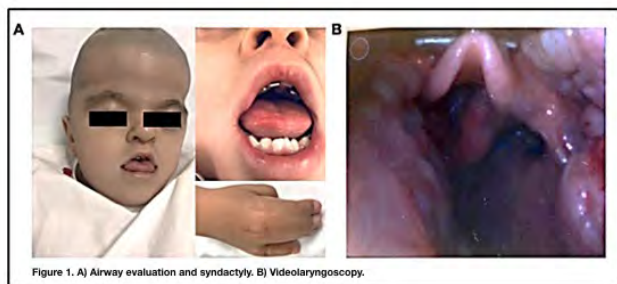


Figure 1. A) Airway evaluation and syndactyly. B) Videolaryngoscopy.

Discussion: Preoperative assessment of the airway is widely recommended. For Apert's and similar syndromes, it needs to include craniofacial features to determine difficulty. Regional anesthesia is recommended, especially in the absence of equipment for difficult airway management. General anesthesia can be performed with inhalational induction and without neuromuscular block agents. Limb malformations characteristics of Apert's Syndrome make inserting an IV line difficult.

References:

1. Patel K, Chavan D, Sawant P. Anesthesia management in a patient of Apert syndrome. *Anesthesia, essays and researches*. 2013;7(1):133.
2. Upadhyay N. Anesthesia Concerns in Apert Syndrome - A Case Report. *J Clin Med Res*. 2019;1(1):1-3.

Learning points: Anaesthetic management of Apert's Syndrome is challenging due to craniofacial features and limb malformations that complicate intubation and IV placement respectively. Regional anesthesia is recommended. General anesthesia is an option when difficult airway management equipment is available.

7211 Effect of abdominal truncal blocks on outcomes of open appendectomy for perforated appendicitis with peritonitis in children: a retrospective study

Kyselova L.¹, Pavlova Y.², Oreš V.¹

¹Shupyk National Medical Academy of Postgraduate Education - Kyiv (Ukraine), ²Kyiv Municipal Children's Hospital #1 - Kyiv (Ukraine)

Background and Goal of Study: Recently, there has been an increasing interest in US-guided abdominal truncal regional anaesthesia such as transversus abdominis plane and quadratum lumborum blocks for elective and emergency surgery. However, there are limited evidence of benefits of this method in children. Over the past year, abdominal truncal blocks has become available and began to be applied in our hospital. The aim of this retrospective is to evaluate the efficiency such practice for surgical treatment of children with acute complicated appendicitis.

Materials and Methods: We retrospectively collected data from 302 charts of paediatric patients underwent appendectomy between April 2020 and March 2021, and extracted 27 cases of open appendectomy for perforated appendicitis with peritonitis. They were divided into two groups: 1) general anaesthesia only (n=14) and general anaesthesia combined with US-guided abdominal truncal block -TAP or QL (n=13). Obtained data were compared using Mann-Whitney U-test for continuous variables, chi-square test and Fisher's exact test for nominative data.

Results and Discussion: Patients in both groups were comparable in age, body weight, ASA status, duration of surgery. In group with truncal block patients needed significantly less doses of phentanyl for maintaining intraoperative analgesia [6,3(2,9) vs 4,3(3,2) mkg/kg/h, P=0,045], and fewer patients in this group required opioid analgesia for the pain relief after surgery [6(43%) vs 1(8%), P=0,04]. Interestingly, that needs in non-opioid analgesia in 1-5 days after surgery was also less in patients who received TAP or QL blocks, but the difference was not significant except 4th day [6(43%) vs 1(38%) patient, P=0,04]. However, we did not found any difference in cases of vomiting, duration of fluid therapy, body temperature increasing, complications and length of stay in hospital after surgery.

Conclusion: Results of the study reveal that abdominal truncal blocks such as transversus abdominis plane and quadratum lumborum blocks may reduce the need for opioids intra- and postoperatively and improve pain relief in children for open appendectomy for perforated appendicitis, but not effect on the postoperative period and outcome in general. Further research are necessary for more detailed study.

7246 Wolff-Parkinson-White pattern newly diagnosed inside the operative room

Castanheira dos Reis G. C.¹, Ribas R.¹, Soares J.¹, Coelho M.¹, Patuleia D.¹
¹Centro Hospitalar Lisboa Norte - Lisbon (Portugal)

Background: Wolff-Parkinson-White (WPW) is an uncommon electrophysiological disorder of the heart. Patients with WPW present with an aberrant atrioventricular pathway, resulting in ventricular pre-excitation and predisposing patients to a variety of arrhythmic disturbances, such as atrioventricular reentrant tachycardia or atrial fibrillation with abnormal conduction over the accessory pathway, which can degenerate into ventricular tachycardia and sudden death. The anaesthetic approach thus focuses on avoiding tachycardia and managing arrhythmic events.

Case Report: We describe the case of a 10-year-old boy presenting for elective rod lengthening after scoliosis surgery. This patient had a polymalformative syndrome under investigation, presenting with craniofacial dysmorphism, scoliosis, hearing loss and cognitive impairment. After birth he was examined by Cardiology; no cardiac structural abnormality was identified and he was discharged. His parents denied any previous episodes of palpitations or syncope. He had been anaesthetised multiple times in the past, apparently without any relevant complications. Due to lack of cooperation, inhalation induction was performed with Sevoflurane while standard monitoring was held in place. After ECG placement, a marked elevation of the ST segment was identified in all leads. Paediatric Cardiology was called to the operative room and an echocardiogram and a 12-lead ECG were then performed.

The ECG revealed short PQ interval, delta waves, wide QRS and associated repolarization changes. WPW pattern was diagnosed. Due to the absence of associated symptoms and normal echocardiogram, surgery was allowed to proceed. Orthopaedic surgery was then performed under general anaesthesia, after confirming the availability of anti-arrhythmics and maintaining self-adhesive defibrillator pads in place during the procedure. Special care was taken to avoid situations that could precipitate tachycardia, such as lighter planes of anaesthesia, pain and certain drugs. The remaining procedure and postoperative period were uneventful.

Discussion: WPW syndrome is a potential life-threatening condition and we should be aware of its anaesthetic implications. We emphasise the importance of preoperative evaluation, intraoperative monitoring and readiness to manage this disease potential complications.

References:

Sahu S. et al. Anaesthetic management of Wolff–Parkinson–White syndrome for hysterectomy. *Indian J Anaesth.* 2011; 55(4): 378–380.

7254

Neonatal anesthetic safety: abdominal surgery in an extremely premature and low birth weight patient

Duarte Portela I. D.¹, Saraiva R.², Xavier C.², Patuleia D.²

¹Centro Hospitalar Universitario do Algarve - Faro (Portugal), ²Centro Hospitalar Universitario Lisboa Norte - Hospital Santa Maria - Lisbon (Portugal)

Background: Anesthesia for neonatal patients is challenging and particularly preterm infants, have a high incidence rate of conditions that require surgery. Advances in neonatal and premature care increased this population's survival and therefore they are presenting more frequently for a variety of surgical procedures.

Case Report: We report a case of a 32 weeks and 4 days premature male, extremely low-birth-weight (ELBW) 800g, that presented for surgical correction of intestinal obstruction due to ileum atresia. The patient was ventilated and optimized in the Neonatal Intensive Care Unit (NICU). After stabilization and multidisciplinary discussion, the neonate was transferred to the operating room to undergo ileum resection and primary anastomosis under balanced general anesthesia. During surgery especially care about room temperature, positioning, and ASA standard monitoring including pre and post ductal oximetry was carried out. As the ELBW possesses a high risk of insensitive losses, it's necessary to maintain adequate normothermia and blood volume by administering fluid therapy to provide good intestinal perfusion. Special care in maintaining normoglycemia and hydroelectrolytic balance was also a concern throughout the procedure. The surgery was uneventful and the neonate was transferred to the NICU in the postoperative period.

Discussion: Preterm and LBW neonates present special problems during anesthetic management due to their immature physiology and anatomy. They also had limited ability to compensate for the stress induced by anesthesia and surgery. Successful management requires a multidisciplinary team and knowledge of neonatal care. Meticulous monitoring and familiarity with drug titration and dilution are essential to minimize perioperative complications.

References:

1. Rajeshwari S. Anaesthetic concerns in preterm and term neonates. *Indian J Anaesth.* 2019; 63: 771-779.
2. Chandrashekar S, Davis L, Challands J. Anaesthesia for neonatal emergency laparotomy. *BJA Education.* 2015; 15(4): 194–198.

Learning points: It is important to understand the special conditions presented by this group of patients to provide safe care. Attention to fluid management, blood loss, temperature control, and analgesia is of utmost importance. A senior pediatric anesthesiologist is essential as the experience and knowledge were the keys to the successful management of critically ill LWB neonates.

7262

Use of low-dose dexmedetomidine for day case surgery in the paediatric population: A prospective randomised controlled trial

Koufopoulou C.¹, Mavri M.², Noutsos G.², Kouna N.³, Pantazopoulos C.¹, Antoniou E.¹

¹Laiko General Hospital of Athens, University of Athens, Greece - Goudi Athens (Greece), ²Agia Sofia Children's Hospital - Athens (Greece), ³Attikon University General Hospital - Athens (Greece)

Background and Goal of Study: Dexmedetomidine is a selective α -adrenergic receptor agonist used increasingly over the last years. Its sedative, anxiolytic and analgesic effects constitute dexmedetomidine very attractive to paediatric anaesthetists. However, some studies have demonstrated prolonged extubation times (ET) and PACU length of stay (LOS) when administering a standard bolus dose (SBD) of dexmedetomidine (1mcg/kg).[1,2] This study's aim was to compare the efficacy of low-dose dexmedetomidine (0,3mcg/kg) in reducing ET, PACU LOS and incidence of emergence delirium (IED) as well as reducing the total amount of opioid analgesics (OA) given intraoperatively to the SBD.

Materials and Methods: Pediatric patients aged from 2 to 12 years old, ASA I-II, presenting for day case surgery under general anaesthesia (GA) from August 1st to November 30th 2020 were included in this study. They were randomised in two groups. Group A received 1mcg/kg dexmedetomidine in 50ml normal saline solution (NS) over 10 minutes and Group B received 0,3mcg/kg dexmedetomidine in 50 ml NS over 10 minutes before induction of GA. ET and PACU LOS were recorded. The total amount of OA administered intraoperatively as well as IED were also recorded. Statistical analyses were carried out using IBM SPSS Statistics 26. Continuous variables were analysed using independent samples t-tests, after checking for normality with the Shapiro-Wilk test.

Results and Discussion: Fifty-eight consecutive patients were included in our study, twenty-nine (n=29) comprising each group. Most patients presented for ENT surgery, followed by minor urologic, general and plastic surgery procedures. Median age in both groups was 7 years. ET and PACU LOS in Group B were lower compared to Group A (p=0,031 and p=0,017 respectively). OA was similar between the two groups (p=0,827). None of the participants presented neither Emergence Delirium nor any adverse cardiovascular events.

Conclusion: Low-dose dexmedetomidine seems to be more effective than the SBD in reducing ET and PACU LOS in day case surgery, while maintaining the clinical benefits on OA use and IED.

References:

1. Mason K.P., Lerman J. Review article: Dexmedetomidine in children: current knowledge and future applications. *Anesth Analg.* 2011;113:1129-42
2. Tsiotou A.G., et al. Dexmedetomidine for the reduction of emergence delirium in children undergoing tonsillectomy with propofol anesthesia: A double-blind, randomized study. *Pediatric Anesthesia.* 2018;1–7

7324

The effect of Dream Doctors in children undergoing digestive endoscopic procedures: Physiological and biological assessment of emotional and cognitive consequences.

Peleg S.¹, Efrat R.¹, Hakim R.¹, Goshen Y.¹, Gralnek I.¹, Avital A.¹

¹Emek Medical Center - Afula (Israel)

Background and Goal of Study: In this study we introduced Dream Doctors (DDs) to children undergoing deep sedation for upper gastrointestinal endoscopies to explore its effects on attention and anxiety at baseline and post procedure.

Materials and Methods: The sample included 99 children randomly assigned for two groups: DD exposed (n=52) and Controls (n=47).

Results and Discussion: We found that DD significantly lowered the probability to generate startle as well as the startle amplitudes compared to controls measured using facial electromyography (EMG). Moreover, electrodermal activity (EDA) measured showed an enhanced relaxation ability as expressed in reduced non-specific electrodermal response and the time reaching 50% and 100% EDA recovery. Finally, DD tended to lower the systolic and diastolic BP faster compared to controls.

Conclusion: Age analysis revealed that the main effects were attributed and related only to the sub population of all children above the age of 8 years old, meaning that the effects of DDs work best at school age through adolescence.

7335

Efficacy of ultrasound-guided Transmuscular Quadratus Lumborum Block in paediatric abdominal surgery. A randomized controlled trial.

Guardabassi D.¹

¹Hospital de Niños, Ricardo Gutierrez - Caba (Argentina)

Objectives: Transmuscular quadratus lumborum block (TQLB) is a novel regional anaesthesia technique that has proven to be effective for postoperative pain reduction in different abdominal surgical procedures. The present study evaluated its efficacy on pain intensity and analgesic consumption in children undergoing low abdominal surgery.

Materials and methods: The study included forty patients, aged 1 to 6 years, ASA I-II, scheduled for low abdominal surgery (hernia repair or orchiopexy) under general anaesthesia. They were enrolled in two groups: TQLB block plus systemic analgesia (group 1; n=20) versus wound infiltration done by the surgeon plus systemic analgesia (Group 2; n=20). Informed consent was obtained from the patients' parents. Randomization was achieved using the closed envelope technique. Exclusion criteria included known allergies to local anesthetics, infection or redness at the injection site, anatomic anomalies or coagulation disorders, liver diseases, or unwillingness to participate in the study. All blocks were performed by the same anesthesiologist after placement of a ProSeal laryngeal mask airway before surgery. Wound infiltration was done by the surgeon at the same time. Analgesic consumption (ibuprofen) within the first 24 postoperative hours, pain intensity scores (FLACC scale) at 60 minutes, 2, 6 and 24 hours after surgery, time in which the first analgesia was required, satisfaction levels of the parents (0-10), adverse events related to systemic analgesia and time to hospital discharge were evaluated and registered.

Results: We found differences between both groups in ibuprofen consumption (80mg vs 185mg; $p < 0.01$) and pain scores (FLACC) within the first 24 postoperative hours at each interval ($p < 0.02$ for every point in time analyzed). Time in which the first analgesia was required was longer for the TQLB group (18 vs 10 hours; $p < 0.05$). Satisfaction levels of the parents were also higher in the first group ($p < 0.05$). Adverse events related to medication and time to hospital discharge showed similar results.

Conclusion: The results of this study showed that in paediatric patients undergoing unilateral inguinal hernia or orchiopexy the TQLB provided longer and more effective postoperative analgesia compared with wound infiltration and systemic analgesia, which has been in use for many years.

7352

Prospective Evaluation of the Temple Touch Pro Temperature Monitoring System compared to Oesophageal Reference Temperature in Paediatric Anaesthesia (PETER PAN)

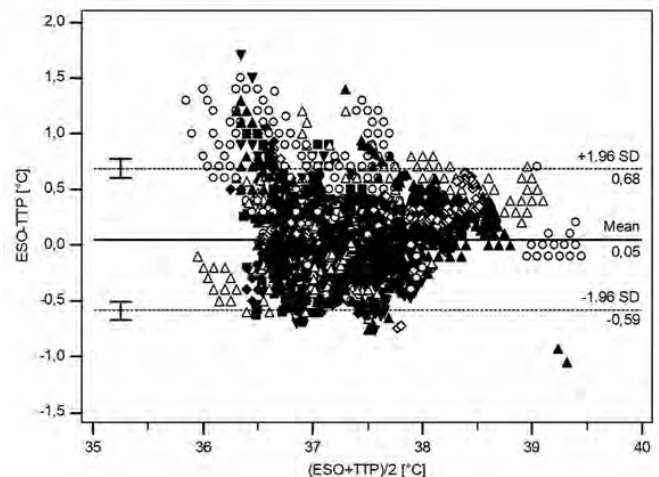
Nemeth M.¹, Klose K.¹, Mielke B.¹, Fazliu A.¹, Bräuer A.¹, Miller C.¹

¹Universitätsmedizin Göttingen - Göttingen (Germany)

Background and Goal of Study: Children are at high risk for perioperative temperature perturbations. Monitoring core temperature requires an accurate measurement method, but current gold standards are (semi-) invasive. The Temple Touch Pro Temperature Monitoring System (TTP) estimates core temperature non-invasively by using heat flux thermometry. We aimed to investigate the agreement of TTP against oesophageal reference temperature (ESO) in children up to 6 years undergoing general anaesthesia.

Materials and Methods: This prospective observational study (German Clinical Trials Register, DRKS00024703) was approved by our institutional review board (No. 22/2/21) and written informed consent was obtained from parents. After induction of anaesthesia, we inserted an oesophageal probe (RÜSCH Temperature Sensor, Teleflex Medical, Athlone, Ireland) and placed the TTP sensor (Medisim, Beit-Shemesh, Israel) above the temple artery. Data were recorded in 1-min-intervals. We analysed the accuracy (bias reflecting mean differences between methods) and precision (95% limits of agreement within ± 1.96 SD, LOA) by a Bland-Altman comparison of differences with multiple measurements using MedCalc (version 19.2.1, Ostend, Belgium). In addition, we calculated Lin's concordance correlation coefficient (CCC) and the percentage of measurements within $\pm 0.5^\circ\text{C}$ of ESO.

Results and Discussion: The inclusion of 100 children (32 female) with a mean age of 2.9 years (SD ± 2.1) resulted in 6766 data pairs. Overall, compared to ESO, TTP resulted in a mean bias of $+0.05^\circ\text{C}$ and 95% LOA of -0.59°C and $+0.68^\circ\text{C}$ (Fig. 1). Lin's CCC of 0.82 supports good agreement. 87.4% of measurements were within $\pm 0.5^\circ\text{C}$ of ESO. Our findings in infants and young children are consistent with those of Evron et al., who concluded a good agreement of TTP in 50 adults and children.¹ Fig 1. Bland-Altman plot for multiple measurements.



Conclusion: With a mean bias of $+0.05^\circ\text{C}$, TTP could prove valuable to estimate core temperature in paediatric anaesthesia.

References:

¹ Evron S et al. Evaluation of the Temple Touch Pro, a Novel Noninvasive Core-Temperature Monitoring System. *Anesth Analg* 2017; 125:103-9.

7358

Investigation of the DNA methylation profile in children presenting emergence delirium

Quintão V.¹, Carlos R.¹, Cardoso P.¹, Kulikowski L.¹, Carmona M.¹
¹Hospital das Clinicas HCFMUSP, Faculdade de Medicina, Universidade de Sao Paulo - Sao Paulo (Brazil)

Background and Goal of Study: Among cognitive changes related to anesthesia, emergence delirium is frequent in children and could be observed in up to 30% of cases. The occurrence of delirium may be related to postoperative cognitive and behavioral changes. Recent studies demonstrated the involvement of epigenetic processes in the behavioral changes related to anesthesia. Thus, performing the DNA methylation profiles is an important tool for studying the role of epigenetic factors in these events.

Materials and Methods: After IRB approval, children between 1 and 12 years old, submitted to general anesthesia for endoscopic procedures, were recruited. Emergence delirium was considered as Pediatric Anesthesia Emergence Delirium Scale score ≥ 10 . DNA from blood lymphocytes were extracted by QIAamp DNA Blood Midi Kit (QIAGEN®). The genomic array was performed using iScan (Illumina®) with Human CytoSNP850K and Infinium MethylationEPIC BeadChips. Arrays data were treated and analyzed using Bluefuse®, GenomeStudio®, and specific packages in R environment.

Results and Discussion: We included 53 patients. Twenty-three children (43.4%) presented emergence delirium. Eight children with emergence delirium and eight controls (after age and gender matching) were selected for methylation profile evaluation. Copy number variation analysis demonstrated no presence of pathogenic deletions or duplications. Bioinformatics analysis demonstrated that children with emergence delirium presented hypomethylation of the genes *SLC22A23* and *GNA12* compared to children that did present emergence delirium, in which those genes were hypermethylated. The gene *SLC22A23* expresses proteins that function as uniporters, symporters, and antiporters to transport organic ions across cell membranes. The gene *GNA12* is involved in the G protein-coupled receptors recognizing diverse messengers and neurotransmitters. Lactic acid concentrations and other metabolites after sevoflurane anesthesia measured by functional MRI are related to emergence delirium. Those metabolites could be involved in the emergence delirium pathophysiology through specific genes.

Conclusion: Our results suggest that DNA methylation profiles may present significant differences between children with emergence delirium and controls, including specific genomic regions. Therefore, we emphasize the importance of investigating and identifying epigenetic alterations to understand this relevant clinical adverse event.

7378

“Infantile TAR syndrome & concurrent Covid 19: Surmounting an uphill!”

Eldo N.¹, Abraham A.², Nair S. G.², Cyril G.², P.Sreenivasan S.²
¹ASTER HOSPITAL - Ernakulam (India), ²ASTER Medcity - Ernakulam (India)

Background: Management of a paediatric case is an uphill task and concurrently diagnosed with Covid 19 in a syndromic infant makes a colossal task to defeat for an anaesthesiologist. Strategically planned multidisciplinary department involvement played a crucial role. Primary aim was to secure a central line in a neonate with covid 19 & syndrome.

Case Report: Thrombocytopenia absent radius is a rare autosomal recessive pattern caused by a genetic disorder due to the deletion of *RBM8A* gene² which can be the most severe in the neonatal period¹. It is associated with absence of long thin bones of forearm; Thrombocytopenia and short stature. Structural alterations in Cardiovascular or Renal system are also another manifestation. These subsets of patient's exhibits cow's milk intolerance making them to reduce intake of fluids thereby making them dehydrated.

The prevalence of this disease is between 0.5 -1:100000 and 1:240000 births affecting both the sexes' equally³. Tar syndrome patient coming for a procedure becomes an anaesthetic nightmare and in an infant sub- sequentially diagnosed with Covid 19 which is considerably an

evolving Pandora's box is certainly going to be a challenge for the anaesthesiologists. Our case is a 58 days old infant diagnosed with Tar syndrome and with Covid 19 presented for securing invasive line.

Discussion: Tar syndrome infants usually would have multiple failed venous cannulations in the ward and it necessitated the requirement of a central line in our case which can have higher risk of failure. The infants would usually also require frequent blood sampling along with the administration of blood and blood products due to their thrombocytopenia. As neonates and infants have immature immunity system⁴, the risk of getting a severe infection is higher. Due to the presence of underlying cardiac anomalies there is also high risk of paradoxical embolism. In our case it was an emergency requirement of invasive lines as severe dehydration has further complicated situation. Ultrasound guidance provided a safe ground for attaining the central line. The operation theatre had minimum personnel at the time of airway manipulation. Care was taken to avoid aerosol spread. Extra care ensured in postoperative period as it can be tedious than induction in infants. Extubation was done in an intermediate plane of anaesthesia.

Learning points: Covid 19 in a pediatric patient with syndrome, requires expertise and a multimodal approach.

7404

Nalbuphine and the occurrence of emergence delirium in children undergoing ophthalmic surgery – a retrospective analysis

Leister N.¹, Menzel C.¹, Yücepete S.¹, Ulrichs C.¹, Wendt S.¹, Trieschmann U.¹

¹University Hospital of Cologne - Cologne (Germany)

Background and Goal of Study: Emergence delirium/agitation (EDA) following general anesthesia is a common complication in pediatric patients: Self-endangerment, delayed dismissal from recovery room, postoperative maladaptive alterations and anxious dissatisfied parents are some of the known consequences. Pharmaceutical agents, preoperative anxiety, pain and psychological immaturity seem to correlate with the occurrence of EDA, although the essence is not yet completely understood. Nalbuphine is a μ -receptor antagonist/ κ -receptor agonist with a slight to moderate analgesic effect showing a pleasant sedation in children lacking the risk of apnea induction. Does the use of nalbuphine in children undergoing ophthalmic surgery influence the incidence of EDA?

Materials and Methods: Retrospective monocentric cohort analysis of n=50 children who underwent ophthalmic surgery with general anesthesia and nalbuphine as postoperative analgesic agent at a German university hospital from June 2020 to February 2021.

Results and Discussion: Between June 2020 and February 2021, a total of n=50 children (17 females and 33 males) underwent general anesthesia for ophthalmic surgery. Nalbuphine was introduced as a postoperative analgesic for children in June 2020. The surgical procedures ranged from examinations to complex ophthalmic surgical procedures such as deep anterior lamellar keratoplasty. The median age of the children was 20.5 months (1 – 68 months), the median body weight was 12.25 kg (2.9 – 29 kg). Inhalational induction was performed in 42 cases (84%) and intravenous induction in 8 cases (16%). Sevoflurane and remifentanyl were used to maintain anesthesia. All patients received ibuprofen (10 mg/kg) during induction of anesthesia and nalbuphine (0.1 mg/kg) at the end of surgery. All patients had an ED-I-score of less than 6 and acceptable pain scores on waking and on leaving the recovery room. As a result, no patient showed EDA. In relevant publications, the incidence of EDA in children is given as up to 80%. As there was no change in the perioperative setting apart from the use of nalbuphine as a postoperative analgesic, it appears to have an impact on reducing the risk of EDA.

Conclusion: Nalbuphine shows a sufficient analgesic effect and appears to reduce the incidence of emergence delirium/agitation in children undergoing ophthalmic surgery. Further studies are needed to investigate this potential beneficial side effect of nalbuphine.

7414

Comparison of hemosorption efficacy using CytoSorb and HA330 in pediatric oncological patients with sepsis

Tobylybayeva Z.¹, Saparov A.¹, Konkaev A.², Kamatayeva G.¹, Muratbekova B.¹, Sazonov V.³

¹University Medical Center National Research Center for Maternal and Child Health - Nur-Sultan (Kazakhstan), ²Scientific Research Institute of Trauma and Orthopaedy - Nur-Sultan (Kazakhstan), ³Nazarbayev University School of Medicine - Nur-Sultan (Kazakhstan)

Background and Goal of Study: Sepsis is one of the leading causes of PICU hospitalization and mortality in pediatric patients with cancer. However, with advances in technology and treatment protocols, the prognosis has improved considerably. One of the methods of choice for adjuvant therapy in sepsis is hemosorption.

Materials and Methods: Oncology patients with sepsis (n=11) transferred to the PICU underwent a hemosorption session using HA 330 adsorber (n=6) or Cytosorb (n=5). The main purpose of the hemosorption session was to scavenge and eliminate bacterial toxins and inflammatory mediators from the blood. As a part of study with obtained approval from the Clinical Research Ethics Committee and signed informed consent by parents, the adsorber was initiated and maintained for the next 4 hours (HA-230) or 24 hours (Cytosorb). For the procedure a hemodialysis catheter was inserted into the subclavian vein as appropriate according to child size. Along with clinical signs of improvement (dependence on ventilation, inotropic support, clinical signs of shock, etc.), laboratory parameters (C reactive protein (CRP), Procalcitonin, S100 protein, IL-6) were monitored.

Results and Discussion. In both groups, there was a significant reduction in inflammatory markers as well as an improvement in the clinical picture. Some publications indicate that HA 330, compared to Cytosorb, has a better ability to eliminate IL. However, this was not confirmed in our study and both adsorbers performed equally well. Mean reduction rate in both groups was $-74.55 \pm 22.44\%$. We would only point out that the procedure with the HA 330 cartridge is relatively shorter, with the same efficiency. This, in turn, reduces the risk of typical complications of extracorporeal methods of blood purification.

Conclusion: This small case series first suggested that the hemoperfusion with both type of cartridges may be an effective and relatively safe adjunctive treatment to counterbalance the cytokine storm in septic children affected with oncological disorders. However, further clinical studies are needed to support our first and preliminary experience.

7416

Hemosorption with HA-230 adsorber in children with cancer in case of Delayed Methotrexate clearance after High Dose Methotrexate Therapy

Sazonov V.¹, Tobylybayeva Z.², Saparov A.², Konkaev A.³, Kamatayeva G.², Muratbekova B.²

¹Nazarbayev University School of Medicine - Nur-Sultan (Kazakhstan), ²University Medical Center National Research Center for Maternal and Child Health - Nur-Sultan (Kazakhstan), ³Scientific Research Institute of Trauma and Orthopaedy - Nur-Sultan (Kazakhstan)

Background and Goal of Study: High-dose methotrexate chemotherapy (HDMTX) remains one of the effective methods of therapy of different type malignancies in children. We still encounter cases of delayed methotrexate clearance (DMC), which leads to toxic effects. In cases where conventional therapy is not effective, hemosorption using a HA 230 disposable cartridge may be the method of choice. Our goal is to evaluate the effectiveness and safety of this method.

Materials and Methods: When conventional therapy (intravenous hydration, leucovorin (FA) rescue) was not effective, the patients (n=7: six of them with acute lymphoblastic leucosis, one with Osteogenic sarcoma) were transferred to the PICU for intensive therapy and hemosorption procedure. As a part of study with obtained approval from the Clinical Research Ethics Committee and signed informed consent by parents, the HA-230 adsorber (Jafron, Zhuhai City, China) was initiated and maintained for the next 4 hours. For the procedure a hemodialysis catheter was inserted into the subclavian vein as appropriate according

to child size. The level of MTX (pMTX) in patients before the procedure in average was $172.71 \mu\text{mol/l}$ (± 137.83). A single procedure of HA-230 adsorption resulted in reduction of methotrexate level in average to $27.9 \mu\text{mol/l}$ (± 56.6) (reduction rate is $-91.6 \pm 2.79\%$). During the entire procedure, the patients continued to receive the FA rescue protocol. The routine blood biochemistry and hematologic parameters improved, as well clinical condition and the patients were transferred to the Hematological unit. After achieved the remission, the patients were discharged from the hospital.

Results and Discussion: In our study the reduction rate was $91.6 \pm 2.79\%$, which is significantly higher compared to other methods of extracorporeal blood purification (plasma exchange, hemodialysis, hemodialysis filtration, and hemoperfusion using an activated carbon absorption column). We may encounter complications common to extracorporeal methods: catheter bleeding and infection, side effects of heparinization. However, the advantage of this method is that the short procedure time reduces the above risks.

Conclusion: Based on our results, single hemoabsorption procedure with the HA-230 adsorber in case of DMC was safe and well-tolerated in a pediatric patients and would significantly improve the patient's condition. Further studies needs to demonstrate its safety and efficacy in a large number of pediatric patients

7418

Paediatric airway foreign bodies. Time for a gameplan rethink?

Low A.¹, Baboolal H.¹

¹University of North Carolina Hospitals - Chapel Hill (United States)

Background: Anaesthetists often opt for inhalational induction for paediatric airway foreign bodies.¹ However, if suitable agents are chosen, intravenous induction may be safer and allow for maintenance of spontaneous ventilation and superior preservation of airway tone.²

Case Report: A 12.2 kg 17-month-old male with 3 weeks of croup-like symptoms presented for management of a presumed airway foreign body. Chest X-ray showed right-sided hyperinflation. Due to concern of worsening ball-valve obstruction, a pre-induction IV catheter was placed for cautious induction while avoiding positive pressure ventilation. The IV was facilitated by anaesthetic cream on the patient's thigh followed by intramuscular (IM) Ketamine (10 mg) and Dexmedetomidine (10 mcg). Anaesthesia was deepened via propofol infusion. A nasal airway attached to a 15-mm endotracheal tube connector was placed and continuous positive airway pressure (CPAP) applied. Bronchoscopy revealed a pedunculated lesion at the carina obliterating entrance to right main bronchus (Figure 1). Spontaneous ventilation was maintained without desaturation.



Figure 1: carina lesion extending into right main bronchus.

Discussion: This case highlights a potentially safer approach to paediatric airway foreign body management. Volatile anaesthetic onset is less predictable than IV agents and airway collapse may ensue. IV access allows for induction with Ketamine and Dexmedetomidine which maintain spontaneous ventilation and airway tone.² A titrated propofol infusion allows for careful deepening of anaesthesia to facilitate airway manipulation. Uncooperative children may make awake IV access difficult. Topical anaesthetics and IM Ketamine and Dexmedetomidine may improve first attempt IV success. Finally, supplemental oxygen is important with any paediatric difficult airway. A nasal airway with ETT connector allows for the administration of invasive CPAP.

References:

1. Pediatric Anaesth. 2014 Oct;24(10):1031-6.
2. Anesthesiology Jan 2012. Vol 116, Issue 1.

Learning points: IV induction for paediatric airway lesions may increase safety. IV access may be facilitated via topical and IM agents. Supplemental oxygenation and CPAP should be administered throughout.

7508

Ehlers-Danlos Syndrome, what now?

Ferreira C.¹, Oliveira Costa F.¹, Arantes A.¹, Félix F.¹, Gomes C.¹
¹Hospital de Braga - Braga (Portugal)

Background and Goal of Study: Ehlers-Danlos syndrome is a group of clinically and genetically heterogeneous, inherited connective tissue disorders that result in dysfunctional collagen bundles. It is characterized by hypermobility and instability of joints, abnormalities of skin texture, and fragility of vessels and soft tissues, so all elements of perioperative management must be handled with extreme care. Successful anesthetic management of these patients requires an understanding of the role of collagen, as intubation difficulties may occur due to collapse of fibrous elastic tissue in the trachea, difficult vascular access, cardiovascular disease, injury during positioning due to hyperextensibility and fragility of the skin. This report describes the anesthetic management of a patient with EDS submitted to tonsillectomy and myringotomy under general anesthesia.

Case Report: A 2-year-old boy with a history of hypoxemia and hypercapnia due to postnatal apnea, macrocrania, developmental delay and EDS was proposed for surgery. He weighed 12500g (50th percentile). Anesthetic examination revealed restricted mouth opening and a high arched palate, suggestive of difficult airway. Induction was performed with 25 mcg fentanyl, 50mg propofol, and 7,5mg rocuronium. The patient was intubated by direct laryngoscopy with a number 4 RAE cuffed without any major difficulty. Since Rose positioning is required, extreme care was taken to avoid extreme pressure points that could cause trauma. Maintenance of anesthesia was performed with sevoflurane. As a multimodal analgesia, 12,5mg lidocaine, 250mg paracetamol and 6mg ketorolac were administered and it was performed a palatine block with 2,5mg of ropivacaine 0,5%. As prophylaxis of nausea and vomiting, 2mg dexamethasone and 1mg ondansetron were administered. At the end of surgery sugammadex was used to fully reverse the muscle paralysis. After extubation, the patient was transferred to the intensive care unit for observation because of the possibility of complications, such as known apnea. The postoperative period was without complications and the patient was discharged 48 hours after surgery.

Conclusion: Currently, there are no guidelines for regional or general anesthesia in patients with EDS. Rare conditions such as EDS can present a clinical conundrum for the anesthetist, nevertheless knowledge of the basic implications of the condition can minimize patient morbidity and mortality without requiring in-depth knowledge of the disease.

7536

Congenital tongue malformation - a newborn airway management challenge

Rosa F.¹, Fonseca D. J.¹, Meleiro H.¹, Abreu F.¹
¹Centro Hospitalar Universitário de São João - Porto (Portugal)

Background: Congenital vascular malformations are common in newborn. Venous malformations are characterized by low blood flow and can appear as nodules or masses. (1) Their location on the oral cavity may become an anesthetic challenge in respect to airway approach and hemodynamic control since even minor manipulation may result in exsanguination or airway compromise (2,3).

Case Report: We report our anesthetic management of a 24-hour newborn (3.7Kg) with prenatal diagnosis of a congenital tongue vascular malformation (66x58x41mm), who was proposed for surgical excision of the lesion. Preoperatively, tongue protrusion and airway patency were observed. We performed a balanced general anesthesia using ketamine (2 mg/kg) for induction to maintain spontaneous ventilation. Intubation was accomplished using anterior projection of the tongue and conventional laryngoscopy. Sevoflurane was used for maintenance. The surgical procedure was uneventful, with hemodynamic and ventilatory stability and no need for transfusion. Postoperatively the patient was transferred to the neonatal unit with the aim of extubation only after 24 hours.



Discussion: Although vascular malformations can be common in newborns, this specific case refers to a large dimension malformation in the oral cavity resulting in considerable challenge in the airway management. Maintenance of spontaneous ventilation during induction was a key factor. Also, the maneuver of pulling out the tongue as much as possible allowed laryngoscope introduction and helped in the visualization of glottis aperture.

References: (1) DIAZ, et al. "Vascular lesions in the newborn" in www.uptodate.com, 2021; (2) Senthil, et al. "Management of the Difficult Airway in the Pediatric Patient". J Pediatr Intensive Care, 2018, 115-125; (3) Howton, et al. "Intraoral vascular malformation and airway management: A case report and review of the literature". Journal of Clinical Anesthesia, 1992, 4(6):498-502.

Learning points: Planification is essential when approaching a predictably difficult airway, particularly in neonates; Hemorrhagic risk associated with vascular malformations should prompt an adequate fluid therapy and transfusion strategy.

7553

Non-pharmacological measures for anxiolysis in pediatric patients in a non-pediatric hospital.

Díaz Gómez T. V.¹, Aguado Sanchez S.¹, Perez Ramos A.¹, Carpintero Cruz A. C.¹, Luis Garcia C.¹, Fort Pelay B.¹
¹Parc de Salut Mar - Barcelona (Spain)

Background and Goal of Study: the purpose of this analysis is to explain how we have developed different pathways to diminish anxiety in pediatric surgical population at our hospital which is a non-pediatric hospital, although the department of anesthesiology has started since 2019 a pediatric anesthesiology group, following the European Guidelines, for children over 3 years old with an American Society of Anesthesiology status (ASA) I and II.

Materials and Methods: surgical scrubs, toys, cell phones, clowns, a car with remote control were the materials we used, and an algorithm of transportation, welcoming before the operation room (OR) and reception at the OR for the patient and the parent were discussed and executed with the anesthesiologist, surgeon, nurses, and stretcher-bearer to make it possible.

Results and Discussion: during the process of starting as a pediatric anesthesia group, we found that parents accompaniment, cartoon videos, clowns, toys and even making the children believe they were driving a car on their way to the OR, diminishes anxiety and promotes empathy between the medical attendings and the patients, promoting a good attitude to face an operation at a new and threatening environment for some of the patients, anxiety is one of the trigger for delirium, in our pediatric population (175 since 2019) we have had only 0,0057% of delirium.

Conclusion: premedication and other measures that improves anxiolysis in pediatric population, should be considered for the daily clinical practice.

7557

Central venous catheter related thrombosis leading to venous alterations in infancy: A case report

Üzümçügil F.¹, Ardıçlı B.¹

¹Hacettepe University School of Medicine - Ankara (Turkey)

Background:The tendency for the development of catheter-related thrombosis (CRT) in neonates can be explained by either the smaller size of the veins, vein/catheter size ratio, number of attempts, underlying diseases such as cancer or an underlying thrombophilia, TPN dependency or site of the central vein (1). This report aimed to present the venous collateral development early in infancy due to thrombus formation in both the right and left internal jugular veins despite anticoagulant treatment, in order to highlight the consideration of larger-sized veins for central venous cannulation in neonates as it may help preserve the access sites.

Case Report:Our patient was born weighing 3040 g at 37.7 weeks of gestational age. On the 2nd day after birth, necrotising enterocolitis was diagnosed. Due to extensive intestinal resection with recurring surgical interventions leading to short-gut syndrome, repeated central venous cannulation (CVC) was required as total parenteral nutrition (TPN) dependency developed. Repeated percutaneous CVCs were presented in a timeline (Figure 1). In the 2nd month of age, enoxaparin was started to be continued for at least 3 months because of the diagnosis of a homozygous mutation in the methylenetetrahydrofolate reductase (MTHFR) gene. A CVC was last required at 5-months of age. Both the right and left internal jugular veins (IJVs) were occluded due to thrombus formation without any visible lumen on Doppler and venous collaterals were present on both sides of the neck. A 4F double-lumen 8 cm catheter was placed using an ultrasound (US)-guided supraclavicular in-plane approach to left brachiocephalic vein (BCV). Despite the use of right and left IJVs only once for CVC, thrombus developed; whereas, the left BCV was used three times with similar indwelling times and left subclavian vein (LSCV) was used once for CVC with a longer indwelling time without any thrombus formation.

Discussion:The use of CVC in larger-sized veins considering the vein/catheter size ratios even in the presence of thrombophilia may preserve the veins for multiple use and prevent venous alterations leading to irreversible occlusion and collateral formation aggravating with time.

References:

1. Citla Sridhar D, Abou-Ismaïl MY, Ahuja SP. *Thromb Res.* 2020; 187: 103-112.

Learning points: Larger-sized veins should be considered for central cannulation in infancy, by using preprocedural evaluation with ultrasound.

7578

Is it empty? Correlation between fasting interval and gastric content in children

Aschkenasy G.¹, Leder O.¹, Pardes R.¹, Nir E.², Turner D.¹, Gozal Y.¹

¹Shaare Zedek Medical Center - Jerusalem (Israel), ²Kaplan Medical Center - Rehovot (Israel)

Background and Goal of Study: An increasing number of pediatric anesthesia societies, including the European Society for Pediatric Anesthesiology, ESPA, is allowing the intake of clear fluids up to one hour before elective procedures. The aim of our study was to measure the volume and pH of the gastric fluid content, after different fasting intervals. Our additional goal was to evaluate which factors, in addition to time, may influence the gastric content in a fasting child.

Materials and Methods: After institutional review board approval and parental consent, 250 children, 1-18 years, coming for elective gastroscopies in our pediatric day care center were included. Age, weight, ASA status, indication for the procedure, time for last food and fluid intake and the time point of the procedure were recorded. After initiating sedation, the gastroscope was inserted. Immediately after reaching the stomach, the fluid content was aspirated into a cup and given to the anesthesiologist. The volume and pH of the gastric aspirate were measured and registered.

Results and Discussion: 250 children, age 1 - 18 years (mean 10.2), coming for elective gastroscopies, were included in the study. The majority were ASA I-II (99%). Average fasting time for clear fluids was

5 (2-17) hours. Average gastric fluid volume was 10 (0-90) ml. We found no correlation between fasting time for clear fluids and the gastric fluid volume. In older children we found a generally larger amount of gastric fluid, even if correlated to weight (ml/kg). The pH of the gastric content was on average 1.5, correlating with the pH of gastric juice. The comparable pH of water is 6, pH of fruit juices around 4-6.

Conclusion: Fasting intervals between 2- 17 hours do not stand in direct correlation to the volume of the gastric content. The pH of the gastric content was on average 1.5, which is the pH of gastric juice. Our assumption is that the measured gastric content in these fasting children, is mainly secreted gastric juice. Younger children (less than 10 years old), had on average a very small, if at all, volume in their stomach, independently of their fasting time between the interval 2-17 hours. In a future study, we plan to allow children clear fluids until one hour before the procedure, in accordance with the new European guidelines and evaluate the gastric content after this shorter interval.

7581

Time for intubation in pediatrics amongst diverse laryngoscopes: a systematic review with network meta-analysis.

Medeiros L.¹, Regueira S.², Souza A.², Manoel M.², Carvalho C.²

¹Huac - Campina Grande (Brazil), ²Federal University of Campina Grande - Campina Grande (Brazil)

Background and Goal of Study: Some concern is currently raised about the time taken to intubate children with videolaryngoscopes (VLs) in comparison to direct laryngoscopy (DL). We conducted this systematic review (SR) with network meta-analysis to assess the performance of VLs and direct laryngoscopes (DLs) for time to intubation in pediatrics.

Materials and Methods: This analysis is part of a larger SR of multiple outcomes. We conducted searches through PubMed and further five databases on 27/01/2021. For the current analysis, we included randomized clinical trials fully reported with patients aged ≤ 18 years, comparing different types of laryngoscopes (VLs or DLs) for time to intubation. We excluded studies published in language other than English, Spanish, or Portuguese, those with contradictory data, and those where we could not abstract data from parallel arms. We used ROB 2 tool to assess the risk of bias within individual studies. We carried a bayesian random-effects network meta-analysis to compare the individual devices. The GRADE approach was used to assess the quality of the evidence.

Results and Discussion: We had 29 studies with 2192 patients evaluating 14 different devices: AirtraqTM, BullardTM, C-MACTM, C-MACTM D blade, StorzTM Miller, CoopdechTM, GlideScopeTM, KingVisionTM, Pentax AWSTM, and TruviewTM, as well as the DLs Maccoy, Macintosh, Oxiport and Miller. The mean time to intubation with the Macintosh laryngoscope (ML) was 25.21 seconds (95% CI: 19.39 to 31.03 seconds). Only one device performed significant worse than the ML: BullardTM (Figure 1). All the remaining devices had their 95% CIs within a too short time range to be considered clinically relevant (Figure 1). We can therefore consider those devices as clinically equivalent to the ML. The evidence was overall judged as of very low quality.

Conclusion: Except for the BullardTM, videolaryngoscopes and direct laryngoscopes may be considered clinically equivalent for time taken to intubate pediatric patients based on the available evidence.

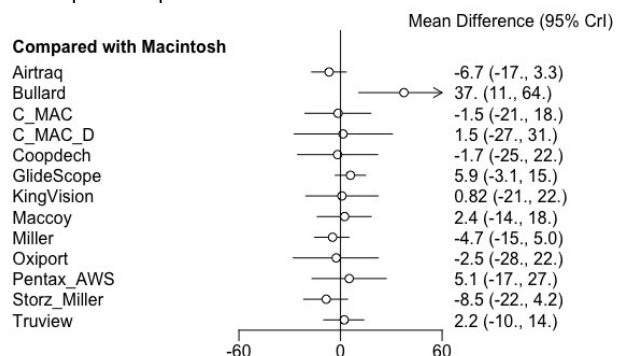


Figure 1. Network forest plot for the comparison between diverse types of laryngoscopes for time to intubation.

7585
Ranking video laryngoscopes and direct laryngoscopes for difficult laryngoscopy in children: a systematic review with network meta-analysis of randomized clinical trials.

Medeiros L.¹, Regueira S.², Souza A.², Manoel M.², Carvalho C.²
¹Huac - Campina Grande (Brazil), ²Federal University of Campina Grande - Campina Grande (Brazil)

Background: Video laryngoscopes are deemed to improve glottic visualization in adult patients in comparison to direct laryngoscopes (DLs). However, the benefit of the video assisted technique is not well established in pediatric patients. We thus conducted a systematic review to assess the role of video laryngoscopes and direct laryngoscopes over the occurrence of difficult laryngoscopes as well as conducted a network meta-analysis to rank the different devices in children.

Methods: We conducted searches through PubMed and further five databases on 27/01/2021. We included randomized clinical trials with patients aged ≤ 18 years, comparing different types of laryngoscopes for difficult laryngoscopy (Cormack and Lehane 3 or 4). We judged the risk of bias in the individual studies through the Cochrane's RoB 2 tool. We conducted random-effects meta-analyses as well as evaluated the risk of selective reporting by funnel plot assessment. We also evaluated the quality of evidence based on the GRADE recommendations.

Results: We had 17 studies with 1506 patients evaluating seven different devices (see Figures 1 and 2). Only one device reached statistically significant reduced risk of difficult laryngoscopy in comparison to the Macintosh laryngoscope: StorzTM Miller (Figure 1). The ranking of the different devices is presented in Figure 2. The evidence underpinning the ranking was overall judged as of very low quality.

Conclusion: We have found the StorzTM video laryngoscopes with Miller and Macintosh blades to be top ranked amongst the evaluated laryngoscopes for difficult laryngoscopy in children. However, we should bear in mind that the evidence supporting such finding is of very low quality and more well-designed studies with larger samples sizes comparing different laryngoscopes for difficult laryngoscopy in pediatrics are still necessary.

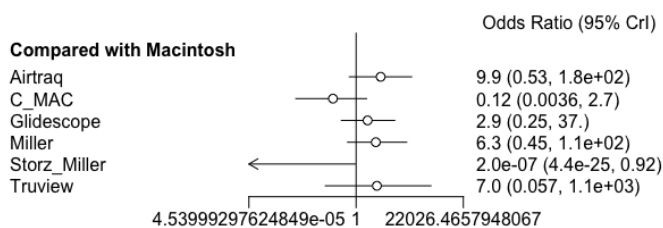


Figure 1.

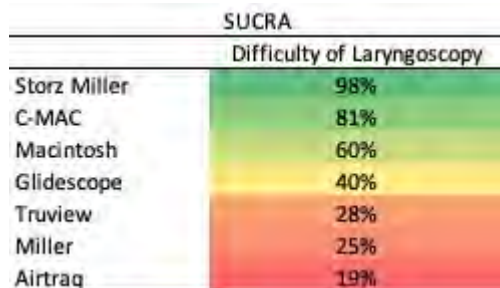


Figure 2.

7586
A service evaluation project exploring anaesthetic technique used for paediatric magnetic resonance imaging in a UK tertiary paediatric hospital.

Winslow L.¹, Tan J.¹
¹Alder Hey Children's NHS Foundation Trust - Liverpool (United Kingdom)

Background: Alder Hey Children's Hospital is a tertiary paediatric centre in North-West England. We provide 6 general anaesthetic (GA) sessions a week for Magnetic Resonance Imaging (MRI). The two most commonly used techniques are volatile anaesthetic with laryngeal mask (LMA) or propofol sedation with spontaneous ventilation (TIVA). Our service evaluation project sought to fully describe our current practice.

Methods: Elective GA MRI cases (June-September 2020) were identified with theatre schedules, excluding those that were emergency scans, cardiac MRIs, and with incomplete notes. The clinical records (anaesthetic/theatre/recovery) of included patients were reviewed. Data was analysed using Excel software. Unpaired student's t-tests were used to compare recovery times for different patient groups.

Results/Discussion: We included 218 cases (70% male and 80% 1-12 years old). Main indications for MRI were neurology, non-oncological brain lesions and developmental delay. Anaesthetic induction was predominantly inhalational (90%) while TIVA was the preferred maintenance technique (84%). Sedation technique used a mean propofol bolus 2.5 (IQR 1.77-3.81) mg/kg and mean infusion rate 112 (IQR 100-120) mcg/kg/min. 97% of scans completed without change in technique, with equipment failure and infusion rate change representing the remaining. T-tests demonstrated no significance in recovery time between TIVA and LMA groups (p=0.682), but did comparing TIVA in particular groups with significantly quicker recovery un those <1 year old vs. ≥1 year (p=0.041) and infusion ≤120 vs. >120 mcg/min propofol (p=0.003). Similar findings have been shown in other literature (1).

Conclusion: Volatile anaesthetic with LMA and TIVA sedation techniques can both be suitably performed for paediatric MRI without need to alter technique or affect recovery time. Significant reduction in recovery were suggested in some patient groups. However, this project is limited by methods and population size and differences in recovery time were <10 minutes, which may not be clinically relevant. Furthermore, this project did not analyse interruptions to scan, nor standardised emergence scales, which would offer further insight into our technique and MRI service.

References:

1. Bryon YF. et al. A Randomized trial comparing sevoflurane and propofol in children undergoing MRI scans. Paediatr Anaesth. 2009.19(7):672-681.

7587
Comparison of intranasal dexmedetomidine-midazolam, dexmedetomidine-ketamine and midazolam-ketamine for premedication in paediatric patients: a double-blinded randomized trial

Banagi Devaraju V.¹, Goyal S.¹, Bhatia P.¹, Sharma A.¹, Sethi P.¹, Kaloria N.¹
¹AIIMS, Jodhpur - Jodhpur (India)

Background and Goal of Study: Pediatric patients are a population with a high level of anxiety. The prevention of perioperative stress in a frightened child is important to render the child calm and cooperative for smoother induction. Intranasal premedication is easy, safe and the drug gets rapidly absorbed into the systemic circulation and ensuring early onset of sedation in children and effectiveness as well. Objective: The primary objective is to assess the anxiety level at separation from the parents after 30 minutes of administration of intranasal premedication. The secondary objective is to assess the depth of sedation, ease of iv cannulation, and mask acceptance after 30 minutes of administration of intranasal premedication.

Materials and Methods: 150 patients of age group 2-4 years, ASA class I undergoing elective surgical procedures were enrolled. The patients were randomly divided into three groups, group DM (receiving intranasal dexmedetomidine 1µg/kg and midazolam 0.12mg/kg), group DK

(receiving intranasal dexmedetomidine 1µg/kg and ketamine 2mg/kg), group MK (receiving intranasal midazolam 0.12mg/kg and ketamine 2mg/kg). After thirty minutes of administration of the drugs, the patients were assessed for parent separation anxiety, sedation, ease of iv cannulation, and mask acceptance.

Results and Discussion: The comparison among the three groups showed a statistically significant difference for ease of iv cannulation, and mask acceptance at 30 minutes with a p-value of 0.010 and 0.007 respectively. The parent separation anxiety and sedation score at 30 minutes was statistically insignificant with a p-value of 0.82 and 0.631 respectively.

Conclusion: The combination of midazolam and ketamine as a premedicant has a better clinical profile as compared to other combination drugs used in our study in terms of providing adequate separation anxiety from parents, sedation, iv cannulation, and acceptance of masks.

7598

Acute abdomen in the course of immunodeficiency-neutropenic enterocolitis, cecal necrosis and perforation in leukemic child

Ivanova E.¹

¹UHATEM "N. I. Pirogov" - Sofia (Bulgaria)

Background: Neutropenic enterocolitis (NEC) is a necrotizing inflammatory process predominantly affecting caecum, terminal ileum and ascending colon. It is a severe condition usually occurring in immunocompromised patients. NEC is the most common among all causes of intestinal complications developed during treatment of pediatric cancer patients and yet it remains quite rare condition with sporadic incident of about 2.5-4%¹. Sepsis may develop in 10% of patients and abscesses and necrosis in roughly 2%.^{1, 2}. Therefore the disease is life threatening with high mortality rate of 50% and more. It demands accurate diagnosis and urgent treatment.

Case report: A 10y old girl with acute lymphoblastic leukemia (ALL) was hospitalized in the department of pediatric surgery with anamnesis of abdominal pain, fever (39C°), nausea and vomitus for 2weeks prior admission. She had several courses of chemotherapy which resulted in pancytopenia- Hgb 91g/L, Hct 0,28L/L, Neu 900/uL, Plt 82G/L, WBC 3G/L. CRP 6,2mg/dl, hypoproteinemia- protein 50g/L, albumin 24g/L, INR 1.53. Initial microbiology haemoculture showed corynebacterium spp. CT images and ultrasound examination demonstrated increased bowel wall thickness of caecum and terminal ileum, caecum inflammation, suspected caecum perforation, caecum abscesses, vertebral Th 11 and Th 12 fractures (most likely due to primary disease- ALL), bilateral pleural effusions (100ml), minimal subhepatic and pelvic effusions. Immediate antibiotic treatment was initiated with vancomycine, ciprofloxacin, metronidazole and fluconazole. Surgical procedure was performed- laparoscopy followed by laparotomy: peritonitis totalis fibrinopurulenta, necrosis et perforatio multiplices coeci- a right hemicolectomy, ileostomy and colostomy were carried out. After a complicated postoperative treatment including fever, vomitus and delayed enteral feeding, the patient's condition was stabilized and transfer to a specialized pediatric department of oncohaematology for subsequent therapy of the primary disease (ALL) followed.

Discussion: NEC is affecting mostly caecum mainly in leukemic children on chemotherapy. Symptoms overlap with acute abdomen.

References:

1. Nelson textbook of pediatrics
2. Gregory's pediatric anesthesia

Learning points: NEC is a gravely severe gastrointestinal complication in patients receiving aggressive chemotherapy. As a life threatening condition it should be timely diagnosed and instantly intervened in order to prevent sepsis.

7603

A randomised controlled trial examining the effect of preoperative oral paracetamol on gastric residual volume and pH in children, in the context of a 1 hour clear fluid fast

Saffer E.¹, Nielsen D.²

¹King's College Hospital NHS Foundation T - London (United Kingdom),

²Cambridge University Hospitals NHS Trust - Cambridge (United Kingdom)

Background and Goal of the Study: Intravenous paracetamol is used widely in paediatric anaesthesia despite no additional analgesic benefit for short procedures, increased cost, and association with 10 fold errors in dosing in vulnerable groups, including neonates and infants. Use of oral premedicant paracetamol has not previously been investigated in younger children and infants in the context of a prescriptive 1 hour clear fluid fast. High gastric residual volume (GRV) and low pH are both associated with increased mortality following pulmonary aspiration in animal studies. We hypothesised that the addition of oral paracetamol suspension to a 3ml/kg drink of water 1 hour prior to induction of anaesthesia, would not have a negative impact upon GRV and pH.

Methods: Children aged 44 weeks post conceptual age upto a weight of 25kg scheduled for elective surgery were randomised to receive a prescribed 3ml/kg drink of water alone (group 0) or water and oral Infant Calpol® syrup (24mg/ml concentration, group 1) 1 hour prior to anaesthesia. Following induction an nasogastric tube was used to aspirate gastric contents in 3 positions and the volume and pH recorded.

Results: 101 children, median age 24 months (range 1 - 96) and median weight 12.6 kg (range 2.9 - 27) were included. Median time from drink to induction was 53 minutes (IQR 20.25). There was no significant difference in GRV (p = 0.941) or pH (p=0.984) between group 0 and 1. Subgroup analysis revealed no difference in GRV or pH for children < 10kg compared to > 10kg, and similar median values for GRV when the time interval from drink to induction was short (21-30 minutes) or long (>60 minutes).

Conclusions: Using a prescriptive fluid regime of 3ml/kg of water, addition of Infant Calpol® syrup does not significantly alter GRV or pH, in the context of a 1 hour fast in infants and young children.

7628

Endotracheal tube obstruction during oesophageal atresia and tracheoesophageal fistula repair: a case report

Silva A.¹, Barros M.¹, Lopes L.², Martins M.³, Ferreira A.¹

¹Centro Hospitalar Universitário de São João - Porto (Portugal), ²Centro Hospitalar Tâmega e Sousa - Penafiel (Portugal), ³Centro Hospitalar Vila Nova de Gaia/ Espinho - Vila Nova de Gaia (Portugal)

Background: VACTERL syndrome is a rare association of congenital malformations.[1] At least three of the following must be present: vertebral anomalies, anal atresia, cardiac defects, tracheoesophageal fistula (TOF) and/or oesophageal atresia (OA), renal dysplasia and limb abnormalities. Surgical repair of TOF/OA is urgent and must be performed on the first/second day of life.[1]

Case Report: We present a case of a 24-h-old full-term female neonate, 1970 g, with a postnatal diagnosis of VACTERL syndrome scheduled for ligation of TFO and repair of OA by thoracotomy, and colostomy. After standard monitoring, the anaesthesia was induced with sevoflurane and, maintaining spontaneous ventilation, two intubation attempts were performed; the first under direct laryngoscopy failed and the second by videolaryngoscopy with a 2.5mm ID orotracheal uncuffed tube (OTT) was successful. The proper placement of OTT was confirmed by broncofibroscopy. Anaesthesia maintenance was performed with sevoflurane, fentanyl and rocuronium as needed. Near the end of the procedure a sudden absence of capnography associated with high peak pressures, absence of chest expansion and bilateral auscultatory silence was noticed and bronchodilator therapy was unsuccessful. Chest radiography was performed without new findings. Malfunction of the gas delivery system was excluded using manual insufflator ventilation. Broncofibroscopy performed through the OTT identified a blood clot

occluding the distal extremity. After blood clot aspiration the ventilation was restored, with presence of normal capnography and peak pressures. After surgery the neonate was transferred to neonatal intensive care unit sedated and mechanically ventilated.

Discussion: OTT obstruction by a blood clot is an uncommon complication with reported incidence <2%. [2] Differential diagnoses include anaesthesia machine malfunction, extraluminal and other causes of OTT intraluminal obstruction, external lung compression and bronchospasm. [3] To our knowledge, there are no other reported cases of this kind of airway obstruction during TOF and OA repair surgery.

References:

1. Anästhesiologie & Intensivmedizin, 2019, (4).
2. Neth J Crit Care. 2021; 29(2):102-103.
3. Ain-Shams J Anesthesiol. 2019; 11(22):1-4.

Learning points: TOF/OA repair is a challenge for the Anesthesiologists. One should be aware of airway difficulties and ventilation critical incidents.

7639

Postoperative complications in pediatric patients in a non-pediatric hospital.

Díaz Gómez T. V.¹, Aguado Sanchez S.¹, Puyada Jauregui M.¹, Armengol Gay M.¹, Luis Garcia C.¹, Fort Pelay B.¹
¹Parc de Salut Mar - Barcelona (Spain)

Background and Goal of Study: Our goal is to analyze and quantify the postoperative complications in our pediatric surgical population, which is a non-pediatric hospital, since the implementation in 2019 of a pediatric anaesthesiology group for children over 3 years old with an American Society of Anesthesiology status (ASA) I or II registered during this period.

Materials and Methods: We made a retrospective study analyzing the complications during the postoperative period of our pediatric population from November 2019 to July 2021.

Results and Discussion: A total of 175 children were operated in this period, reminding that unfortunately our hospital had to stop pediatric surgery during the high affluence of SARS-CoV-2 periods. 79 complications were registered, of which: 7 children presented respiratory complications, 7 children had postoperative nausea or vomits (PONV), 2 patients presented neurological status complications, there was only one mild allergy case and 1 mild cardiovascular complication. As remarkable, 61 patients required rescue analgesia, after a brainstorming reunion, we have realized that sometimes rescue analgesia was automatically administered without a real need of it.

Conclusion: we considerate that including a postoperative checklist that includes pain, PONV and delirium, to easily identify this complications in children will improve the assertive administration of medication.

7646

The implementation of the ERAS protocol in paediatric orthopaedic surgery may influence on surgical stress response and length of hospital stay in children

Kyselova L.¹, Biliaiev A.¹

¹Shupyk National Medical Academy of Postgraduate Education - Kyiv (Ukraine)

Background and Goal of Study: The concept of Enhanced Recovery After Surgery (ERAS) is aimed at minimizing the surgical stress response. The lack of ERAS recommendations for the paediatric surgical patients prompts to search for pathways to implement ERAS programs in children. But surgical stress response in children still remains unexplored¹.

Materials and Methods: After approval by the ethics committee, we conducted the prospective randomised study including 47 children 1-17 y.o. underwent upper and lower limb surgery. In the study group the ERAS program consisted 14 components was applied. In the control group ERAS protocol was not implemented. We calculated a glycemic stress index (GSI) which represented glycemic intraoperative change and surgery duration [2]. Length of postoperative hospital stay (LOS) and GSI

were compared between groups using Mann-Whitney U-test. Then simple and multiple regression analysis was applied to determine relationship between LOS and GSI and factors influencing GSI.

Results and Discussion: Patients in both group were comparable in age, sex, weight, ASA status, type and duration of surgery. The LOS after surgery was 5,6±3,4 days in the study group and 8,9±3,5 days in the control group (P=0,002). The GSI was significantly higher in the control group (1,62±0,78 vs 2,12±0,93, P=0,046). The simple linear regression analysis revealed a linear relationship between postoperative LOS and GSI (R 0,515, R² 0,266, B 2,156, 95% CI 1,04 – 3,27, P=0,00034), and on multiple regression analysis GSI was significantly influenced by blood loss (β=0,381, 95% CI 0,55 – 4,72, P=0,00003). In our study blood loss was indeed higher in the control group, but it was not significant (1,25±0,94 vs 1,9±1,7, P=0,098).

Conclusion: Results of the study suggest that implementation of ERAS may shorten the length of postoperative hospital stay in children undergoing limb surgery. This study showed the relationship between LOS and indicator of surgical stress response (GSI), which, in turn, is influenced by blood loss. Further research are necessary.

References:

1. Rove KO, Edney JC, Brockel MA. Enhanced recovery after surgery in children: Promising, evidence-based multidisciplinary care. Paediatr Anaesth. 2018 Jun;28(6):482-92.
2. Piastra M, Pizza A, Tosi F, Mensi S, Massimi L, De Bellis A, et al. Validation of the Glycemic Stress Index in Pediatric Neurosurgical Intensive Care. Neurocrit Care. 2017 Jun;26(3):388-92.

7652

Unexpected presentation of tracheoesophageal fistula during intubation in a pediatric patient - a case report

Telo M.¹, Morais L.², Coelho A.³, Miranda I.³

¹Hospital da Luz - Lisboa (Portugal), ²Hospital Espírito Santo de Évora - Évora (Portugal), ³Centro Hospitalar Lisboa Central - Lisboa (Portugal)

Background: Tracheoesophageal fistula (TEF) is an abnormal connection between trachea and esophagus. We present a rare case of a battery swallow-induced TEF in a pediatric patient.

Case Report: A 4-year-old child with a known history of battery ingestion 2 years before, with significant weight loss and recurrent respiratory tract infections, was transferred from a low income country to our hospital presenting with severe dehydration and malnutrition. Chest x-ray showed left lung heterogeneous opacities and a radiopaque foreign body in the esophagus. The patient was scheduled for a central venous line insertion under general anesthesia and arrived at our operating room with stable vitals, but with signs of dehydration and respiratory distress. After preoxygenation, general anesthesia was induced with ketamine, propofol and rocuronium. We performed a videolaryngoscopy with visualization of the cords and intubation with a 4.5mm cuffed endotracheal tube (ETT). However, after connecting the patient to the ventilator, there was no thoracic expansion, no capnography curve and the stomach was inflating. A new laryngoscopy was performed and ETT's position confirmed. Despite an increase in FiO₂ and high ventilatory pressures, we were not able to ventilate the patient, oxygen saturation dropped quickly and she went into cardiac arrest. We promptly started resuscitation and the patient recovered after the second cycle of CPR. As we suspected the presence of a TEF, we did a selective intubation to the right bronchus which allowed clinical improvement. The patient was transported ventilated to the intensive care unit and the presence of TEF was confirmed by bronchofibrosocopy. Later she was submitted to surgical correction of the TEF, without complications.

Discussion: TEF has significant anesthetic and airway management implications, especially if positive pressure ventilation is required. Differential diagnosis of hypoxemia and lack of end-tidal CO₂ after intubation permitted the presumption of a TEF, and resolution of the problem with right endobronchial intubation. Clinical expertise and team leadership were crucial in this crisis management.

References: Nguyen et al, Battery Swallow-Induced Tracheoesophageal Fistula in a Pediatric Patient in *Athorea* (2020).

Learning points: Airway and ventilation in the presence of a TEF is challenging, our aim is to draw attention towards this rare complication and to the impact of its rapid diagnosis in the clinical outcome.

7678

Cognitive dysfunctions in the context of multiple anaesthesia during traumatic illness resulting from child abuse

Yaroslavska S.¹, Filipenko O.¹, Lukavska E.²¹National Children Specialized Hospital "OHMATDYT" - Kyiv (Ukraine),²National Children Specialized Hospital "OHMATDYT" - Kiuiv (Ukraine)

Background: Child abuse, the epidemiology of which is diverse, leads in the future to a decrease in the quality of life, which subsequently leads to drug addiction, early alcoholism, and suicide. As a result, the injuries received by the child require repeated surgical intervention under anaesthesia, which determines the problem of multiple anaesthesia affecting cognitive functions, and is an additional stressful mechanism for the child which lead to a number of problems in future.

Case Report: Analysis of data collected at National Children's Hospital 'OHMATDYT' from 1989 to 2021. 168 patients from 2 months to 17 years old were treated for abuse. The severity of the condition was assessed using the ASPTS scale by age.

Discussion: Treatment at the stages of traumatic illness of children due to abuse requires a multidisciplinary approach of such specialists: surgeon, anaesthesiologist, neurosurgeon, pediatrician, psychologist, psychotherapist. The aim of the work is to determine the change in the psycho-emotional sphere of cognitive functions at the stages of treatment of injuries resulting from abuse and the need for a multidisciplinary approach in the treatment of post-traumatic stress disorders and cognitive dysfunction. The most severe manifestations of violence are associated with the socio-economic conditions of family life and the level of spiritual and moral values. In addition to physical trauma, psychological stress was different for all children over a year old. 46% of children had multiple anaesthesia, which were necessary at the stages of treatment of traumatic diseases. Emotional lability was observed in 111 cases, decreased alertness – 58, difficulty assimilating new information – 62, appetite disorders - in 12, blood pressure fluctuations - in 12. In all children over a year old, in addition to physical trauma, psychological stress and further depression were noted.

Conclusions: Patient management for the abused requires a multidisciplinary approach with the involvement of a psychologist at the early stage of the diagnosis of PTSD to help improve the quality of anaesthetic and surgical treatment, especially when multiple interventions are required. The need for knowledge of the characteristics of child psychology is vital for doctors of any speciality who work with patients in critical situations.

Neuroanaesthesiology

6501

Preoperative exercise ameliorates postoperative cognitive dysfunction in rats with muscle atrophy.

Nemoto A.¹, Sunaga S.¹, Goyagi T.¹, Niiyama Y.¹¹Akita University Graduate School of Medicine - Akita-city (Japan)

Background and Goal of Study:Preoperative muscle atrophy promotes postoperative cognitive dysfunction (POCD), which is partly contributed to the impairment of neurogenesis. Mild exercise is known to improve cognitive function through hippocampal neurogenesis. However, it is unclear whether preoperative exercise has a beneficial effect on POCD. In this experiment, we examined whether preoperative exercise reduced the POCD in rats with muscle atrophy.

Materials and Methods:All 22-weeks-old rats had their hindlimb muscle atrophied by tail suspension for 2 weeks before surgery. All rats were allocated to four groups; (1) tail suspension (TS) group, (2) TS with surgery (TS + S) group, (3) Locomotor (L) group which had preoperative exercise for 1 week, and (4) L with surgery (L + S) group. Rats with surgery groups underwent hepatectomy and mesenteric manipulation under 3% sevoflurane with 30% oxygen on the day of surgery. Cognitive function was assessed by the Morris water maze test (MWM), fear conditioning test (FCT) 7 days after surgery. Neurogenesis in the hippocampus was assessed by brain-derived neurotrophic factor (BDNF) expression levels and immunohistochemical staining for doublecortin and ki-67. Data

were expressed as mean \pm SEM. Comparisons of behavioral tests were made by two-way analysis of variance (ANOVA), and other comparisons were made by one-way ANOVA. $P < 0.05$ was considered statistically significant.

Results and Discussion:The swimming latency and swimming path length to the platform in the L and L + S groups were significantly lower than those in the TS and TS + S groups. The freezing ratio in the contextual FCT in the L and L + S groups had higher than that in the TS and TS + S groups, while there was no significant difference of the freezing time in the cued FCT. The expression of BDNF in L and L + S groups significantly increased compared with the T + S group.

Conclusion: In rats with muscle atrophy, preoperative exercise ameliorated the spatial and contextual memories with the hippocampal neurogenesis. These results indicate that preoperative exercise has beneficial effects on the prevention of POCD through neurogenesis, since muscle mass is an important factor in POCD.

6600

Preliminary data on the use of TRAM-34, a KCa3.1 channel blocker, in a murine model of perioperative neurocognitive disorders

Jamar K.¹, Saxena S.¹, Nuyens V.¹, Kruys V.², Maze M.³, Vamecq J.⁴¹CHU Charleroi - Lodolinsart (Belgium), ²Université Libre de Bruxelles - Brussels (Belgium), ³University of California, San Francisco - San Francisco (United States), ⁴Inserm, CHU Lille & University of Lille, France - Lille (France)

Background and Goal of Study: Microglia are resident macrophages of the CNS, involved in its immunological surveillance. Perioperative neurocognitive disorders (PND) result from exaggerated neuroinflammatory responses with activation of hippocampal microglia and disruption of long-term potentiation after surgery. TRAM-34 is a KCa3.1 blocker known to blunt microglial activation. For this reason, we sought to study the effects of TRAM-34 vs its drug diluent (miglyol) on inflammation and microglia in the scope of PND. Cognitive scores and inflammatory states in surgery were compared to baseline anaesthesia in mice.

Materials and Methods: C57BL/6 mice were 12 to 14 weeks old. Their cognitive status was evaluated by the spatial memory capacity with Y-maze testing for 5 minutes 6 hours after surgery/anaesthesia (alternations and total arms entries were compiled, reduction in alternations indicating spatial memory failure). Surgical intervention was performed under isoflurane anaesthesia and buprenorphine analgesia and consisted of an internal fixation of a tibia fracture. Anaesthesia conditions were met by mice given similar isoflurane and buprenorphine doses without surgical injury. The inflammatory responses to surgery and anaesthesia were assessed by circulating interleukin 6 (IL-6) determined by ELISA. Microglial presence was observed through hippocampal Iba-1 staining. TRAM-34 and miglyol were both tested and administered prior to surgery.

Results and Discussion: Surgery decreased alternations ($P = 0.028$) in miglyol but not TRAM34-treated mice. Under anaesthesia, alternations were lower in TRAM-34 vs miglyol ($p = 0.003$) while hippocampal microglial presence was higher ($p = 0.013$) (Figure 1). Surgery-induced rise of circulating IL-6 levels was not prevented by TRAM-34.

Conclusion: Overall, data show that administration of TRAM-34 induces anaesthesia-dependent cognitive decline and microglial proliferation, the mechanisms of which remain to be elucidated. It is currently unknown whether this might worsen, improve or leave PND unaffected.

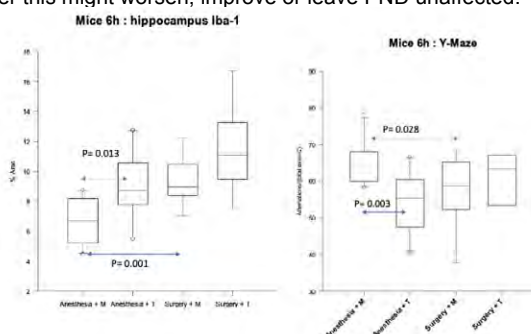


Figure 1: Hippocampal microglia (left) and cognitive scores (right) in TRAM34 (T) vs Miglyol (M) treated mice.

6645

Anaesthetic Management in a Patient with anti-IgLON5 disease

Fernández-Esmerats A.¹, Ramis T.¹, Bergé R.¹, Pujol R.¹, Gaig C.¹, Valero R.¹

¹Hospital Clinic of Barcelona - Barcelona (Spain)

Background: Anti-IgLON5 disease was first described in 2014, with more than 60 cases reported worldwide¹. This neurological disease presents as a sleep disorder with parasomnias, obstructive sleep apnoea (OSA) and stridor¹. As its precise anesthetic implications and management are mostly unknown, every anesthetic procedure performed on these patients poses a challenge. We describe the first case on anesthetic management of a patient with anti IgLON-5 disease to our knowledge.

Case Report: A 63 year-old man, diagnosed in 2012 of Anti-IgLON5 disease, underwent inguinal hernioplasty. He presented with parasomnias, snoring, stridor (CPAP during sleep), bulbar dysfunction (dysphagia, dysarthria), memory loss, gait instability, chorea, dysautonomia (difficult urination). General anesthesia (GA) was induced using fentanyl, lidocaine, propofol, and rocuronium. Direct laryngoscopy (glottic vision Cormack II) and oral intubation was accomplished. Maintenance was achieved with inhaled desflurane. Neuromuscular blockade was reverted with sugammadex. During the post-anesthesia recovery unit he was put on BiPAP and was discharged uneventfully.

One year later, the patient arrived at the ER with severe breathing difficulty, stridor, cyanosis and peripheral oxygen saturation of 73%. Emergent tracheostomy was performed under local anesthesia without incidents.

Discussion: The most concerning aspect is airway management. We aim to avoid pharmacologic respiratory depression. So whenever possible, local or regional anaesthesia should be preferred. If the patient is to go under GA, planning and execution of a potentially difficult airway management are essential. A complete reversal of neuromuscular blockade is paramount to perform a safe extubation in these patients. An elective tracheostomy should be performed when needed². Respiratory complications (depression, insufficiency, pneumonia) are the greatest concern in the immediate postoperative period, so monitoring closely by long observation period (>2h) might be useful.

References:

1. Gaig C et al. Clinical manifestations of the anti-IgLON5 disease. *Neurology*. 2017;1736-1743.
2. Chen J et al. A Novel Presentation of the Acute Airway: Anti-IgLON5 Disease. *Laryngoscope*. 2021;E724-E726.

Learning points: Airway management and respiratory complications are the greatest concern in anti-IgLON5 patients. Disease follow up is necessary. In order to avoid in extremis ventilatory support, tracheostomy should be considered.

6667

Iatrogenic right common iliac artery injury during lumbar discectomy: a case report

Pilveliene I.¹, Gasiunaite D.¹, Kundrotaitė A.¹

¹Vilnius University Hospital Santaros Clinics - Vilnius (Lithuania)

Background: Vascular injury during lumbar discectomy is rare, but potentially life-threatening complication with high mortality rate. Prognosis depends on early diagnosis and treatment.

Case Report: A 77-year-old woman underwent open lumbar discectomy surgery for right L4/L5 disc herniation. Surgery was performed under general anesthesia with prone position. Standard monitoring was recorded (continuous electrocardiogram, pulse oximetry and intermittent noninvasive blood pressure). Surgery continued approximately 2.5 hours without any concerns, but suddenly extreme end tidal carbon dioxide level decrease was observed with acute blood pressure drop. Aggressive fluid management and vasopressors were administered. There was no bleeding from the operative field. The surgery was finished immediately, patient was repositioned into a supine position and abdominal wall tension was noticed. Intra-abdominal bleeding was suspected and approved by abdominal ultrasonography prior to arrival of vascular and abdominal surgeons. Laparotomy was performed and right common iliac

artery perforation was found and repaired with right superficial femoral artery thrombectomy. Coagulopathy was corrected with massive blood products transfusion. The patient was transferred to intensive care unit with minimal vasopressors need and extubated after 24 hours. She was successfully discharged from hospital after 16 days.

Discussion: The vascular damage location depends on surgery site - injuries of common iliac arteries are related to surgery between L4 and L5, because the aorta bifurcates into common iliac arteries around the L4 vertebra level (1). There are many risk factors for such complication, but deep surgical exploration of the disc, because of massive herniation, may lead to vascular damage (2). The injury may be undetected timely, because anterior longitudinal ligament can form a one-way valve mechanism and bleeding into the retroperitoneal space rather than the operating field (2).

References:

1. Denli Yalvac ES, Balak N. The probability of iatrogenic major vascular injury in lumbar discectomy. *Br J Neurosurg*. 2020 Jun;34(3):290–8.
2. Liu B, Ye K, Gao S, Liu K, Feng H, Zhou F, et al. The summary of experience of abdominal vascular injury related to posterior lumbar surgery. *Int Orthop*. 2019 Sep;43(9):2191–8.

Learning points: It is essential to remind anesthesiologists of the importance of remaining watchful in order to obtain early treatment and good outcome in such cases.

6676

Delayed-onset bradycardia and hypotension with negative pressure application to subgaleal drain following supra-tentorial craniotomy

Sarao S.¹, Srinivasaiah R.¹ Neuroanaesthesia

¹The Walton Centre NHS Foundation Trust - Liverpool (United Kingdom)

Background: Subgaleal drain (SGD) is often used in intracranial surgery to evacuate intracranial fluid and blood collection. We report a case of delayed-onset bradycardia and hypotension after negative pressure (NP) was applied to SGD following craniotomy.

Case Report: A 72-year-old, ASA 2 patient was scheduled for craniotomy for an occipital tumour with mastoid erosion. All preoperative routine blood tests were normal and ECG showed 1st-degree heart block. The patient received total intravenous anaesthesia with full monitoring including invasive blood pressure (BP). Intraoperatively, the patient had an episode of bradycardia during tumour capsule excision and was treated with glycopyrrolate 0.2 mg and release of surgical traction. The rest of the intraoperative period was uneventful and a low vacuum SGD was placed at the end of the procedure. The patient was reversed, extubated uneventfully and transferred to recovery where NP was applied to the SGD. After 10-15 minutes of NP application, the patient developed headache, bradycardia with a heart rate (HR) of 20 bpm and hypotension (SBP 40 mmHg). The HR and BP recovered immediately with the release of the NP to SGD. Thereafter, the patient was monitored in HDU with the free drain of CSF without suction and remained haemodynamically stable.

Discussion: There have been case reports of abrupt NP application to SGD causing sudden hypotension, bradycardia and even cardiac arrest. This could be due to rapid onset negative intracranial pressure, which causes midbrain stretching with reverse midbrain herniation¹ and activation of trigemino-cardiac reflex². We believe that the delayed onset of bradycardia and hypotension in our case was due to slowly developing negative intracranial pressure eventually reaching a threshold high enough to cause symptoms.

References:

1. Prabhakar, H., Umesh, G., Chouhan, R. et al., 2003. Reverse Brain Herniation During Posterior Fossa Surgery. *Journal of Neurosurgical Anesthesiology*, 15(3), pp.267-269.
2. Chowdhury, T., Petropolis, A. and Cappellani, R., 2015. Cardiac Emergencies in Neurosurgical Patients. *BioMed Research International*, 2015, pp.1-14.

Learning points: We recommend that SG drain suction should be applied slowly to allow the brain to adjust to negative pressure generated, and that the anaesthetist and surgical team be vigilant for phenomenon of delayed onset haemodynamic changes following NP application to SGD.

6680
Should we pay attention to radiation exposure from brain computed tomography-related medical imaging in the NICU

Kovac N.¹, Martinovic P.¹, Viskovic A.¹, Murselovic T.¹, Buinac A.¹, Ruzic K.¹
¹University Hospital Center Zagreb - Zagreb (Croatia)

Background and Goal of Study:Medical imaging consider the highest source of unnatural radiation in developed countries. Computed tomography (CT) has significantly higher radiation doses per study than standard x-rays and subsequent small but relevant increased risk of cancer. The ICU patients are especially sensitive because of increased needs for multiple medical imaging and radiation exposure. The goal of this study is to quantify cumulative effective dose (CED) of neurosurgical patients attributable to brain CT scans.

Materials and Methods:This was retrospective study in large tertiary university hospital. We analyzed a total number of brain CT imagines and CED for each patient admitted in NICU in 5 years period. The patients included in the study were staying in NICU more than 5 days due to neurotrauma or operated cerebral aneurysm. Estimated average effective dose of CT machines at our institution was 1.58 mSv.

Results and Discussion:300 patients with a median age 67 (range 19-93) years were included in the study. The patients' demographic data and type of admission are outlined in Table 1. The median number of brain CT scans of 5 (range 1-19) and median CED of 7.9 mSv (range 1.58-30.02 mSv).The international commission on radiological protection have estimated cancer risk associated with protracted exposure to low-dose ionizing radiation and epidemiological studies have provided evidence of increased cancer-related mortality following exposure to low levels of ionizing radiation from diagnostic imaging.

Total patients (n)	300
Age (y)	67 (19-93)
Gender	163 male (54%)
Lenght of hospital stay (d)	21 (5-167)
Total number of brain CT scans/per patient	5 (1-19)
Cumulative effective dose (mSv)	7.9 (1.58-30.02)
Type of admission	Trauma 184 (61%) Aneurysm 116 (39%)

Conclusion:We report a relatively low CED in our NICU patients. But, keeping in mind the above-mentioned increased cancer risk related to radiation exposure, physicians should be aware of the risk and be obliged to keep radiation exposures of patients as low as reasonably practical with feasible CED reduction.

6783
Safety of asleep deep brain stimulation for Parkinson's disease: perioperative outcomes after moving from conscious sedation to general anaesthesia.

Garcia-Orellana M.¹, Pujol G.¹, Hurtado P.¹, Maldonado F.², Fàbregas N.¹, Valero R.¹
¹Hospital Clinic of Barcelona - Barcelona (Spain), ²Hospital Clinico Universidad de Chile - Santiago de Chile (Chile)

Background and Goal of Study: Deep brain stimulation (DBS) for Parkinson's disease is an alternative for drug-resistant patients. Advancements in neuroimaging have led to image-based targeting of the subthalamic nucleus under general anaesthesia (GA, or "asleep DBS") without using microelectrode recording (MER) or intraoperative test stimulation (performed under conscious sedation, CS)¹. Our aim was to compare their anaesthetic concerns and complications.

Materials and Methods: Retrospective observational analysis of patients who underwent DBS surgery (2014-19), performed under CS or GA. Data collected included: demographics, ASA, comorbidities, difficult airway criteria, duration of surgery and hospital admission. Intraoperative and postoperative complications were registered.

Results and Discussion:78 patients were analysed in 2 groups: CS 36 (47.4%) and GA 42 (52.6%), 25 women and 52 men, mean age was 60.9 years (33-75). Patients meeting difficult airway criteria: 4 in CS group and 7 in GA group. Twenty-three patients suffered an intraoperative complication, 19 (52.7%) in CS group and 4 (9.5%) in GA group. The most frequent perioperative complications are shown in table 1. Total mean duration was 5.4 h (3.5-9.2h) in CS and 4.7 h (3.1 -9.2 h) in GA (p=0.002). All procedures under CS were performed in two surgical times. Length of admission was reduced from 8.7±3.9 days in the CS group to 3.7±4.0 in the GA group (p<0.0001).

Conclusion: Asleep DBS was associated with reduced morbidity. Arterial hypertension was the most frequent complication. Asleep DBS could be performed in one surgical time, which reduced the surgical and admission time.

Reference: ¹ Dunn LK et al. Innovations in Functional Neurosurgery and Anesthetic Implications. J Neurosurg Anesthesiol. 2018 Jan;30(1):18-25. doi: 10.1097/ANA.0000000000000398.

TABLE 1. Feasibility and relationship of ABPopt/LLA with ABP.]

	n or median or r	% or (IQR) or p-value
ABP pre-operative (mmHg)	90	(84-95)
ABP intra-operative (mmHg)	76	(71-81)
rSO2 (%)	72	(64-78)
COx	0.1	(-0.1 - 0.4)
EtCO2 (mmHg)	31	(29-33)
Availability		
ABPopt	73	86
LLA	76	89
Time to achieve the first value (min)		
ABPopt	97	(80-155)
LLA	93	(78-122)
Time to achieve the first value relative to the total duration (min)		
ABPopt	35	(24-47)
LLA	39	(25-62)
patients with insults below LLA	32	40
Dose above or below ABPopt (mmHg*h)	6.8	3.6 - 12.4
%Time above or below ABPopt (± 5 mmHg)	72	56-86
pCor (controlling for patiens and time)	0.01	p = 0.36

Table 1. r: correlation coefficient; **ABP:** arterial blood pressure; **rSO2:** regional cerebral oxygen saturation; **Cox:** correlation index between slow changes in mean arterial blood pressure ABP and cerebral regional O₂ saturation rSO₂; **EtCO2:** CO₂ end-tidal; **ABPopt:** optimal arterial blood pressure; **LLA:** low limit of autoregulation; **pCor:** partial Pearson correlation.

6851
Postprocedure delirium and time point of assessment after electroconvulsive therapy: a prospective clinical service evaluation audit.

Beilstein C.¹, Meyer A.², Lehmann L. E.³, Wuethrich P. Y.³
¹Inselspital, Bern University Hospital - Bern (Switzerland), ²University Hospital of Psychiatry and Psychotherapy, University of Bern - Bern (Switzerland), ³Inselspital, Bern University Hospital, University of Bern - Bern (Switzerland)

Background and Goal of Study: Postprocedure delirium after electroconvulsive therapy (ECT) occurs in up to 67.9%, leading to agitation and putting patients at risk. Optimal time for delirium assessment in order to compare preventive interventions remains unclear. Aim was to verify recovery time (time from induction to obeying commands) and to find the optimal time for delirium assessment.

Materials and Methods: We conducted a prospective, 8-week clinical service evaluation audit (21.09. - 16.11.2020) in 21 adult patients scheduled for elective ECT. Anaesthesia was induced with etomidate 0.2mg/kg and suxamethonium 1mg/kg, prolonged seizure duration or agitation were terminated using propofol. Induction with propofol, concomitant use of alfentanil or preventive administration of clonidine was possible. We assessed patients' alertness using the Richmond Agitation-Sedation Scale (RASS) and presence of delirium using the Confusion Assessment Method for the ICU at 10, 15, 20 and 30 min after muscle relaxation.

Results and Discussion: Data were completely recorded in 85 of 94 sessions (90.4%). ECT was performed in 16 of 21 patients (76.2%) for major depressive disorder. Clonidine was given in 40 sessions (42.5%), alfentanil administered in 52 sessions (55.3%), propofol for induction in 14 sessions (14.9%). Rescue medication for agitation had to be used in 17 sessions. Postprocedure delirium was present in 65 of 89 sessions (69.1%) and agitation (RASS ≥1) in 9 of 94 sessions (9.6%). 19 patients (90.5%) showed at least one episode of delirium and four patients (19%) had at least one positive RASS score. Recovery time (RASS) and incidence of delirium over time are depicted in Figure 1 respectively 2.

Conclusion: Optimal time for delirium assessment is 20 minutes after muscle relaxation. Preventive measures need further investigation.

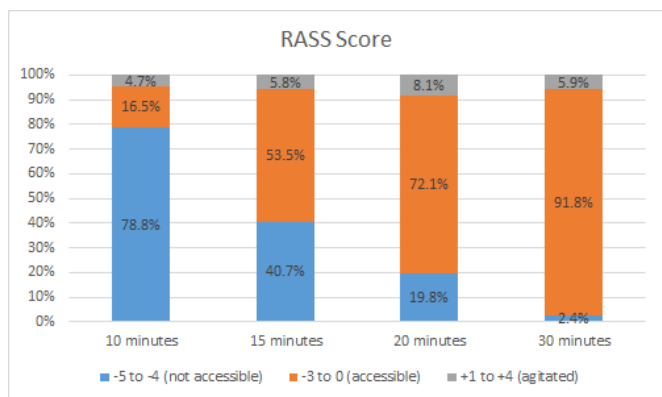


Figure 1

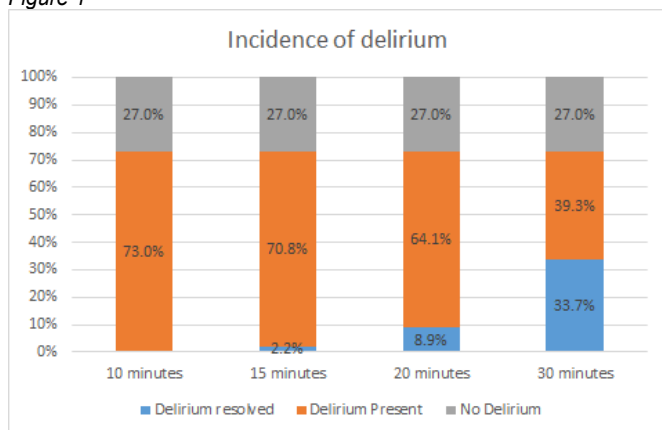


Figure 2

6865
Awake craniotomy on a patient with Freeman-Sheldon syndrome: Challenges in anesthesia management

Saoulidou E.¹, Pinna L.², Theodorou L.², Makrypodis M.², Dimitropoulou K.², Dimakopoulou A.²
¹General Hospital of Athens "G. Gennimatas" Greece - Athens (Greece), ²General Hospital of Athens "G. Gennimatas" Greece - Athens (Greece)

Background: Freeman-Sheldon syndrome (FSS) is a rare congenital disorder defined by facial and skeletal abnormalities. A distinctive facial appearance of microstomia, macroglossia, short nose, H-shaped chin dimple and sucked eyes is described. Additional characteristics of this condition are campylodactyly with ulnar deviation and talipes equinovarus.^(1,2) We present a case of a difficult anesthetic management in a patient with FSS presenting electively for awake craniotomy due to brain glioma.

Case Report: A 23-year old male, with FSS presented for awake craniotomy for his brain glioma. Routine preoperative blood tests and ECG were found to be normal. Standard monitoring applied. Given his orofacial anatomy and his restricted mouth opening (approximately 2.5cm), his airway was secured via awake tracheal intubation with videolaryngoscope (C-mac,D-blade) after local anesthesia with aerosolized lidocaine 10% and bolus dexmedetomidine (1mcg/kg) over 10min. The endotracheal intubation was successful and induction to anesthesia was made via TCI Propofol-Remifentanyl and neuromuscular blockage with rocuronium. Maintenance of anesthesia was by TCI Propofol, Remifentanyl and dexmedetomidine under PSI guidance (target values 25-50). We performed a scalp block with ropivacaine 0.5%. In the awake phase we reversed the neuromuscular blockage with sugammadex and propofol infusion was interrupted. Sedation was kept with dexmedetomidine 0,3-0,7mcg/kg/min and low dose of remifentanyl according to patient response. After the tumor resection reinduction was performed with propofol and rocuronium. The surgery finished uneventfully.

Discussion: FSS is a rare progressive myopathic disorder affecting the face, chest and limbs. The combination of difficult airway and poor venous access make anesthetic management challenging. The awake craniotomy allows better control of ventilation and oxygenation for the greatest part of the procedure and it is connected with less recurrence of the tumor.

References:

- Freeman EA, Sheldon EN. Cranio-carpo-tarsal dystrophy: an undescribed congenital malformation. *Archives of Disability in Childhood* 1938; 13: 277-283
 - Corrigan LA, Duncan CA, Gregg TA. Freeman-Sheldon syndrome: a case report. *Int J Paediatr Dent.* 2006 Nov; 16(6): 440-3
- Learning points:** While many challenges and therapeutic limitations are present much can be done to offer patients with FSS a safe and efficient quality of medical care.

6889
Individualising management of arterial blood pressure during neurosurgery: cerebral autoregulation guided approach

Beqiri E.¹, Garcia-Orellana M.², Aries M.³, Valero R.², De Riva N.², Smielewski P.²
¹Brain Physics Laboratory, Cambridge University - Cambridge (United Kingdom), ²Hospital Clinic of Barcelona - Barcelona (Spain), ³Department of Intensive Care, Maastricht UMC - Maastricht (Netherlands)

Background and Aim: Poor postoperative outcomes have been associated with impaired cerebral autoregulation (CA). Monitoring CA using COx index (correlation between slow changes in mean arterial blood pressure -ABP- and near-infrared spectroscopy based cerebral regional O₂ saturation -rsO₂) could allow to individualize management of ABP in order to preserve CA. Our aim was to analyse the feasibility of a continuous automated assessment of 'optimal ABP' (ABPopt, ABP where CA is best preserved) and ABP at the lower limit of autoregulation (LLA) in elective neurosurgery.

Methods: ABP and rsO₂ signals of 99 patients were collected during elective neurosurgeries lasting at least 2 hours. 85 patients (median age 60 (IQR 51-68), 45% males) were analysed. ABP baseline was the mean of 3 pre-operative non-invasive measurements. ABP and rsO₂ waveforms were processed with ICM+ software to calculate ABPopt and LLA trend-lines with an expanding window approach. To assess feasibility, we calculated availability (n of patients where ABPopt/LLA were available) and time required to achieve the first values. The relationship between ABPopt and ABP was explored with dose and % of time with ABP above or below ABPopt (±5 mmHg), partial correlation, granger causality test and linear mixed effect models (lme). The number of hypotensive insults of ABP below LLA were counted per patient.

Results: Table 1 and Figure 1 show the main results. Median (IQR) ABPopt (75 (69-84)) was different from ABPbaseline (90 (84-95)) (p<0.001, Wilcoxon test). ABPopt and ABP time trends (lme, p>0.4) and variability (bidirectional granger-test, p>0.025 for >90% of tests) were independent across patients.

Conclusion: It seems possible to assess individualized automated ABP targets during neurosurgical setting in most patients. Further investigation is required in order to assess its relationship with postoperative outcomes.

TABLE 1. Feasibility and relationship of ABPopt/LLA with ABP.

	n or median or r	% or (IQR) or p-value
ABP pre-operative (mmHg)	90	(84-95)
ABP intra-operative (mmHg)	76	(71-81)
rsO ₂ (%)	72	(64-78)
COx	0.1	(-0.1 - 0.4)
EtCO ₂ (mmHg)	31	(29-33)
Availability		
ABPopt	73	86
LLA	76	89
Time to achieve the first value (min)		
ABPopt	97	(80-155)
LLA	93	(78-122)
Time to achieve the first value relative to the total duration (min)		
ABPopt	35	(24-47)
LLA	39	(25-62)
patients with insults below LLA	32	40
Dose above or below ABPopt (mmHg*h)	6.8	3.6 - 12.4
%Time above or below ABPopt (± 5 mmHg)	72	56-86
pCor (controlling for patients and time)	0.01	p = 0.36

Table 1. r: correlation coefficient; **ABP:** arterial blood pressure; **rsO₂:** regional cerebral oxygen saturation; **Cox:** correlation index between slow changes in mean arterial blood pressure ABP and cerebral regional O₂ saturation rsO₂; **EtCO₂:** CO₂ end-tidal; **ABPopt:** optimal arterial blood pressure; **LLA:** low limit of autoregulation; **pCor:** partial Pearson correlation.

Figure 1. Population ABP time profile and ABPopt estimation time trend in short and long duration subgroups.

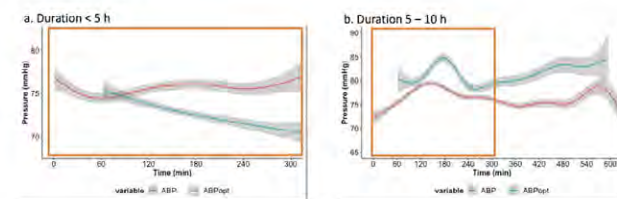


Figure 1. ABP time profile and the time trend of the estimation of ABPopt are represented for patients with (a) short recordings lasting less than 5 h (corresponding to shorter surgeries, n = 41) and (b) recordings lasting from 5 to 10 h (corresponding to longer surgeries, n = 29). **ABP:** arterial blood pressure; **ABPopt:** optimal arterial blood pressure.

6894
Effect of adjunctive lidocaine-based scalp block and laryngotracheal local anesthesia vs. general anesthesia only on plasma and cerebrospinal fluid interleukin-6 levels in unruptured cerebral aneurysm patients

Matas M.¹, Sotošek V.², Miklič Bubljić M.¹, Nagy B.³, Sekulić A.⁴
¹University Hospital Centre Zagreb - Zagreb (Croatia), ²Faculty of Medicine, University of Rijeka - Rijeka (Croatia), ³Medical School, University of Pécs - Pécs (Hungary), ⁴School of Medicine, University of Zagreb - Zagreb (Croatia)

Background and Goal of Study: Treatment of cerebral aneurysms has significant mortality rate and high hospital costs. In this setting, level of interleukin-6 (IL-6) in plasma and cerebrospinal fluid (CSF) is associated with patient outcome (1). Lidocaine exerts significant anti-inflammatory effect. Dynamics of IL-6 is also influenced by the autonomic response to laryngoscopy and head fixation device placement. Our aim was to determine the effect of adjunctive lidocaine-based scalp block and laryngotracheal local anesthesia compared with general anesthesia only on perioperative IL-6 levels in unruptured cerebral aneurysm clipping surgery.

Materials and Methods: Single-centre, randomized trial obtained permission from the Institutional Review Board. Between March 2019 and March 2020, patients with unruptured brain aneurysms undergoing clipping surgery were enrolled. After anesthesia induction and prior to endotracheal intubation, patients in the lidocaine group (Group L) had lidocaine for laryngotracheal topical anesthesia and for scalp block. Patients in the control group (Group C) underwent general anesthesia only. Plasma levels of IL-6 were measured with enzyme-linked immunosorbent assay (ELISA) at four time points: S0 - before induction of anesthesia; S1 - at the time of incision; S2 - at the end of surgery; S3 - 24 hours postoperatively. Cerebrospinal fluid (CSF) levels of IL-6 were measured at two time points: L1 - at the time of the incision; L2 - at the end of surgery. Within-group and between-group comparisons were performed.

Results and Discussion: 40 patients (Group L=20, Group C=20) were randomized (mean age L=54±8, C=59±10); 3 patients were excluded, leaving 37 patients for analysis. Plasma IL-6 in both groups were higher at S3 compared to S0 (P<0.001). CSF IL-6 were higher at L2 compared to L1 in Group C (P=0.008). CSF IL-6 in Group L at L2 were lower compared to Group C (P=0.042). The results show that aneurysm surgery is followed by an alteration of plasma IL-6. Lidocaine administration was associated with a mitigated increase of CSF IL-6, which might suggest an effect on local inflammatory response.

Conclusion: Adjunctive lidocaine-based scalp block and laryngotracheal local anesthesia might attenuate elevation of CSF IL-6 in patients undergoing unruptured cerebral aneurysm clipping surgery.

References: 1. Simon M, Grote A. Int. J. Mol. Sci. 2021; 22(8):4133.

7021

Anaesthetic management of a patient with deep brain stimulation implant for total parotidectomy

Roxo M.¹, Almeida C.¹, Spencer L.¹¹Centro Hospitalar Lisboa Central - Lisbon (Portugal)

Background: Parkinson's disease (PD) is an extrapyramidal system disorder characterised by rest tremor, rigidity, bradykinesia, and gait impairment. Deep brain stimulation (DBS) is an alternative and effective treatment for severe and refractory PD, essential tremor or intractable epilepsy. Nonetheless, there is little information available on the management of patients with DBS implant, proposed for surgery. Here, we present a case of severe PD under DBS therapy who underwent a total parotidectomy under Total Intravenous Anaesthesia.

Case Report: A 67-year-old man diagnosed with PD for the past 18 years was scheduled for left total parotidectomy for a Whartin tumor. He underwent DBS implantation surgery 8 years ago, with marked improvement of his symptoms. The patient was on a combination of carbidopa and levodopa, amantadine, sertraline and clonazepam and was able to walk, had only mild tremors of the left superior arm without muscle rigidity. After discussion with the patient's neurological team, it was decided to keep the device on because, even though the surgical field was close to the implanted system, diathermy was not essential. On the morning of surgery, his usual medication for PD was given. General anesthesia was induced with co-administration of propofol and remifentanyl by target-controlled infusion. Rocuronium was used to create better intubating conditions but residual neuromuscular blockade was reversed with sugamadex 200mg for facial nerve evaluation. Patient was haemodynamically stable throughout the surgery and the procedure lasted for 280 minutes. At the end, anaesthetic agents were discontinued, and the patient was successfully extubated.

Discussion: Special consideration is needed because of the potential interaction between the neurostimulator and the diathermy. The anaesthesiologist should investigate the indication for placement, type, model of DBS, and consult with a specialist to plan his approach. Most DBS may be turned off during surgery, to mitigate the electromagnetic interference risk. Regardless of the decision, the device should always be checked by a DBS specialist postoperatively. In case diathermy is essential, bipolar mode has been shown to be safer for use in these patients. Also, turning the neurostimulator off can precipitate sudden respiratory dysfunction, so all decisions regarding a potential shutdown should be weighed against the potential risk.

7112

Anesthetic management of foramen magnum meningiomas (FMM) – a comparison of 2 case reports - the ventral decubitus (VDP) vs the sitting position (SP)

Rodrigues D.¹, Saldanha Marques J.¹, Vaz Antunes M.¹, Moreira A.¹¹Centro Hospitalar Universitário São João - Porto (Portugal)

Background:The FMM is one of most challenging tumors among all the meningiomas because of its distinctive location, clinical course, insidious onset, and the relative large size of tumor during presentation. Surgeries of this complex tumors in the posterior fossa can be performed with the patient placed in several positions. The SP during surgery is thought to provide advantages, yet it remains controversial. We report the anesthetic approach of 2 FMM resections (with different sizes and origins) performed in different positions.

Case Report:In both cases, a total intravenous anesthesia (TIVA) was used. ASA Standard monitoring, PVC, direct arterial pressure, INVOS, BIS and sensory and motor evoked potentials were monitored. Case 1 – 52 yo, ASA 2, female, smoker. Spinoclivular tumor - 36mm at its bigger axis. Before induction, dexamethasone, mannitol and 20% saline were administered. Remifentanyl infusion was used for awake intubation. Propofol and remifentanyl were used for induction. Arterial line (AL) and a multi-pore central venous catheter (CVC) in the subclavian vein (SV) were placed and patient was positioned in the SP. Precordial doppler was used. Case 2 – 55 yo, ASA 3, male, obesity, chronic hypertension and sleep apnea. Clivospinal tumor - 24mm at its bigger axis. Before induction

20% saline was used. Propofol and fentanyl were used for induction. An AL and CVC in the SV were placed. Patient was positioned in VDP.

Both surgeries lasted 9h, had no interurrences and at the end the patients were transferred intubated and under sedation to the ICU.

Discussion:FMM resection is a complex surgery that can be performed in several positions depending on surgeon's approach and tumor location. As it grows it invariably leads to brainstem compression. From an anesthetic view different patient positions, tumor size and origin, and brainstem compression have different implications. The SP although possibly offering the surgeon the best approach to the surgical field is known to cause higher incidence of pneumocephalus and venous air embolism. Saline 20%, mannitol and awake intubation was the best option for patient 1 due to tumor size, origin and severe compression of brainstem.

References: J Clin Neurosci;22(2015)705–712

Learning points:Posterior fossa surgery may require several different positions whose complications should be known, prevented and promptly treated. Tumor size and brainstem compression obligates an additional care during airway management.

7225

Early effects of intracerebroventricular applied recombinant osteopontin on secondary brain damage and bone healing in a murine polytrauma model

Ritter K.¹, Federspiel J.², Appel D.², Ritz U.², Schäfer M.²¹Universitätsmedizin Mainz - Mainz (Germany), ²Universitätsmedizin Mainz - Mainz (Germany)

Background:Fractures of long bones are a frequent concomitant injury in patients with traumatic brain injury (TBI) and increase secondary brain damage in experimental settings. The protein osteopontin (OPN) exerts neuroprotective and bone remodelling functions in different experimental models but its putatively beneficial role has not been studied yet in a polytrauma model of combined cerebral and osseous injury.

Materials and Methods:After approval by the responsible animal welfare committee (Landesuntersuchungsamt Rheinland-Pfalz), 40 female C57BL/6 mice were subjected to a combined trauma of right parietal controlled cortical impact (CCI) and osteosynthetic stabilized fracture of the left femur (poly, n=24) or sham injury (n=16). Before CCI or sham procedure mice received an intracerebroventricular injection of recombinant osteopontin (poly/rOPN, n=12; sham/rOPN, n=8) or vehicle solution (poly/veh, n=12; sham/veh, n=8). Neurological and motoric impairment was assessed by neurological severity score (NSS), leg performance test (LPT) and open field test (OFT). 5 days post injury (dpi) mice were euthanized, and brains were processed by sequential cryosectioning. Following (immuno-) histological analyses of brain damage, samples of brain tissue, bone tissue, and blood plasma were analysed by qPCR, Western Blot or ELISA.

Results: Mice subjected to combined injury showed enhanced neuromotor impairment and increased mRNA expression of inflammatory markers (e.g., GFAP, Iba-1) in injured brain tissue as well as increased plasma levels of OPN compared to sham, but no significant alterations were found between poly/rOPN and poly/veh. While lesion volume remained unaffected, poly/rOPN mice showed reduced numbers of GFAP-immunopositive particles in the perilesional region (p<0.05) and reduced substance loss of the ipsilesional hippocampal granular cell layer compared to poly/veh (p<0.05). mRNA expression of Runx-2, BSP and BDNF was reduced in the fractured bone of poly/rOPN mice compared to poly/veh.

Conclusion: Intracerebroventricular administration of rOPN reduces local histopathological damage and perilesional astrogliosis in injured brain tissue five days after combined trauma of CCI and femoral fracture and affects bone remodelling associated gene expression. The increased availability of OPN might have neuroprotective properties but seems to interfere with early bone healing-associated gene transcription with both effects requiring further investigations.

7251

A case report of anesthesia management for an intracranial aneurysm embolization in a patient with atrial septal defect

Branea L.¹, Rad P.², Marginean L.²¹University Emergency Hospital Targu Mures - Targu- Mures (Romania),² county clinical emergency hospital Targu Mures - Targu Mures (Romania)

Background:Anesthesia management in non-cardiac surgery for a patient with Atrial Septal Defect (ASD) requires specific management based on the planned procedure and the level of dysfunction of the right heart and the pulmonary vasculature. Endovascular procedures, specifically for intracranial aneurysm embolization, requires certain physiologic conditions created through anesthetic management that are contradictory with the recommendations for managing a patient with ASD.

Case Report:A 53-year-old female was diagnosed with ASD 3 years prior to the rupture of an intracranial aneurysm. She refused surgical treatment for her ASD. Now she required an interventional procedure for her ruptured aneurysm. Her general anesthesia was decided to be managed as for a patient with right heart dysfunction. There are multiple elements that increase the risk of an intracranial thromboembolic event in this scenario as (1) the limitation for hemodilution, (2) the risk for aneurysm re-rupture if an anticoagulant is administered before the aneurysm is secured, (3) CO₂ blood levels that need to be maintained in the lower-normal range and (4) avoiding sympathetic stimulation. During the endovascular procedure a thromboembolic event occurred, involving an M3 segment branch of the right middle cerebral artery. Mechanical thrombectomy was unsuccessful and an intraarterial antiaggregant bolus followed by infusion was unable to recanalize the occluded vessel. The aneurysm was successfully embolized. She developed a cerebral infarction in the territory, which was managed pharmacologically.

Discussion:Anesthetic management for non-cardiac endovascular procedures in patients with congenital heart diseases (CHD) have no clear recommendations in literature. There is one study that describes a patient with a complex CHD and a ruptured intracranial aneurysm, but it was managed by craniotomy and clipping¹.

References:

1. Chen PY, Chen HJ, Lu K. An unusual and complex congenital heart disease in a patient with a ruptured cerebral aneurysm. *Turk Neurosurg.* 2014;24(6):974-7

Learning points: Further studies are required to describe recommendations for managing patients with CHD during non-cardiac endovascular procedures. Certain CHDs limit the anesthesiologist possibility to create favorable hemodynamics for endovascular procedures. At the moment decisions are based on local experience, local practice and experts' recommendations.

7353

Comparison of procedure duration of spinal and general anesthetic techniques for lumbar disc surgery

Varosyan A.¹, Aghasaryan N.¹, Mangoyan H.¹, Manukyan A.¹, Anjelova D.¹¹Erebouni Medical Centre - Yerevan (Armenia)

Background and Goal of Study: Lumbar disc surgery can be performed under different anesthetic techniques including general endotracheal anesthesia (GA) or spinal anesthesia (SA). A number of studies compared different aspects of both techniques, most of them showing definite advantages of SA, however, the common anesthetic techniques being GA. We hypothesized that one of the limiting factors for the use of SA may be its longer procedure duration than in GA. The goal of the study is to compare the duration of procedures in both anesthetic methods for lumbar disc surgery.

Materials and Methods: With approval of local ethics committee all patients undergoing elective lumbar disc surgery in 2020 in a tertiary care hospital were enrolled in the study. Selection of anesthetic technique was performed by senior anesthetists who were not aware of the research and data collection. All 312 patients were divided into two groups: 164 patients had surgery under GA and 148 patients under SA. The same anesthetic agents were used in each group. 3 time intervals

were measured and compared in both groups, start time: between the establishment of intravenous access and patient placement for surgery (with achieved adequate block in SA group), end time: between the end of surgery and patient discharge from the operating room (OR) and the total procedure time, which is the sum of 2 above-mentioned intervals. Time intervals were rounded to minute. Procedure duration comparison between 2 patient groups was performed by the independent samples t-test and a p-value of <0.05 was used to confirm statistical significance. No patient related clinical or demographic data were collected.

Results and Discussion: Mean values of measured time intervals in minutes with their standard deviations are presented in the table.

Time interval	GA	SA	p value
Start time	12.8±1.9	15.2±2.9	p<0.001
End time	17.3±2.9	2±0.7	p<0.001
Total time	30.1±3.4	17.2±2.9	p<0.001

Although SA technique takes significantly longer to start the surgery, its total procedure time is significantly shorter than that of GA due to the rapid discharge of the patient from the OR.

Conclusion: SA is associated with significantly shorter total procedure duration than GA in lumbar disc surgery which is one of the advantages of this technique over GA.

7374

Effectiveness of hands-free trans-nasal humidified rapid insufflation ventilatory exchange (THRIVE) over conventional facemask ventilation technique for oxygenation in patients undergoing electroconvulsive therapy: A cross-over study

Vaithalingam B.¹, Ramesh V.¹, Bansal S.¹, Muthuchellappan R.¹,Thirthalli J.¹, Chakrabarti D.¹¹NIMHANS - BENGALURU (India)

Background and Goal of Study:The primary objective of the study was to compare the incidence of oxygen desaturation in THRIVE technique versus conventional face mask ventilation (FM) technique during modified electroconvulsive therapy (ECT). Haemodynamic changes, airway complications (nasal trauma, hoarseness, pneumothorax), time to awakening, and motor seizure duration were additional points of interest.

Materials and Methods:This single-center, cross-over study included 201 adult psychiatric patients with ASA physical class 1 and 2, aged 18 to 50 years, and body mass index (BMI) ≤ 40 kg/m². Patients with a baseline oxygen saturation (SpO₂) of less than 95% were excluded. Between the third and fifth ECT sessions, patients were subjected to the conventional FM technique, and the same patients were exposed to THRIVE technique in one of the subsequent sessions. Standard recommended doses of intravenous thiopentone and succinyl choline were administered during all sessions. A LUBO cervical jaw thrust collar (Inovytech Medical Solutions, Israel) was used to maintain the upper airway patency in THRIVE technique. For THRIVE, the flows were adjusted between 30-70 L/min and delivered through a single-use custom-built nasal cannula. Any intra-procedural SpO₂ value less than 92% was defined as desaturation in both techniques. Intra-procedural SpO₂ values were recorded at eleven-time points (T0-T10) in both techniques. Haemodynamic parameters were noted down at three-time points (H0, H1, H2). Time to awakening (from the cessation of last motor seizure activity to the first verbal response to command) and motor seizure duration were also documented.

Results and Discussion:There was one desaturation (<92%) event in the THRIVE technique requiring intervention with facemask ventilation and none in the FM technique. Average (mean ± SD) intra-procedural SpO₂(%) in FM and THRIVE techniques were 99.41 ± 0.3 and 99.45 ± 0.3, respectively. No peri-procedural airway complications were observed in both techniques. No statistical difference was found in haemodynamic parameters, seizure duration(sec) {FM vs THRIVE (Mean ± SD): 40.8 ± 15.5 vs 40.2 ± 13.1 (P=0.67)} and time to awakening(min) {FM vs THRIVE (Mean ± SD): 6.9 ± 2.8 vs 7.1 ± 3.1(P=0.49)} between the two techniques.

Conclusion:The hands-free THRIVE technique with cervical jaw thrust collar is non-inferior to the conventional FM technique during ECT.

7502 Disseminated Intravascular Coagulation during Olfactory Neuroblastoma resection

Pujol E.¹, Baca B.¹, Ricart A.¹, Diaz E.¹, Hernandez C.¹
¹Hospital Universitari Dr Josep Trueta - Girona (Spain)

Background: Disseminated intravascular coagulation (DIC) is an haemostatic disorder characterized by the activation of coagulation path with concomitant consumption of platelets and coagulation factors. The incidence during brain tumor resection is low. We present a case of DIC, diagnosed by clinical signs and Thromboelastography (TEG) test, during intracranial resection of olfactory neuroblastoma with fatal haemorrhagic shock and irreversible ventricular arrhythmia.

Case Report: A 64yo woman was admitted to the Neurosurgery Department of Girona U. Hospital for an elective frontal craniotomy. She was diagnosed with olfactory neuroblastoma. The first clinical signs were bradypsychia and epistaxis after that, a low level of awareness was established (Glasgow coma scale score of 12) during hospital stay. Magnetic resonance (MRI) revealed left nasoethmoidal mass with intracranial massive extension and a midline brain shift with subfalci herniation. The preoperative Platelets and Fibrinogen were altered (127 10³/mcL and 57mg/dL respectively). The patient was anesthetized under general endovenous anesthesia and she was monitored according to the standardized neuroanesthesia guidelines. During the resection of the tumor, sudden bleeding with hemodynamic instability was objectivated. Therefore, we administered a blood transfusion and we obtained a TEG test. The trace of TEG showed hyperfibrinolysis and all the parameters were altered. At this stage, we observed nasal mucosa bleeding. The diagnosis of disseminated intravascular coagulation was established and the patient received 1000 units of Prothrombin complex concentrate, 2 units of platelets, 3g of Fibrinogen, 2g of Tranexamic acid, and 4500ml of Crystalloids. Ventricular fibrillation was registered on electrocardiogram (ECG) and cardiopulmonary resuscitation (CRP) maneuvers were started which resulted ineffective after 35 minutes of resuscitation.

Discussion and learning points: In brain surgery, the origin of DIC is multifactorial although, the tissue factor appears to play an important role in triggering coagulation path. Correction of the coagulopathy should have been done for her preoperative optimization. Moreover, a rapid diagnosis and management of DIC during the surgery seem to be crucial to avoid a fatal outcome.

References:

1. Pasternak JJ, Hertzfeldt DN, Stanger SR, Walter KR, Werts TD, et al. Disseminated intravascular coagulation after craniotomy. *J Neurosurg Anesthesiol.* 2008;20(1):15–20

7613 Cardiopulmonary resuscitation in prone position during spine surgery: Case-by-case.

Burgos Santamaría A.¹, Arnalich A.¹

¹Hospital General Universitario Gregorio Marañón - Madrid (Spain)

Background: Prone position is necessary for some neurosurgical and orthopedic procedures. Intraoperative cardiac arrest in a prone positioned patient is a rare complication. The most frequent causes are air embolism, reduced venous return and hypovolemia.¹ Cardiopulmonary resuscitation (CPR) in prone position (or "reverse" CPR) was first described by McNeil. Since then, successful cases of reverse CPR have been reported. However, the quality of evidence is low and only general indications are provided by the guidelines. We report the case of a patient who suffered cardiac arrest during spinal cord surgery.

Case Report: A 72-year-old woman who presented acute spinal cord compression was scheduled for surgical spinal cord decompression and arthrodesis. After several hours of surgery, cardiorespiratory arrest occurs while patient was in prone position. Unstable spine and head fixation made turning the patient into supine position very difficult. Reverse CPR maneuvers were started with two-handed technique for chest compressions and biaxillary defibrillation pads. Successful cardiopulmonary resuscitation was performed and the patient recovered spontaneous circulation.

Discussion: If cardiac arrest occurs in a prone positioned patient turning

the patient into supine position could be complicated because of various reasons: 1) is a time-consuming maneuver 2) if intracranial or spinal cord surgery is in progress mobilising the patient could cause neurologic injuries 3) endotracheal tube displacement may occur.¹ Since 2005, guidelines recommend the early onset of reverse CPR maneuvers.² The abruptness of cardiac arrest makes difficult to design randomized studies, being a case-by-case evaluation a reasonable form to guide clinicians in reverse CPR.

References:

1. Moscarelli A, Iozzo P, Ippolito M, Catalisano G, Gregoretti C, Giarratano A, et al. Cardiopulmonary resuscitation in prone position: A scoping review. *Am J Emerg Med.* noviembre 2020;38(11):2416-24.

2. Link MS, Berkow LC, Kudenchuk PJ, Halperin HR, Hess EP, Moitra VK, et al. Part 7: adult advanced cardiovascular life support: 2015 American Heart Association guide-lines update for cardiopulmonary resuscitation and emergency cardiovascular care. *Circulation.* 2015;132:S444-64.

Learning points: If cardiac arrest occurs in prone position, reverse CPR might be reasonable being the main point the reduction of the no flow time to the heart and brain. The quality of evidence of CPR in prone position is low. Further studies are needed.

7664 Anaesthetic management in Moyamoya disease: a case report.

Ron Villalba Z.¹, Martínez Gascón A.¹, Cay Melero S.¹, Gloria Escobar S.¹, Lagen Coscojuela C.¹, Buriticá Aguirre A. M.¹
¹Hospital Arnau De Vilanova - Lleida (Spain)

Background: Moyamoya disease (MMD) is a cerebrovascular condition that presents progressive stenosis of large intracranial arteries around the circle of Willis with development of a network of small collateral vessels. The disease causes cerebral ischemia, intracranial aneurysms, intracerebral hemorrhages, headache, and seizures.

Case Report: We present the case of a 66-year-old man who underwent an axillo-bifemoral bypass due to severe peripheral vasculopathy. His medical history includes MMD, multiple cerebral ischemic lesions and transient ischemic attacks. He has a normal neurological examination. In the operating room balanced general anesthesia is performed by induction of intravenous drugs: propofol 1 mg/kg, lidocaine 1 mg/kg, rocuronium 0.6 mg/kg and continuous infusion of remifentanil 0.05 mcg/kg/min. Orotracheal intubation with Airtraq. Anaesthetic maintenance with deflurane guided by mean alveolar concentration >1 and bispectral index 40-60. We use continuous infusions of remifentanil and phenylephrine to optimize the hemodynamic management and achieve mean arterial pressure >80 mmHg, as well as goal-guided serum therapy looking for intravascular hypervolemia with a goal of diuresis of 4 mL/kg/h. We control pain in the immediate postoperative period with intravenous morphine prior to delivery. We perform a slow eduction with Bailey maneuver.

Discussion: There is no evidence in favor of a specific anaesthetic technique for induction or maintenance that reduces the risk of intra-post-operative complications in MMD. The main objectives are to maintain hemodynamic stability, avoiding hypotension that causes a decrease in cerebral blood flow (CBF), to achieve normocapnia and to maintain an adequate level of anaesthetic depth during induction, eduction and in critical periods of surgery, to avoid an increase in oxygen consumption at the brain. It is important to maintain normocapnia: hypercapnia dilates healthy cerebral vessels reducing perfusion in areas irrigated by pathological ones and hypocapnia generates cerebral vasoconstriction. Close neurological monitoring is essential during the perioperative period.

Learning points: The objective in MMD is to maintain the balance between the supply and demand of oxygen at the brain, ensuring an adequate CBF by avoiding hypotension, perform a correct anxiolysis and pain management and maintaining a state of hypervolemia to avoid episodes of ischemia. At the respiratory level, the goal is normocapnia.

Cardiac, Thoracic and Vascular Anaesthesiology

6559

Postoperative outcome in solitary kidney patients after an elective cardiac surgery

Ioannidis R.¹, Ampatzidou F.¹, Sifaki F.¹, Pistiolas G.¹, Gkiouliava A.¹, Asteri T.¹¹George Papanikolaou General Hospital of Thessaloniki - Thessaloniki (Greece)

Background and Goal of Study: Solitary kidney patients are not a rare patient group in cardiac surgeries. Our main goal was to identify if these patients have postoperative complications after an elective cardiac surgery.

Materials and Methods: We retrospectively investigated 4416 patients underwent an elective cardiac surgery from June 2012 until April 2021 in our hospital. The following factors were compared between the two-kidney patients and the solitary kidney patients: Reexploration (bleeding), Low Cardiac Output Syndrome (LCOS), postoperative use of Non Invasive Ventilation (NIV), AKI (KDIGO Criteria), postoperative Renal Replacement therapy (RRT), because of AKI, postoperative atrial Fibrillation (AF) and prolonged ventilation (>24 hours).

We conducted a statistical analysis using chi-square test.

Results and Discussion: From 4416 patients, 28 were solitary kidney patients.

	Group A n=9	Control group n=133	p
Age	58.9±13	61.5±9.2	
Preoperative Ejection fraction	31±11.7	35.5±12.4	
IABP	4 (44,4%)	57 (42,9%)	0,92
Postoperative AF	80 (74,1%)	197 (68%)	0,64
MODS	3 (33,3%)	19 (14,3%)	0,12
Inotrope infusion>24 h	6 (66,7%)	40 (30,1%)	0,02
PMI	0	12 (9%)	0,34
Mortality	3 (33,3%)	21 (15,8%)	0,17

No statistical significant relationship was found between the groups regarding all the investigating parameters.

Conclusion: Solitary kidney patients seem not to be in a higher risk of postoperative complications after elective cardiac surgeries.

6561

Perioperative flow-controlled ventilation (FCV) versus pressure-controlled ventilation (PCV) in elective on-pump cardiac surgery procedures: A prospective randomized-controlled clinical trial. Study acronym: FLOWVENTIN HEARTSURG.

Becker S.¹, Kurz C. T.¹, Geppert J.¹, Wichelhaus L. M.¹, Timmesfeld N.², Zahn P. K.¹¹University Clinic Bergmannsheil - Bochum (Germany), ²Medical Informatics, Biometry & Epidemiology, Ruhr-University Bochum - Bochum (Germany)

Background and main hypothesis: Flow-controlled ventilation (FCV) allows the control of gas flows during in- and expiration (1). This unique approach may reduce mechanical power and dissipated energy of invasive ventilation as new key determinants of ventilator-induced lung injury (VILI) (2,3). In on-pump heart surgery, lungs are at high risk of VILI and ischemia/reperfusion injury after cardiopulmonary bypass (CPB) with high clinical impact. We hypothesize that perioperative FCV in on-pump cardiac surgery reduces the inflammatory response due to VILI and CPB compared to conventional pressure-controlled ventilation (PCV).

Methods: FLOWVENTIN HEARTSURG is a single-centre interventional trial with either perioperative FCV or PCV in elective on-pump cardiac surgery procedures in adults. In the PCV-group, positive end-expiratory

pressure (PEEP) is individualized and the driving pressure (DP) is set to obtain a tidal volume of 6-8 ml/kg optimal body weight. Ventilation in the FCV-group is conducted above the lower and approximating the upper inflection pressure point of the airways, resulting in a personalized PEEP, DP and consequently tidal volume. As part of the perioperative study approach, lung aeration (EIT), lung and ventilatory functional parameters, plasmatic biomarker concentrations (ELISA), activation of circulating leucocytes (flow cytometry) as well as postoperative pulmonary and extra-pulmonary complications are assessed among others at different perioperative time points up to postoperative day 7.

Results and Discussion: The plasmatic IL-8 concentration 6 hours after termination of CPB is the primary study endpoint. The *a priori* power analysis for two study groups with a moderate effect size, α -error of 0.05 and a power of 0.9 resulted in a group size of 64 patients in each group. FLOWVENTIN HEARTSURG is the largest randomized-controlled trial on perioperative flow-controlled ventilation. The trial is ongoing and preliminary results will be presented the first time.

Conclusion: The optimal perioperative ventilatory protocol in on-pump heart surgery is under current debate (4). Thus, our study data may enhance perioperative care in this fragile patient population but also our understanding of perioperative ventilation in general.

References:

1. Spraidler, P et al. Crit Care 2020;24:662,
2. Cressoni, M et al. Anesthesiology 2016;124:1100,
3. Barnes, T et al. Med Hypotheses 2018;121:167
4. Lagier, D et al. Intensive Care Med 2019;45:1401.

6578

Passive leg rising test predicts fluid responsiveness during high thoracic epidural anesthesia after off-pump coronary surgery

Volkov D.¹, Paromov K.¹, Kirov M.²¹City Clinical Hospital № 1 named after. Volosevich - Arkhangelsk (Russia), ²Northern State Medical University - Arkhangelsk (Russia)

Background and Goal of Study: In off-pump coronary artery bypass grafting (OPCAB), high thoracic epidural anesthesia (HTEA) can reduce the number of perioperative complications. Passive leg rising (PLR) is a non-invasive reversible dynamic test for assessment of fluid responsiveness, which efficacy was confirmed in numerous studies. However, the effects of HTEA on performance of PLR in coronary surgery are still unsettled. The aim of our study was to estimate the influence of HTEA on the predictive value of PLR after OPCAB.

Materials and Methods: Thirty-five patients scheduled for elective OPCAB were enrolled into a single-center prospective observational pilot study. All patients received sevoflurane anesthesia (1 MAC), fentanyl 2-4 µg/kg/h and HTEA. An epidural catheter was inserted at Th2-5 level with administration of 0,5% ropivacaine 1 mg/kg before surgery and continuous infusion of ropivacaine 0.2% and fentanyl 2 µg/mL at a rate of 3-8 mL/h postoperatively. We measured cardiac index (CI) using Swan-Ganz catheter and assessed blood gases. To estimate response to fluid therapy after OPCAB, we used PLR test and fluid challenge test (FCT) (7 ml/kg of crystalloids during 15 min). FCT was used as a "gold standard" for assessment of fluid responsiveness. Patients with CI increase after tests by >10% were estimated as responders.

Results and Discussion: One patient was excluded from analysis due to transfer to cardiopulmonary bypass. Mean CI at the end of operation was 1,86 ± 0,6 l·min⁻¹·m⁻². After PLR and FCT, CI increased to 2,25 ± 0,7 l·min⁻¹·m⁻² (p<0,01) and 2,43 ± 0,8 l·min⁻¹·m⁻², respectively (p<0,01). 23 (67,6%) and 27 (79,4%) patients were classified as responders to PLR and FCT. During ROC analysis, the area under curve for PLR was 0,89 (p=0,048) with sensitivity 74,1%, specificity 57,1%, positive and negative prognostic values 80,5% and 48,0%, respectively.

Conclusion: During HTEA after OPCAB, the PLR can be used for prediction of fluid responsiveness and for goal-directed fluid therapy.

6618

Multicenter international survey on the clinical use of inhaled nitric oxide

Van Loon K.¹, Rossaint R.², Saraçoglu A.³, Marczin N.⁴, Rex S.¹

¹University Hospitals Leuven - Leuven (Belgium), ²Department of Anaesthesiology, University Hospitals of the RWTH Aachen - Aachen (Germany), ³Clinic of Anesthesiology and Intensive Care, Marmara University Pendik Training and Research Hospital - Istanbul (Turkey), ⁴Department of Surgery & Cancer, Section of Anaesthetics, Imperial College London; Harefield Hospital, Royal Brompton & Harefield Hospitals, Harefield - London (United Kingdom)

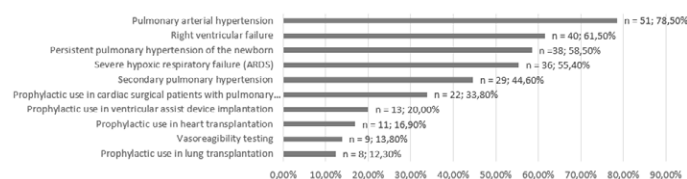
Background and Goal of Study: To evaluate the current practices of the use of inhaled nitric oxide in different settings and to identify potential pitfalls.

Materials and Methods: Web-based survey with 42 questions addressing organizational background, availability, indications and practical considerations regarding the use of iNO; approved by the board of ESAIC, endorsed by the European Association of Cardiothoracic Anaesthesiologists and sent via email to ESAIC members.

Results and Discussion: 65 anaesthesiologists from 27 countries who had iNO available at their institution participated in this survey, the majority of whom were affiliated with university hospitals. The survey demonstrated that pulmonary arterial hypertension, right ventricular failure, persistent pulmonary hypertension of the newborn and ARDS were the main indications for treatment with iNO. Prophylactic use of iNO during heart and lung transplantation or VAD implantation surgery was only reported by a small minority. A third of the respondents had institutional guidelines for the use of iNO. 10-20 ppm and 20-40 ppm of iNO were most frequently reported as initial and maximum treatment doses, respectively. Echocardiography was the most universally used form of advanced hemodynamic monitoring during treatment with iNO, followed by pulmonary artery catheterization. Half of the respondents had a fixed strategy to prevent rebound pulmonary hypertension in patients that were to be weaned from iNO, consisting mostly of the use of phosphodiesterase inhibitors, prostacyclins and calcium channel antagonists. About half of the respondents indicated that therapy with iNO was reimbursed in their country.

Conclusion: The survey demonstrated that in line with the available evidence and expert recommendations, the use of iNO remains a rescue treatment reserved for the most severe cases. Indications vary and only a minority of respondents had institutional guidelines available for informed decision-making. The observations made in this survey should inspire future research to help define the role of iNO in the setting of an ARDS-pandemic and the emergence of alternative selective pulmonary vasodilators.

Indications for which iNO is used per institution



6622

Plasma Annexin V levels as a marker of early cardiac complications after on-pump coronary artery bypass grafting

Loskutov O.¹, Maruniak S.¹, Druzhyna O.², Malysh I.³, Korotchuk N.²

¹Shupyk National Medical Academy of Postgraduate Education - Kyiv (Ukraine), ²Heart Institute Ministry of Health of Ukraine - Kyiv (Ukraine), ³Clinical Municipal Communal Emergency Hospital - Kyiv (Ukraine)

Background and Goal of Study: High serum Annexin V levels in patients with acute myocardial infarction and cardiac arrest may reflect the severity of myocardial and / or other visceral damage, and measurement of Annexin V plasma concentrations may help assess patient prognosis [1]. The aim of the study was to analyze the dynamics of Annexin V during on-pump coronary artery bypass grafting (CABG) and the dependence of anesthesia scheme on its level.

Materials and Methods: The study included 30 patients with coronary heart disease who underwent on-pump CABG. The median age of patients was 59.0 (55.0; 62.0) years. The average body weight is 92.1 ± 17.2 kg. The median operational risk for EuroSCORE II was 3.45% (2.15%; 4.05%). According to the anesthetic management, all patients were divided into two groups: the study group (13 patients) – low opioid anesthetic scheme; the control group (17 patients) – a standard scheme of anesthetic management. The determination of the level of Annexin V in the blood plasma was performed directly before anesthesia and after sternum reduction by ELISA.

Results and Discussion: The low-opioid scheme of anesthetic management was in 1.5 times significantly lower the level of Annexin V after sternum reduction as compared to the standard scheme (0,85±0,52 pg/ml against 1,28±0,75 pg/ml, p=0,047). Patients in the study group significantly less often recorded low cardiac output syndrome (LCOS) (7.6% vs. 17.6%, p = 0.427). One-way analysis of variance showed that patients who had LCOS in the postoperative period had a significantly higher level of Annexin V after sternum reduction (p = 0.001). Atrial fibrillation (AF) was also significantly less common in the study group than in the control group (15.4% vs. 29.4%, p = 0.368), but no significant association was found between Annexin V levels and postoperative AF frequency (p = 0.403).

Conclusion: The use of multimodal low-opioid anesthesia is characterized by lower level of Annexin V compared to the standard group. Higher levels of Annexin V associated with the development of LCOS.

References:

- Matsuda R, Kaneko N, Kikuchi M, Chiwaki F, Toda M, Ieiri T, Horikawa Y, Shimizu M, Shimamoto K. Clinical significance of measurement of plasma annexin V concentration of patients in the emergency room. Resuscitation. 2003 May;57(2):171-7. doi: 10.1016/s0300-9572(03)00034-0.

6629

Intraoperative α power and its correlation with the occurrence of postoperative delirium (POD) in cardiac surgery with cardiopulmonary bypass (CPB): preliminary results of a prospective observational cohort study

Khalifa C.¹, Stouffs A.¹, Lemaire G.¹, De Kerchove L.¹, Mouraux A.², Momeni M.¹

¹UCL - Cliniques Universitaires Saint-Luc - Brussels (Belgium), ²UCL - Institute of Neuroscience - Brussels (Belgium)

Background-Goal of Study: POD is a frequent issue after cardiac surgery. Analysis of the EEG frontal α band might be an objective tool to unmask brain vulnerability to anaesthesia and surgery. Our aim is to evaluate whether the power of frontal α oscillations after weaning from CPB is associated with the occurrence of POD.

Materials-Methods: In this ongoing study (NCT03706989), we analysed EEG data from 100 adult patients who underwent elective cardiac surgery under sevoflurane anaesthesia. In total, 220 patients need to be included. An intraoperative 32-channel EEG recording of 5 min was collected, at least 30 min after weaning from CPB. POD was screened using CAM-

ICU, CAM and a chart review until hospital discharge. Alpha (7-13Hz) average power, peak power and peak frequency were extracted from the spectral analyses using MATLAB®. Results were log-transformed to obtain normally distributed data. Student t-test, Mann Whitney U and Chi square tests were used. A multivariate regression analysis was used to predict POD including age and EEG data that showed significant difference in the univariate analysis. **Results-Discussion:** Table 1 shows patients' characteristics. Patients who developed POD had significantly lower average α power and lower peak α power than patients who did not. In multivariate analysis, when taking account for age >74 y, this difference was not statistically significant (Table 2). **Conclusion:** Preliminary results of this currently underpowered study suggest that patients with lower intraoperative average α power might have a higher risk of developing POD after cardiac surgery.

TABLE 1	POD- (n=72)	POD+ (n=28)	p
Age,y	68(56-76)	74(65-81)	0.01
CPB time,min	97(76-119)	114(86-133)	0.06
α avg power (log10)	-0.44±0.22	-0.57±0.2	0.01
α peak power (log10)	-0.21±0.24	-0.35±0.23	0.01
α peak frequency (log10)	0.95±0.05	0.95±0.05	0.63

TABLE 2	OR (95%CI)	p
α avg power (log10)	0.91 (0.01-1.03)	0.05
age >74y	1.49 (0.53-4.14)	0.45
α peak power (log10)	0.15 (0.02-1.26)	0.08
age >74y	1.61 (0.59-4.41)	0.36

Results: median (P_{25} - P_{75}), mean±SD

6638

Predictors of LCOS in the early postoperative period after coronary artery bypass grafting

Maruniak S.¹, Loskutov O.¹, Druzhyna O.², Malyshev I.³

¹Shupyk National Medical Academy of Postgraduate Education - Kyiv (Ukraine), ²Heart Institute Ministry of Health of Ukraine - Kyiv (Ukraine), ³Clinical Municipal Communal Emergency Hospital - Kyiv (Ukraine)

Background and Goal of Study: Despite the use of modern intraoperative cardioprotective techniques, cardiac surgery causes damage to cardiomyocytes, which can be clinically manifested by low cardiac output syndrome (LCOS) in the early postoperative period. The aim of our study was to analyze the predictors of the development of LCOS in the early postoperative period after coronary artery bypass grafting (CABG).

Materials and Methods: The study included 120 patients with coronary heart disease who underwent on-pump CABG. The mean age of patients was 61.6±4.1 years. According to the scheme of anesthesia, all patients were divided into two groups: experimental group (60 patients) – low-opioid scheme of anesthesia; control group (60 patients) – standard scheme of anesthesia. Blood levels of IL-6 were determined directly before anesthesia and after sternum reduction by ELISA.

Results and Discussion: Experimental group was characterized by 2.3 times less frequency of LCOS compared to control group (11.7% vs. 26.7%, $p=0.037$). Significantly correlated with LCOS such indicators as the duration of aortic cross-clamping ($r=0.208$, $p=0.015$), the level of IL-6 after sternum reduction ($r=0.517$, $p=0.001$) and ejection fraction (EF) before surgery ($r=0.193$, $p=0.011$). The results of the regression model [F (8, N=120)=6.748, $p<.001$, $R^2=0.327$] showed that only the EF before surgery ($p=0.036$), the duration of cardiopulmonary bypass (CPB) ($p=0.028$), the duration of aortic cross-clamping ($p=0.044$) and the level of IL-6 after sternum reduction ($p=0.001$) were significant predictors of LCOS. When removing insignificant factors from the regression model, reliable indicators for the prediction of LCOS were the duration of CPB ($p=0.032$) and the level of IL-6 after sternum reduction ($p=0.004$). The final statistical model [F (4, N=120)=12.52, $p<.001$, $R^2=0.304$] covers almost a third of all factors in the development of LCOS. In order to assess

the effectiveness of predicting LCOS from the level of IL-6 after sternum reduction, we constructed a ROC-curve. We found that at a cutoff value for IL-6 of 42.5 pg / ml, the sensitivity and specificity of the test were 73.1% and 75.5%, respectively, the area under the curve - C-0.84 (95% CI 0.77-0.92) (Fig. 1).

Conclusion: The results of the study showed that the levels of IL-6 during cardiac surgery can be used with high sensitivity and specificity to predict the development of LCOS.

6652

FLAVOUR-study: Flow patterns And postoperative VasOplegia in mechanical circUlatory support

Kersten B. J.¹, Van Der Schoot M.¹, Ramjankhan F.¹, De Jong M.¹, Van Laake L.¹, De Waal E.¹ Department of Anaesthesiology, Department of Intensive Care, Department of cardiothoracic surgery, Perfusion group Heart Beat, Department of Cardiology, University Medical Centre Utrecht, Netherlands.

¹UMC Utrecht - Utrecht (Netherlands)

Background: Vasoplegia is a common immediate postoperative complication after continuous flow left ventricular assist device (cLVADs) implantation in the treatment of end-stage heart failure (ESHF). Several risk factors have been identified. We investigated whether there is an association between the incidence of vasoplegia and the specific properties and flow patterns of these devices (axial flow: Heartmatell (HMII), centrifugal flow Heartware (HVAD), and centrifugal flow with intrinsic pulse Heartmate 3 (HM3)) as this have never been reported.

Materials and Methods: This observational study, conducted in accordance with the declaration of Helsinki, was approved by the IRB, with exemption from ethical approval as no investigational treatment was performed. Adult patients with ESHF, scheduled for primary long term cLVAD implantation were included. Vasoplegia was defined based on a vasodilation criterion, a hemodynamic criterion and high vasopressor requirements as previously published by de Waal. Primary endpoint was the overall incidence of vasoplegia after cLVAD implantation and its incidence in each flow pattern group. Statistical analysis included One-way ANOVA or the chi-squared test.

Results and discussion: The overall incidence of vasoplegia was 25.3% (73 out of 269), while the incidence was 30.3%, 25.0% and 18.9% in the HMII, HVAD and HM3 group respectively ($p=0.160$). Significant differences were observed in preoperative age, INTERMACS class, CRP, liver enzymes and antihypertensive drugs, and lower preoperative hemoglobin (Hb) levels in the HMII group (HMII<HVAD<HM3, $p<0.01$), higher intraoperative PC and FFP administration in the HMII group (HMII>HVAD>HM3, $p<0.05$), and lower postoperative Hb levels in the HMII group (HMII<HVAD<HM3, $p<0.01$).

Differences in the release of pro- and anti-inflammatory cytokines due to blood transfusions, specific internal properties of the various assist devices, such as hemocompatibility (axial flow is thought to be less hemocompatible) and their specific flow patterns with higher shear stress on the endothelial wall during continuous flow versus centrifugal flow with artificial pulse, may have contributed to the observed differences in vasoplegia.

Conclusion: The trend towards lower incidence of vasoplegia in the HM3 group may partly be explained by less intraoperative administered blood products, improved hemocompatibility with lower internal shear stress, and reduced shear stress on endothelial cells.

6685 Increased episodes of intraoperative hypotension as independent risk factor for the development of postoperative delirium after cardiac surgery: a retrospective cohort study

Mohr N.¹, Jung H.¹, Zittermann A.¹, Gummert J.¹, Hulde N.¹, Von Dossow V.¹

¹Herz- und Diabeteszentrum Bad Oeynhausen - Bad Oeynhausen (Germany)

Background and Goal of Study: There is growing evidence that intraoperative hypotension (IOH) might be associated with adverse outcome. Primary aim of this study was to determine the impact of IOH on adverse neurological outcome. Secondary outcome included all-cause mortality thirty days and one year after surgery.

Materials and Methods: This retrospective cohort study included 31.315 adult patients who underwent cardiac surgery at the Heart and Diabetes Centre NRW between January 2009 and December 2018. Adverse neurological outcome was defined as postoperative delirium and stroke. IOH was defined as mean arterial pressure (MAP) under 60 mmHg for > 2 minutes. The frequency of IOH episodes, the cumulative IOH duration and the severity (depth) of hypotensive episodes were recorded. The association between IOH and adverse neurological outcome was examined with univariate and multivariate logistic regression analysis.

Results and Discussion: 849 patients (2.9 %) developed postoperative stroke and 2401 patients (7.7 %) developed postoperative delirium. Mean frequency of IOH episodes was 6 (25th/75th percentile 4/9), mean time under MAP threshold of 60 mmHg was 45 minutes (25th/75th percentile 18/84) and mean blood pressure level under threshold was 50 mmHg (25th/75th percentile 50/55) in all patients. Frequency of IOH episodes was an independent predictor of postoperative delirium in the multivariate analysis (OR 1.02, 95 % CI 1.01 - 1.03, p < 0.05). Cumulative duration of IOH was significantly associated with higher 30-day-mortality (OR 1.003, 95 % CI 1.00 - 1.01, p < 0.01) and 1-year-mortality (OR 1.004, 95 % CI 1.00 - 1.01) in multivariate logistic regression. There was no association of IOH duration and adverse neurological outcome in multivariate logistic regression.

Conclusion: This large retrospective cohort study revealed that increased episodes of IOH are associated with the risk of developing postoperative delirium after cardiac surgery. This might have important clinical implications with respect to a precise hemodynamic monitoring and proactive treatment, especially in patients with increased risk for delirium. In addition, longer cumulative IOH duration is associated with increased mortality. However, further prospective randomized trials are necessary to develop stronger evidence and to assess the benefits of intraoperative blood pressure management techniques in cardiac surgery.

6720 Anaesthetic management of a patient with giant pulmonary bullae for video-assisted thoracoscopic surgery (VATS) bullectomy: a case report

Eloy A.¹, Tinoco J.¹, Dias C.²

¹Centro Hospitalar Setúbal - Setúbal (Portugal), ²Centro Hospitalar Lisboa Central - Lisboa (Portugal)

Background: The term giant bulla (GB) is used for bullae that occupy at least 30 percent of a hemithorax¹. It is a rare entity nowadays, largely due to the earlier and better approach to pathologies such as emphysema and tuberculosis.

Case Report: 52-year-old female patient (61kg) with history of chest pain and shortness of breath, admitted for VATS bullectomy. She had hypertension and past history of tuberculosis 5 years ago with 2-year complicated treatment. CT scan revealed a GB with left lung compression of 70% with severe right mediastinal shift. A left internal jugular venous catheter and radial artery catheter were placed prior to induction. Patient was preoxygenated for 6 minutes with 100% oxygen at 8L/min. Induction was completed with fentanyl 0.1mg, etomidate 5mg, ketamine 30mg, propofol 30mg and rocuronium 70mg. A 35-Fr left double lumen tube was inserted with direct laryngoscopy until it passes the vocal cords, then it was inserted with bronchofibroscope guidance until correct positioning

was confirmed. Tidal volume was set at 4 to 5mL/Kg, rate of 18-20 breaths/min and PEEP 4. Propofol was used to maintain anesthesia with BIS at 40-55. After resection, two-lung ventilation was cautiously initiated with increasingly higher tidal volumes for safe and slow re-expansion.

Discussion: Complications like enlargement of bullae during anesthesia, tension pneumothorax and pneumopericardium requiring immediate management, haemorrhage due to vascular damage, worsening hypoxemia because of preexisting emphysema and re-expansion edema can easily complicate these cases. Measures to avoid and control life-threatening events are essential, like periodic arterial blood gas analysis, immediate availability of chest drain and meticulous invasive monitoring. Ventilatory strategies like larger ETT, high FiO₂, tidal volumes 4-6mL/Kg, Pplat<30cmH₂O, allowing permissive hypercapnia and increase expiratory time to prevent air trapping are essential. Avoidance of hyperventilation, hyperinflation and N₂O are key. After resection, initiating two lung ventilation with low tidal volumes is crucial for slowly re-expand the collapsed lung.

References:

1. J of Clinical and Diagnostic Research. 2019 Aug, Vol-13(8):UD01-03
2. J of Intern. Medical Research 49(4)1-5

Learning points: Anaesthetic management of these patients is challenging and requires careful investigation and understanding of anatomical and pathophysiological variation of disease.

6723 Ventricular septal bulge in patient undergoing liver transplantation

Barrera Bohórquez L. C.¹, Tesouro A.², González-Suárez S.²

¹Hospital Universitario Vall d'Hebrón - Barcelona (Spain), ²Hospital Universitario Vall d'Hebrón - Barcelona (Spain)

Background: Cirrhotic patients can suffer cardiomyopathy associated with cardiac chamber enlargement and left ventricular wall thickness; but an isolated hypertrophy of the basal segment of the interventricular septum (sigmoidal septal shape or septal bulge) can also be found in elderly hypertensive patients¹ and can be difficult to distinguish from hypertrophic cardiomyopathy.

Case Report: The patient was a 69-yr-old male, no previous cardiac pathology, with hypertension and end-stage alcoholic liver disease underwent liver transplantation. After clamping of the inferior vena cava (IVC), the patient developed hypotension (blood pressure 54-32 mmHg), tachycardia (140 bpm) and decreased pulmonary capillary pressure (5 mmHg). The patient didn't improve with fluid replacement. A transesophageal Echocardiography (TEE) was performed and showed basal septal wall thickness of 14 mm, mid-septal wall thickness of 7 mm, an increased left ventricular outflow tract velocity 3.32 m/sec with maximal gradient of 78 mmHg, and systolic anterior movement of mitral valve with moderate mitral regurgitation. Hyperkinesis of all segments of left ventricular (LV) and no signs of structural disorder of the myocardium were seen. No restrictive LV filling pattern was seen (E/A ratio 1,2; E/e' ratio 11). Fluid was replaced according to LV dimensions on TEE and an infusion of phenylephrine (0,2 µg/kg/min) and esmolol (70 µg/kg/min) were started and continued throughout the surgery. No hemodynamic repercussions were observed during the reperfusion phase.

Discussion: Left ventricular outflow tract obstruction is produced by the thickening of the proximal interventricular septum (proximal to mid/distal septal thickness ratio ≥1,3-1,5), and by the sigmoid-shaped septum. These factors are associated with a sharper angulation between the long axes of the LV and the aorta (aortoseptal angle < 110°) that could favor a Ventury mechanism with an increase of outflow tract velocity² and low cardiac output.

References:

1. Canepa M et al. Heart 2016; Jul 15: 102(14): 1087-94.
2. Krasnow N et al. J Am Soc Echocardiogr 1997;10:545-55.

Learning points: Patients with basal septal bulge do not usually present LVOTO at rest, but they are particularly susceptible to LVOTO in case of hypovolemia, tachycardia and increased ventricular contraction during clamping or unclamping of the IVC in liver transplantation.

6727

Efficacy of broncho-alveolar lavage in pulmonary alveolar proteinosis: bilateral or single sessions?

Barrera Bohórquez L. C.¹, García T.², González-Suárez S.²
¹Hospital Universitario Vall d' Hebrón - Barcelona (Spain), ²Hospital Universitario Vall d' Hebrón - Barcelona (Spain)

Background: The gold standard therapy for pulmonary alveolar proteinosis (PAP) is the broncho alveolar lavage (BAL), but this procedure has not been yet standardized because PAP is a rare disorder and each institution has its own protocol 1.

Case Report: A 40-years-old man was underwent to general anesthesia for sequential bilateral BAL. The peripheral blood saturation (SpO₂) was 89% on room air. After anesthetic induction, a left sided double-lumen endotracheal tube (DLT) was introduced. Volumen controlled ventilation was performed with tidal volumes for each lung of 350 mL at a rate of 15 breaths per minute, PEEP was 5 cmH₂O and FiO₂ between 0.6-0.9%. Prior to lung lavage, de-nitrogenating of the lung was carried by ventilation with 100% oxygen for 15 min. The patient was positioned in supine position with anti-tren 30°. Then, 200 mL saline was instilled to fill the lung and after aliquots of 350 mL normal saline at 38° was infused with the bags hanging 40 cm above the mid-axillary line into the lung. Afterwards the effluent was drained passively. This procedure was repeated until the rinsed fluid is clear. A total of 12 L saline was used for lavage this lung. In the same procedure, this algorithm was applied to the right lung. A total of 13 L of saline was used and after procedure extensive suction of the residual solution was required for the better oxygenation and the trachea was extubated. The duration of the total procedure was 6 hours. Two years later the procedure was repeated; first left-sided BAL and a week later washing the right side. The duration of each lung lavages was 4 h and 13 L saline was used for lavage of the left lung and 14 L saline for the right lung. No complications were seen. In both procedures the average improvement in PO₂ levels after BAL was 25 mmHg withing the first week and clinical benefits were 24 months.

Discussion: Anaesthetic management in patients with PAP involved integrated lung isolation, optimal positive end-expiratory pressure and use of recruitment manoeuvres for the lavaged lung. Usually the procedure is well-tolerated and improves respiratory distress.

References:

1. Cormac McCarthy et al. *Curr Opin Pulm Med* 2019 Sep; 25(5): 450-58.

Learning points: In patients with pulmonary alveolar proteinosis, the decision to perform a sequential bilateral BAL or a BAL in separate sessions for each lung must be individualized, and the two options can be valid to optimize oxygenation.

6765

Anaesthetic management for non-cardiac surgery in patients with left ventricular assist device. A third level Spanish centre experience.

Comino-Trinidad O.¹, Fernández-Esmerats A.¹, Borrat X.¹, López-Baamonde M.¹, Balust J.¹
¹Hospital Clínic - Barcelona (Spain)

Background and Goal of Study. Left ventricular assist devices (LVAD) are an alternative for patients with end-stage cardiac failure when heart transplant is contraindicated, not available or as bridge to trasplant. The use of LVAD is increasing and a growing number of patients require anaesthesia for non-cardiac procedures. Here we report our experience in this setting.

Materials and Methods. All anaesthetic procedures for non-cardiac surgery performed in patients with LVAD at our centre were reviewed since the first device was implemented in 2014 until 2020. Demographic data, perioperative management and complications were assessed.

Results and Discussion. 6 LVAD were implanted at our hospital, all in males between 20 and 67 years old. HeartMate II was implemented in 2 (33%) patients and HeartMate III in 4 (67%), 3 (50%) due to dilated myocardiopathy, 2 (33%) due to ischemic heart disease and 1 (17%) due to Fallot tetralogy. 2 (33%) LVAD were implemented as a definitive

therapy and 4 (67%) as bridge therapy. 5 patients underwent anaesthesia for non-cardiac surgery in a total of 17 procedures: 1 (6%) debridement of driveline infection, 1 (6%) resection of a rectal tumour, 1 (6%) due to tracheostomy bleeding, 3 (18%) endovascular cerebral procedures and 11 (65%) endoscopies, 6 (55%) of which required a biopsy or a polypectomy. 7 (41%) were emergency procedures. Endoscopies, endovascular procedures and debridement of driveline infection were performed under sedation with standard monitoring (non-invasive arterial pressure, oxygen saturation and electrocardiogram). Resection of rectal tumour was done in prone position under general anaesthesia with standard monitoring, invasive pressure monitoring, use of transoesophageal echocardiography and regional cerebral oxygen saturation. Vasoactive agents were used in 2 (12%) cases and intensive care unit postoperative care was required after 6 (35%) of the procedures. No patients died during admission. The most significant complication after endoscopy was bleeding (55%), which required transfusion in 2 (18%) cases. None of the procedures were cared by cardiac anaesthesiologists.

Conclusions. The majority of patients with LVAD presenting for non-cardiac surgery will require an endoscopy due to gastrointestinal bleeding, which can be done under sedation with standard monitoring. A cardiac anaesthesiologist may not be required for most of the procedures.

Reference:

1. *J Cardiothorac Vasc Anesth.* 2018 Apr;32(2):1001-1012.

6778

Left coronary artery trunk occlusion after insertion of aortic valve prosthesis

Barrera Bohórquez L. C.¹, Blázquez J.¹, Martín S.¹, González-Suárez S.¹
¹Hospital Universitario Vall d' Hebrón - Barcelona (Spain)

Background: The optimal result of aortic valve surgery does not only depend on pressure changes between the left ventricle and the aorta, it also depends on dynamic changes at the level of the entire aortic root that facilitates the opening and closing movements of the valve. Structural alteration or distortion of the geometric proportions of the aortic root components can condition a valve dysfunction and even a deficient coronary flow1.

Case Report: 28-year-old patient affected by bicuspid aortic valve with double severe valve lesion, underwent aortic valve replacement surgery. The insertion of the prosthesis (Carpentier-Edwards Perimount 19) was difficult due to a small and dysmorphic aortic root (22 mm). After adequate rewarming, cardiopulmonary bypass was discontinued and three minutes later a refractory hypotension and ventricular fibrillation was seen without response to defibrillation (10 J). After four attempts of discontinuation of cardiopulmonary bypass, a severe dysfunction of left ventricle (ejection fraction 10%) was seen as well as lack of flow in the left coronary artery trunk (Midesophageal Aortic valve Short-axis 40° view) and a distance of 7 mm between the origin of the left coronary artery trunk and the insertion of the prosthesis (Midesophageal Aortic valve Long-axis 130° view). An obstruction of the left coronary artery trunk by the aortic prosthesis was suspected due to a small and distorted aortic root. In view of these findings, an enlargement of the aortic root was performed, and the biological prosthesis was changed by another mechanic (OnX 19 mm). The final transesophageal echocardiography showed a mechanical prosthesis in an aortic position, with correct angulation, mean gradient of 10 mmHg and an improved ventricular movement (ejection fraction 45%).

Discussion: Although coronary occlusion is not common in aortic valve surgical replacement, it must be considered in those patients with distortion of the geometric proportions of the aortic root components and/or a small aortic root, with difficulty in the discontinuation of cardiopulmonary bypass.

References:

1. P Garcí-González et al. *Cir Cardiovasc.* 2016; 23 (4): 187-91.

Learning points: To avoid coronary arteries obstruction after aortic valve surgical replacement, the minimum distance values between the origin of the coronary arteries and the insertion of the prosthesis leaflets is indicated to be of 10-14 mm measured with transesophageal echocardiography.

6793

The impact of sinotubular junction diameter threshold on pressure recovery adjustment for disease severity in transcatheter aortic valve replacement patients

Gonzalez Ciccarelli L. F.¹, Ferrufino R.¹, Alfadhel A.¹, Quraishi S.¹, Brovman E.¹, Smith J. E.¹

¹Tufts Medical Center - Boston (United States)

Background: Pressure recovery (PR) is thought to influence aortic valve area (AVA) calculations in patients with sinotubular junction (STJ) diameter <3cm. Preliminary evidence for our group suggest that a significant proportion of patients with a larger aorta may still reclassify from severe to moderate aortic stenosis after PR adjustment. Therefore, our goal was to determine the proportion of patients with STJ diameter >3cm that would reclassify after PR adjustment and to determine the optimal threshold for PR adjustment to best characterize disease severity. **Materials and Methods:** We performed a retrospective, single center study of transcatheter aortic valve repair patients from 10/2012-03/2020. Pre-procedure standard measurements and mean transaortic gradients were obtained via transthoracic echocardiograms. AVA was calculated using the continuity equation. PR and PR adjusted AVA were calculated using validated equations. STJ diameter was obtained from pre-procedure computerized tomography scans. Chi-square test was used to compare proportions of patients who reclassified using different STJ diameter thresholds

Results: After excluding all patients with >mild mitral or aortic regurgitation, a total of 544 patients were included in the final analysis (Table 1). 73/365 (20%) patients with STJ diameter <3cm reclassified, while 36/179 (20%) patients with STJ diameter ≥ 3cm reclassified. Alternatively, 104/109 (95%) patients with STJ diameter <3.5cm reclassified, while 5/109 (5%) patients with STJ diameter ≥ 3.5cm reclassified. The number of patients with larger sized aorta who reclassified when the threshold was moved from 3cm to 3.5cm was significantly lower (P<0.001).

Conclusion: PR adjustment resulted in reclassification of disease severity in equal proportion of patients when comparing STJ diameter <3cm to >3cm. Our data suggest that PR adjustment for patients with STJ diameter <3.5cm may allow for more accurate assessment of disease severity in over 95% of patients who may be influenced by PR. Prospective studies are needed to validate our findings and to determine whether clinical decisions based on reclassified disease severity influence outcomes.

6794

Monitoring of SC perfusion, ischaemia and reperfusion with NIRS to guide anaesthesiologic management of open thoracoabdominal aneurysm repair surgery: towards a new standard in monitoring?

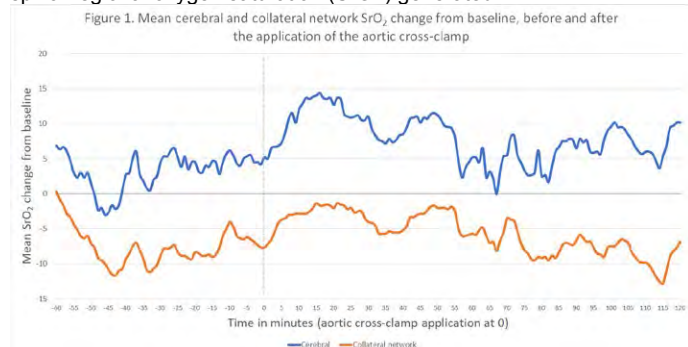
Šitum I.¹, Karmelic D.¹, Habijanec B.², Tomić Mahečić T.¹

¹University Hospital Centre Zagreb - Zagreb (Croatia), ²University of Zagreb, Faculty of Humanities and Social Sciences - Zagreb (Croatia)

Background and Goal of Study: Monitoring the perfusion of the collateral network (CN) to prevent spinal cord injury (SCI) (and subsequent paraplegia) during thoracoabdominal aortic aneurysm (TAAA) open repair surgery is a challenge for the anesthesiologist, and a possible tool guiding the anaesthesiologic management, allowing for timely implementation of neuroprotective strategies and individualized blood-pressure management. Near-infrared spectroscopy (NIRS) has occasionally been used for non-invasive real-time monitoring of the paraspinous vasculature as a surrogate for spinal cord oxygenation (CnNIRS). However, its clinical relevance in routine use for this type of procedure awaits more validation.

Materials and Methods: We will present 6 consecutive patients undergoing open TAAA repair in our centre. Prior to TAAA repair, an intrathecal catheter and 2 optodes were placed: one over the left cerebral hemisphere and one paravertebrally at level Th9-10, along with other standard advanced monitoring for this type of procedure. Data collected

with O3® Regional Oximetry (Masimo Corporation, Irvine, CA, USA) were downloaded and a graph demonstrating the mean cerebral and spinal regional oxygen saturation (SrO₂) generated.



Results and Discussion: CnNIRS was simple to use and its results easily interpretable. The readings corresponded well with the clinical situation and could be used reliably to guide intraoperative management. As can be seen in Figure 1, successful intraoperative management resulted in similar changes in SrO₂ from baseline for both brain and collateral network in the observed time period. During prolonged observation (270 min after aortic cross-clamping), 1 patient experienced a drop in CN SrO₂ (-22) which had not recovered, and she was the only patient with recorded SCI and paraplegia.

Conclusion: CnNIRS can be used as a part of routine monitoring for open TAAA repair surgery and a guide for anaesthesiologic management. It is also a feasible monitoring modality for CN perfusion as it can alert to the onset of SCI in the early perioperative period.

6815

Anesthetic management of a patient with oculopharyngeal muscular dystrophy (OMD) - a case report

Pereira S.¹, Nunes J. M. C. R.², Conde P.¹, Alves Â.¹

¹Centro Hospitalar Universitário Lisboa Norte - Lisboa (Portugal),

²Instituto Português de Oncologia de Lisb - Lisboa (Portugal)

Background: OMD is a rare, autosomal dominant, muscular dystrophy characterized by ocular ptosis and dysphagia.¹ This case describes the anesthetic management of a patient with OMD. Its importance lies with the fact that this disorder is rare and has anesthetic implications.

Case Report: Male, 62 years old, undergoing endovascular abdominal aorta repair. Past medical history included OMD (reporting bilateral ptosis and sporadic choking), obesity, atrial fibrillation, arterial hypertension, chronic obstructive pulmonary disease, acute myocardial infarction and coronary bypass surgery, pacemaker implantation and levator palpebrae resection. Preoperative sedatives were avoided. A balanced general anesthesia and endotracheal intubation was performed. ASA standard monitoring, invasive arterial pressure, bispectral index and neuromuscular blockade monitoring were used. Induction of anesthesia was achieved with remifentanyl, propofol and 0.5mg/kg of rocuronium. Anesthesia was maintained with sevoflurane, remifentanyl and rocuronium perfusion. Sugammadex was used to reverse neuromuscular blockade. Awake extubation was ensued in a head elevated position, after aspiration of oropharyngeal secretions, a train-of-four ratio >0.9, adequate spontaneous ventilation and compliance with simple orders. No adverse outcomes were reported and the patient was discharged 3 days later. **Discussion:** OMD is a rare muscular dystrophy that carries a risk of aspiration and pulmonary complications perioperatively. There are very few case reports of the anesthetic management of these patients.¹ It is important to assess the presence of recurrent respiratory infections and dysphagia. Also, myopathic patients can have higher pharmacologic sensitivity and so, avoiding preoperative sedatives, using short acting opioids intraoperatively and neuromuscular blockade monitoring is recommended. These patients are at no increased risk for malignant hyperthermia.²

References:

1. Chaves, A et al. Anestesia Para A Distrofia Muscular Oculo-Faríngea: A Propósito De Um Caso Clínico. Revista Sociedade Port de Anestesiologia. 2008.

2. Schieren, M et al. Anaesthetic Management Of Patients With Myopathies. *European Journal Of Anaesthesiology*, vol 34, no. 10, 2017.

Learning points: It can be challenging to approach patients with unfamiliar disorders. Case reports can be a useful tool. In OMD, risk of aspiration and pulmonary complications are main concerns, so induction and extubation should be planned cautiously.

6867

Opioid-sparing intravenous multimodal analgesia/ sedation strategy for non-intubated thoracic surgery: A case report

Stefanakis G.¹, Vardakis P.², Papastratigakis G.¹, Koutoulaki E.¹, Nyktari V.³, Papaioannou A.³

¹University Hospital of Heraklion - Heraklion (Greece), ²Medical School, University of Crete - Heraklion (Greece), ³University Hospital of Heraklion - Medical School, University of Crete - Heraklion (Greece)

Background: Although general anesthesia is regarded as the gold standard for thoracic surgery, over the last years non-intubated techniques under regional anaesthesia or sedation have emerged. Sedation usually relies on target-controlled propofol and remifentanyl infusions.¹ To our knowledge intravenous opioid-sparing regimens have not been used so far for this purpose. We present a case of non-intubated segmental lung resection under a multimodal opioid-sparing analgesia/sedation strategy.

Case Report: A 70-year-old male patient was referred for segmental lung resection due to a solitary pulmonary nodule. Patient's comorbidities included severe COPD with home O₂ requirement. Due to concerns regarding pulmonary complications a non-intubated operation was performed. Prior to positioning, dexmedetomidine and lidocaine infusions and boluses of ketamine, midazolam, tramadol, dexamethasone, paracetamol, parecoxib and hyoscine were administered. Before incision the operation site was infiltrated with lidocaine and ropivacaine. Analgesia and sedation were maintained with dexmedetomidine and lidocaine infusions and subanaesthetic propofol and ketamine boluses. Spontaneous ventilation was maintained and no pain was reported. At the end the collapsed lung was re-expanded via pressure support ventilation and the patient was transferred to the post-anaesthesia care unit with minimal sedation and no pain.

Discussion: Non-intubated techniques for thoracic surgery are regarded as good alternatives to endotracheal intubation, as the associated lung collapse is comparable to the one provided by a double-lumen tube.¹ The use of opioids has been reported in most cases performed under locoregional techniques or sedation/general anaesthesia. In view of the "opioid epidemic" and the related side effects, opioid-sparing regimens have been successfully implemented in traditional thoracic surgery.² However, to our knowledge, this is the first reported case of a non-intubated thoracic operation under an intravenous opioid-sparing multimodal sedative and analgesic strategy.

References:

1. Anaesthetic considerations for non-intubated thoracic surgery. Irons JF et al. *J Vis Surg*. 2016 Mar 23;2:61.
2. Opioid-Free Anesthesia for Lung Cancer Resection: A Case-Control Study. Devine G et al. *J Cardiothorac Vasc Anesth*. 2020 Nov;34(11):3036-3040.

Learning points: An opioid-sparing strategy could be a suitable alternative in order to achieve sedation and analgesia in non-intubated thoracic surgery.

6904

Effects of positioning and hypovolemia on the distribution of pulmonary perfusion during one-lung ventilation in pigs

Wittenstein J.¹, Scharffenberg M.¹, Ran X.¹, Gama De Abreu M.¹, Huhle R.¹ Pulmonary Engineering Group Dresden

¹University Hospital Carl Gustav Carus Dresden - Dresden (Germany)

Background and Goal of Study: Hypoxemia during one-lung ventilation (OLV) occurs in as much as 10% of patients and is partly determined by the distribution of pulmonary perfusion. Depending on the type of surgery, lateral, semilateral, supine, or even prone position, is used. Due to the influence of the gravity gradient, the position has effects on pulmonary perfusion distribution. In addition, hypovolemia can occur during surgery, and impair hypoxic vasoconstriction. Yet, the impact of body position and hypovolemia on the pulmonary perfusion distribution is not well defined. We hypothesised that, during OLV, the pulmonary perfusion distribution in the lateral position is more favourable with regard to oxygenation than other positions, and that it is impaired by hypovolemia.

Materials and Methods: The Institutional Animal Care and Welfare Committee and the Government of the State of Saxony, Germany approved the study (DD24.1-5131/449/71). Sixteen juvenile pigs were anaesthetized, mechanically ventilated, submitted to a right-sided thoracotomy and randomly assigned to one of two groups (n=8/group): 1) normovolemia and 2) hypovolemia following removal of approximately 25% of the estimated blood volume. To resemble the inflammatory response during surgery, *E. coli* lipopolysaccharide was administered intravenously (0.5µg/kg/h). While under OLV (left), animals were randomly assigned to one of four sequences of lateral, semilateral, supine, or prone positioning. The pulmonary perfusion distribution was measured with fluorescence-marked microspheres, and gas exchange assessed during two-lung ventilation in supine position and after 30 min OLV in each position.

Results and Discussion: During OLV, the relative perfusion of the non-ventilated lung, was lower in lateral than supine as well as prone position, and in semilateral than prone position. The highest arterial partial pressure of oxygen was observed in lateral position. The perfusion distribution and oxygenation did not differ significantly between normo- and hypovolemia.

Conclusion: In this model of thoracic surgery with OLV in pigs, body positioning yielding higher gravity gradients resulted in more adequate perfusion distribution to the dependent lung and improved oxygenation,

6906

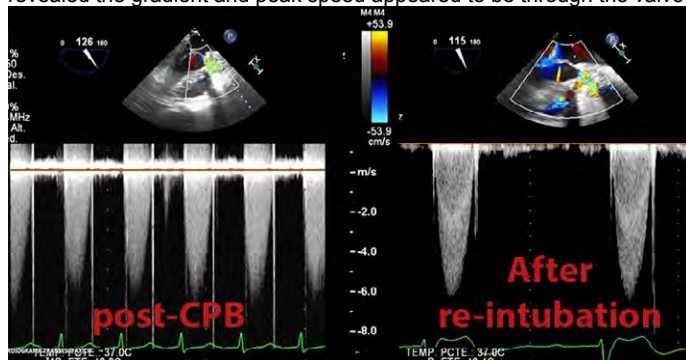
Endocarditis with a twist: Tilted aortic valve replacement conditions severe aortic stenosis, leading to hemodynamic collapse

Vazquez Tojo S.¹, Martinez Salgado A.¹, Regueira Cuiña J.¹, Rodríguez Lago M. M.¹, Francisco Iglesias C.¹, Álvarez Escudero J.¹

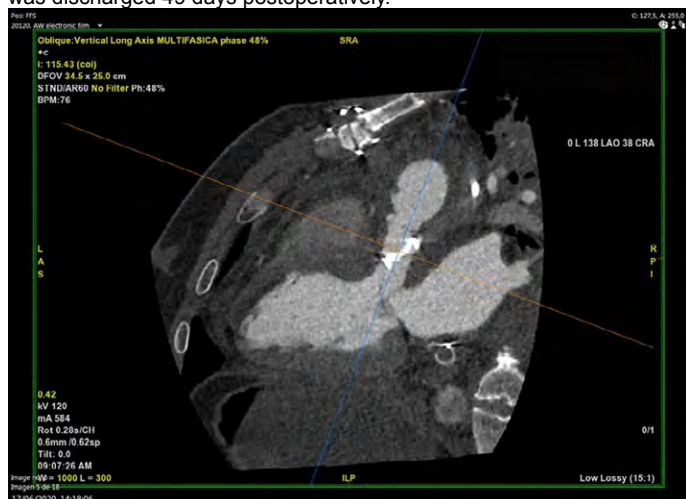
¹Complejo Hospitalario Universitario de Santiago - Santiago (Spain)

Background: The displacement of aortic valve replacements is not a singular occurrence in case of TAVI. However, in surgical replacements this complication is neither often considered nor reported.

Case Report: A 41y/o man with an aortic valve replacement one year ago because of a bicuspid valve presents with fever, 2 positive blood cultures and a PET-CT with increased glucose uptake on the prosthetic valve. Endocarditis diagnosis is reached. An aortic replacement with a carbomedics #21 was performed. Post-CPB transesophageal echocardiography (TEE) showed no aortic valve complications, but presented a seemingly ventricular septal defect (VSD) close to the LVOT with high gradients and peak speed around 6m/s. The patient was extubated 24h postoperatively. 2h later he developed sudden dyspnea and respiratory failure with hemodynamic instability. Urgent reintubation was performed and vasopressors re-started at high doses. A new TEE couldn't identify more than one prosthetic leaflet on any given plane, but revealed the gradient and peak speed appeared to be through the valve.



The patient developed cardiogenic shock and acute pulmonary edema. Peripheral V-A ECMO was established. Definitive diagnosis was achieved with a cardiac CT: a 50° tilt of the prosthetic that caused a 0.9cm² stenosis. The patient underwent an urgent aortic valve replacement. He was discharged 49 days postoperatively.



Learning points: Sudden hemodynamic collapse after cardiac surgery can be due to several causes. Swiftly evaluating most likely diagnosis is key and echocardiography very useful, but has the downside of being observer-dependent. What seemed a VSD was ruled out and proven to be the flow through the misplaced valve. Non-anatomical positioning of valves is particularly tricky to evaluate with TEE as it won't be possible to study them on usual planes, but CT can provide definitive diagnosis.

6931

Opioid-free anesthesia in anterior mediastinal mass excision through an hemiclammshell incision

Matos Delgado A.¹, Ribeiro J.², Rato F.², Ferreira M.²

¹Hospital Prof. Doutor Fernando Fonseca - Amadora (Portugal), ²Centro Hospitalar Lisboa Norte - Lisboa (Portugal)

Background: Anterior mediastinal masses (AMM) require a unique anesthetic approach due to the possibility of airway and vascular compression with induction of general anesthesia (1).

In addition, administration of opioids may be detrimental to recovery after surgery, mainly to lung function and may cause immunomodulation affecting cancer progression. Opioid-free techniques may therefore benefit cancer patients and may minimize the risk of developing chronic pain. We describe the successful application of an opioid-free anesthesia in a patient undergoing excision of an AMM through an extensive hemiclammshell incision.

Case Report: A 65-year-old woman was admitted for excision of an AMM diagnosed during follow-up of multiple myeloma. She showed no signs of airway compression. Pre-operative imaging studies revealed an 11x8cm anterior mediastinal mass which caused left superior lobe atelectasis and displacement of left hilar vessels. Due to its size and proximity to the pulmonary artery, the patient was at risk of acute cardiopulmonary decompensation. Standard ASA, invasive blood pressure, BIS and TOF monitoring devices were applied and a thoracic epidural placed in T5-T6 interspace. The epidural catheter was tested and 5ml ropivacaine 0,375% administered. Intubation with a double-lumen endotracheal tube was performed after topical laryngotracheal anesthesia and administration of ketamine and dexmedetomidine (ketodex), while maintaining spontaneous ventilation. Central venous access was established and anesthesia provided with ketodex, propofol and epidural ropivacaine infusions. The patient remained hemodynamically stable during the 5h procedure with an estimated blood loss of 800ml. Complete resection was achieved and the patient was extubated and transferred to the ICU with effective pain control.

Discussion: The primary goal of the anesthetic management of patients with AMM is to preserve spontaneous ventilation (1), under tight hemodynamic control, which was accomplished in this case by combining topical airway anesthesia and ketodex infusions.

An opioid-free technique allowed successful pain control during the perioperative period.

References:

1. Slinger, P., 2011. Principles and Practice of Anesthesia for Thoracic Surgery, Springer.

Learning points: Ketodex may facilitate maintaining spontaneous ventilation in patients with AMM, allowing safe management of these cases. An opioid-free technique may be advantageous in this population.

6950

Hand ventilation versus machine ventilation for transportation of post-operative paediatric cardiac patients: A prospective randomized study

Rajesh V. S. P.¹, Chauhan A. K.¹, Pujara J.¹, Singh G.¹

¹U N Mehta Institute Of Cardiology And Research Center, Ahmedabad, Gujarat, India - Ahmedabad (India)

Background and Goal of Study: Transportation of intubated paediatric cardiac patients usually requires some form of positive pressure ventilation, either by manual resuscitation device or using a portable transport ventilator. Manual resuscitators are readily available, inexpensive and familiar, but unable to deliver adequate tidal volume at safe pressure compared to machine ventilator. The authors hypothesized that manual ventilation after paediatric cardiac surgery would alter haemodynamic and arterial blood gas (ABG) parameters, peak and mean airway pressures during transport as compared to mechanical ventilation.

Materials and Methods: One hundred intubated postoperative paediatric cardiac patients were randomised to either hand (group A) or machine ventilation (group B) while transporting from the operating room to the paediatric intensive care unit (PICU). Haemodynamic variables, end-tidal CO₂ (ETCO₂), oxygen saturation, heart rate, systolic (SBP), diastolic blood pressure (DBP), peak airway pressures (Ppeak) and mean airway pressures (Pmean) were measured at origin, during transport, and at the destination. ABGs were measured before and upon arrival in PICU, and adverse events were recorded. Chi-square test and independent t-test were used for comparison of categorical and continuous parameters, respectively.

Results and Discussion: The mean transport time was comparable between group A (5.77 ± 1.46 min) and group B (5.96 ± 1.19 min). ETCO₂ was significantly lower, while Ppeak and Pmean were significantly higher at all time points during transportation with hand ventilation as compared to machine ventilation. SBP and DBP significantly decreased at 5 and 6 minute intervals and after shifting, in hand-ventilated patients than the other group. Additionally, significant increase in pH and decrease in PaCO₂ was observed after shifting in group A as compared to group B. No adverse events were noted with either mode of ventilation.

Conclusion: The use of mechanical ventilation results in fewer repercussion in haemodynamics, blood gas analysis, peak and mean airway pressures as compared to hand ventilation in paediatric patients during transportation after cardiac surgery. We concluded that, a machine ventilator is preferable method during the transportation of post-operative paediatric cardiac patients.

6957

Thoracic paravertebral versus interpleural analgesia for post-thoracotomy pain management in minimally invasive cardiac surgery

Singh G.¹, Pujara J.¹, Rajesh V. S. P.¹

¹U N Mehta Institute Of Cardiology And Research Center, Ahmedabad, Gujarat, India - Ahmedabad (India)

Background and Goal of Study: The development of minimally invasive cardiac surgery (MICS) demands better analgesic interventions to achieve enhanced recovery. MICS with lateral thoracotomy requires a tailored analgesic approach to minimize postoperative pain. Regional interventions such as paravertebral block (PVB) and interpleural analgesia (IPA) are less invasive techniques compared to thoracic epidural. The aim of this study was to compare the efficacy and safety of PVB and IPA after MICS through thoracotomy in terms of quality of analgesia, postoperative mechanical ventilation time, length of stay (LOS) in intensive care unit (ICU) and hospital.

Materials and Methods: A prospective, double blinded, randomised clinical study was conducted with total of 50 patients undergoing MICS, randomised to thoracic PVB (group A, n =25) or IPA group (group B, n = 25). Catheter was inserted in paravertebral space at T4-T6 level before induction of anaesthesia in group A and in interpleural space under direct vision before closure of thoracotomy incision in group B. Both groups received 8 ml of 0.125% bupivacaine with inj. tramadol 100 mg as an adjuvant via catheter at the end of surgery. Visual analogue scale (VAS)

was recorded at intervals of 0, 2, 3, 4, 8, 12, 24 hours in both groups during rest and deep breathing post extubation. The primary objective of this study was to compare postoperative analgesia between two groups. Secondary objectives were to compare rescue analgesia requirements, haemodynamics, duration of mechanical ventilation, LOS in ICU and hospital. Statistical analysis was performed by using the independent Student's t-test and Chi-square test for continuous variables and categorical variables respectively. A value of P < 0.05 was considered statistically significant.

Results and Discussion: Post extubation VAS score at rest and on deep breathing were statistically insignificant at all time intervals in two groups. There was no significant difference in haemodynamics, rescue analgesia requirements, duration of mechanical ventilation, ICU and hospital stay between the two groups. One patient in IPA group needed rescue analgesia.

Conclusion: Both PVB and IPA are safe and equally effective modalities for postoperative pain relief in MICS with thoracotomy approach, however IPA is comparatively simpler and easier to perform and doesn't require much expertise.

6982

Reoperation of mitral valve replacement in a patient with factor XII deficiency: a case report

Mocsári E. F.¹, Costa J. M.¹, Villares Da Costa L. G.¹, Ribeiro R. G.¹,

Amemiya C. E. E.¹, Xander C. A. S.¹

¹Hospital Israelita Albert Einstein - São Paulo (Brazil)

Background: Factor XII (FXII) deficiency is a rare autosomal recessive disorder, and patients are usually asymptomatic. FXII participates in the fibrinolytic system through the conversion of plasminogen to plasmin and pre-kallikrein to kallikrein, agents that act in fibrinolysis. Its deficiency is characterized by changes in activated partial thromboplastin time (aPTT) and INTEM clotting time (CT INTEM), despite that, most patients do not have an increased risk of bleeding, instead presenting with an increased risk of thrombotic events.¹

Case Report: A 59-year-old female, with FXII deficiency, admitted for reoperation of mitral valve replacement due to rupture of the prosthesis leaflet. She has a previous history of valve thrombosis and was using warfarin, which was reversed preoperatively using prothrombin complex. Some relevant tests are: FXII activity 2% (normal range 42-161%); aPTT >160s; INR 1.48; CT INTEM 1023s; activated clotting time (ACT) 246s. Balanced general anesthesia and bilateral erector spinae block were uneventful. After pericardiotomy, 5 mg/kg of unfractionated heparin was administered, to achieve a pre-cardiopulmonary bypass (CPB) ACT of 1500s. Total CPB time was 85 min. Weaning off CPB was uncomplicated. Administering protamine (1:1) resulted an ACT of 329s and CT INTEM 1148s. In spite of the altered exams, there was no evidence of bleeding, therefore, no action was taken. At the end of the surgery, the patient was weaned off the ventilator and transferred to the intensive care unit extubated, being discharged on the 7th postoperative day.

Discussion: The use of CPB in patients with FXII deficiency is challenging, since this pathology compromises the fibrinolytic system. The use of antifibrinolytic agents intraoperatively is controversial and measures for thromboembolism prophylaxis should be started early in the postoperative period, in order to prevent thrombotic complications¹. Although the use of antifibrinolytics in this type of surgery is well established, due to the pathophysiological implications of FXII deficiency, a previous history of valve thrombosis and a similar case reports in the literature, the decision was made not to use it.

References:

1. Conaglen PJ, Akowuah E, Theodore S, et al. Implications for Cardiac Surgery in Patients With Factor XII Deficiency. *Ann Thorac Surg* 2010; 89: 625–626.

Learning points: The use of antifibrinolytics in patients with factor XII deficiency undergoing CPB should be carefully evaluated

6994

Heart transplantation in young patient after severe COVID-19 infection: a case report

Mocsári E. F.¹, Fernandes M. C.¹, Tedoldi T. A.¹, Villares Da Costa L. G.¹, Costa J. M.¹

¹Hospital Israelita Albert Einstein - São Paulo (Brazil)

Background: Heart transplantation (HT) is considered the gold standard surgical treatment for refractory heart failure¹. With the advance in the pre, intra and postoperative management of these patients, outcomes have been shown to be increasingly favorable². In this context, the COVID-19 pandemic brought on great challenges, as these patients are more susceptible to infection and its severe forms, and little is known about the outcome of HT in individuals who became infected perioperatively.

Case Report: A 31-year-old male with dilated cardiomyopathy, 15% left ventricular ejection fraction, dependent on inotropic and intra-aortic balloon pump presented for HT. Amid the admission exams, he had a positive RT-PCR SARS-CoV2, hence the procedure had to be postponed. Few days later he evolved with fever, respiratory failure requiring invasive ventilatory support and refractory cardiogenic shock requiring a veno-arterial extracorporeal membrane oxygenation (ECMO VA) cannulation as a bridge to HT depending on the course of the infection. After 13 days of treatment and respiratory improvement, it was decided to proceed with the HT. After anesthetic induction a transition from ECMO VA to cardiopulmonary bypass was performed and the procedure went uneventful. At the end, the patient was hemodynamically stable with low inotropic support and a transesophageal echocardiogram was performed, which showed satisfactory graft function. Therefore, it was decided not to re-cannulate ECMO VA and the patient was transferred to the intensive care unit without mechanical circulatory support, evolving satisfactorily.

Discussion: Since 1968, when Christiaan Barnard made the first HT, more than 110,000 procedures have been performed in the world¹. In addition to complications related to transplantation, such as rejection, cardiac allograft vasculopathy, graft dysfunction and chronic kidney disease, COVID-19 infection brought a new range of uncertainties regarding the outcome of these patients². Despite few reports in the literature, this case illustrates that HT in patients after severe COVID-19 infection may have a favorable outcome.

References:

1. Mangini S, Alves BR, Silvestre OS, et al. Heart transplantation: review. *Einstein (São Paulo)*. 2015 Apr-Jun; 13(2): 310-318;
2. Aslam S, Adler E, Holm A, et al. Guidance from the International Society of Heart and Lung Transplantation regarding the SARS CoV-2 pandemic.

Learning points: HT after COVID-19 infection may have favorable outcome

6998

Hybrid cardiac surgery in a 96-year-old patient: a case report

Mocsári E. F.¹, Costa J. M.¹, Villares Da Costa L. G.¹, Facchini A. O.¹, Koerich De Souza J.¹, Vettorazzo Amaral L.¹

¹Hospital Israelita Albert Einstein - São Paulo (Brazil)

Background: With the increase in life expectancy and the higher incidence of cardiovascular diseases, progressively more elderly patients are becoming candidates for cardiac surgery. It is known that outcomes are often satisfactory, but few studies assess the risk of cardiac surgery in the extremely elderly (> 80 years).¹

Case Report: A 96-year-old male, with hypertension, diabetes mellitus and severe aortic stenosis admitted with worsening of functional class one week prior to admission. Coronary angiography revealed triple arterial disease with stenosis of the left main coronary trunk. Considering the high risk, the decision was made to perform a hybrid procedure with off-pump coronary artery bypass graft and transcatheter aortic valve implantation. Initial sedation with dexmedetomidine 20mcg and ketamine 15mg, followed by bilateral erector spinae block. Anesthetic induction with fentanyl 50mcg, propofol 40mg and rocuronium 50mg and maintenance with total intravenous anesthesia. Intraoperative transesophageal echocardiography (TEE) was performed and the initial

findings showed diffuse left ventricular hypokinesia and significant aortic stenosis. The procedure went uneventful and at the end, another TEE was done, which showed the same previous contractile pattern, well-expanded aortic prosthesis and minimal periprosthetic reflux. The patient was transferred to the intensive care unit (ICU) intubated, at RASS 0, comfortable, without pain complaints and hemodynamically stable with norepinephrine 0.15mcg/kg/min and dobutamine 3mcg/kg/min. He was extubated less than one hour after ICU admission and remained stable, being discharged on the 7th postoperative day.

Discussion: Risk stratification models are valuable instruments for anesthesiologists and cardiac surgeons, as they assist in decision making and improvement of patient care. The most used model today is the EuroSCORE II, created from an international and highly accurate database. However, it has limitations such as the small number of patients over 90 years old in the sample (only 21), the oldest being 95 years old.¹ Therefore, further studies should be conducted in this growing specific population in order to have a more reliable risk assessment.

References:

1. Nashef SAM, Roques F, Sharples LD, et al. EuroSCORE II. *European Journal of Cardio-Thoracic Surgery*, Volume 41, Issue 4, April 2012, Pages 734–74;

Learning points: Risk stratification models should include the elderly on their database.

7014

Associated factors to unilateral pulmonary edema after minimally invasive mitral valve surgery

López-Baamonde M.¹, Eulufi S.², Italiano S.¹, Martínez Otero S.¹, García Rojas I.¹, Navarro Ripoll R.¹

¹HOSPITAL CLINIC DE BARCELONA - Barcelona (Spain), ²Hospital Luis Calvo Mackenna - Santiago (Chile)

Background and Goal of Study: In recent years, minimally invasive cardiac surgery (MICS) has been developed and applied to a greater number of pathologies, especially in mitral valve surgeries, as it obtains results comparable to those of conventional techniques while entailing lower surgical trauma and shorter recovery time. MICS requiring one-lung ventilation has been associated to the appearance of unilateral pulmonary edema (UPE), which is a potentially serious complication. The objective is determining the incidence of UPE after mitral MICS and the associated factors for its appearance.

Materials and Methods: Observational descriptive and single-center study analyzing data from patients undergoing mitral valve MICS (right mini-thoracotomy) consecutively collected between the years 2015 and 2017 at Hospital Clínic Barcelona.

Results and Discussion: A total of 93 patients were included and 23 presented UPE. The most common complications after mitral valve MICS were atrial fibrillation (38.7%), UPE (28%) and transient and/or definitive second- or third-degree atrioventricular block (19.4%). The UPE group had longer ICU stay [3.3 days ± 8.0 vs. 1.84 days ± 2.23] and longer total hospitalization length-of-stay [15.5 days ± 34.7 vs. 10.6 days ± 7.5]. The mortality in the UPE group was 3.9%. A significant association was found between the following collected variables and the development of postoperative UPE: preoperative baseline pulse oximetry, preoperative use of ACE inhibitors, postoperative atrial fibrillation (independently if it was present prior to surgery or not) and the cumulative chest-tube drainage volume on the first 24h.

Conclusion: The incidence of UPE is high (up to 28%) and its appearance is associated with a longer ICU and total hospital length of stay. Further studies are needed to understand its pathophysiology and apply measures to help decreasing its appearance. It will allow to individualize clinical management selecting those high-risk patients to perform a prolonged more carefully weaning and those low-risk who could benefit from early extubation and the application of fast-track or ERAS protocols.

References:

1. Tutschka MP, Bainbridge D, Chu MWA, Kiaii B, Jones PM. *Ann Thorac Surg*. 2015;99(1):115-122.
2. Keyl C, Staier K, Pingpoh C, et al. *Eur J Cardiothorac Surg*. 2015;47(6):1097-1102.

7047

Valve – in – Valve transcatheter aortic valve implantation for aortic incompetence: a challenging case.

Prabhudesai A. A.¹, Waje N.¹, Sharma K.¹, Mehta H.¹
¹Sir HN Reliance Foundation Hospital - Mumbai (India)

Background: The valve-in-valve (VIV) transcatheter aortic valve implantation (TAVI) for acute, severe aortic insufficiency (AI) with cardiogenic shock represents a challenging TAVI subset with limited published data. We present a case of a VIV - TAVI in patient with structural valve deterioration (SVD).

Case Report: Elderly male with a SVD (23mm Magna Ease - bovine bioprosthesis) with acute dyspnoea, orthopnoea, oliguria, was diagnosed to have severe AI, PHTN (mPAP = 51mmHg, PCWP 35mmHg; PVR = 5.5 WU), RV dysfunction (TAPSE 10, RVS' 9), with a proximal LAD 70% block (coronary angiogram). The pre-operative optimisation included invasive cardiac output monitoring, inotropic support with adrenaline, milrinone, non-invasive ventilation and SLED.

The procedure was done under general anaesthesia (using standard AAGBI monitor) for a better haemodynamic control. TOE and pulmonary artery pressure monitoring guided the management of RV dysfunction. Inhalational Nitric oxide given after valve deployment stabilized haemodynamics. The valve was deployed on the rim under fluoroscopy; TOE confirmed position and functioning. The mPAP (32 mmHg), PCWP (20 mmHg) and RV function showed marked improvement post deployment of the valve. The patient was electively ventilated overnight along with iNO and SLED. Inotropes were tapered off on POD 3. He was discharged on 13th day with antiplatelet agent, diuretic.

Discussion: In view of high risk (STS EURO score), severe RV dysfunction, pulmonary hypertension, the VIV-TAVI with ECMO back up was preferred over a redo-surgery. RV dysfunction itself, due to the risk of hemodynamic deterioration upon discontinuation of cardiopulmonary bypass (CPB), carries high risk of mortality for a surgical repair.¹ Several risk factors have been identified for a redo surgery.² In such cases, TAVI have been associated with a high rate (95%) of successful valve implantation and a mean 30-day mortality of 8%

References:

1. Eleid MF. Right Ventricular Function in TAVR: The Right Hand Knows What the Left Hand Is Doing. *JACC Cardiovasc Imaging*. 2019 Apr;12(4):588-590
2. Greenbaum AB, et al. Caval-aortic access to allow transcatheter aortic valve replacement in otherwise ineligible patients: initial human experience. *J Am Coll Cardiol* 2014;63:2795-804

Learning points: VIV TAVI is a feasible, less-invasive option for high-risk surgical patients with SVD. Knowledge of TOE, heart catheter, management right ventricular dysfunction is essential for a successful outcome.

7064

Is the adherence to coagulation algorithms as part of Point-of-Care diagnostics in elective Cardiac surgery beneficial?

Wolf A.¹, Puehler T.¹, Friedrich C.¹, Lorenzen U.¹, Haneya A.¹, Renner J.²
¹University Medical Center Schleswig-Holstein, Campus Kiel - Kiel (Germany), ²Municipal Hospital Kiel, Department of Anesthesiology and Intensive Care Medicine - Kiel (Germany)

Background and Goal of Study: Cardiac surgery is associated with a risk of perioperative coagulopathy and the use of allogenic blood products. Thus, it is of great importance to optimize hemostasis, reduce blood loss and decrease morbidity and mortality¹. Beneficial effects of point-of-care (POC)-based transfusion algorithms are still controversial². We investigated the effects of a center-specific transfusion algorithm on the outcome of patients after elective heart surgery.

Materials and Methods: We report on a retrospective single-center analysis over a period of 24 months, including 458 patients for elective cardiac surgery. 359 patients (78.4%) for isolated coronary artery bypass and 99 (21.6%) for aortic valve replacement. We divided them into two cohorts: first cohort, complete adherence with the POC-based transfusion algorithms (41.7%); second cohort, defined as non-adherence with the

algorithm (58.3%). Primary outcome was the rate of intraoperatively transfused red blood cells (RBC); secondary outcome was the rate of re-thoracotomy, length of stay on the intensive care unit (ICU) and the 30-day mortality rate.

Results and Discussion: Only a tendency in intraoperative transfused RBC has been observed in the adherent algorithm-guided group (14.9% received RBC during cardio-pulmonary bypass (CPB) and 19.5% post-CPB), in contrast to the non-adherent group (20.8% received RBC during CPB and 25.5% post-CPB), without reaching significance ($p > 0.05$). Significantly more prothrombin complex concentrates (44.4% vs. 25.1%, $p < 0.05$) has been administered, more frequent use of desmopressin-medication (56.7% vs. 11.5%, $p < 0.05$) and thrombocytes (45.1% vs. 14.6%, $p < 0.05$) have been observed in the adherent algorithm-guided group compared to the non-adherent group. 30-day mortality, rate of re-thoracotomy and length of stay on the ICU was not affected significantly.

Conclusion: Our single center-study demonstrates that adherence of POC-guided transfusion algorithm has no significant effects on the rate of intraoperatively transfused RBC in patients undergoing elective cardiac surgery. Additionally, no beneficial effects in case of mortality, re-thoracotomy rate and intensive care time could be observed.

References:

1. Weber CF et al., *Perioperative Medicine* 2012
2. Lehmann F et al., *BMC Anesthesiology* 2019

7078

T3 levels but not testosterone and prolactin is associated with prolonged ventilation in elective cardiac surgery patients

Tóth K.¹, Szabó A.¹, Menyhárd J.¹, Merkely B.¹, Gál J.¹, Székely A.¹
¹Semmelweis University Budapest - Budapest (Hungary)

Background and Goal of Study: The cardiovascular system is known to be associated with the thyroid hormone levels. Our aim was to observe the association of preoperative and postoperative endocrine hormone levels and their changes with mortality.

Materials and Methods: Our research is a single-center, prospective, observational study (ClinicalTrials.gov Identifier: NCT03736499). We examined 253 patients who underwent elective cardiac surgery between 2018.07.01. and 2020.06.30. Hormone levels (TSH, fT3, fT4, testosterone, prolactin) were collected at admission. The primer outcome was prolonged ventilation (>24 hours). The secondary outcome was all-cause mortality. During the statistical analysis Cox regression was used to predict the outcomes.

Results and Discussion: The mean age of the patients was 64.2 years (standard deviation [SD]: 11.1 years). Thirty-four patients (13.4 %) died during the median follow-up time of 623 days (interquartile range [IQR]: 575-699 days). The median Euroscore II score was 1.73 (1.06-2.99) points. The preoperative fT3 level was associated with prolonged ventilation (HR: 0.565; 95% CI: 0.444-0.720 $p < 0.001$). In the multivariate model, fT3 was independently associated with prolonged ventilation after adjustment of postoperative complications (HR: 0.556; 95% CI: 0.430-10.720 $p < 0.001$). TSH (HR: 0.699; 95% CI: 0.340-1.439 $p = 0.332$), fT4 (HR: 1.661; 95% CI: 0.811-3.402 $p = 0.165$), prolactin (HR: 1.497; 95% CI: 0.678-3.306 $p = 0.318$) and testosterone (HR: 0.792; 95% CI: 0.482-1.299 $p = 0.355$) were not associated with prolonged ventilation. None of the preoperatively investigated hormone levels was associated with the mortality.

Conclusion: Low preoperative fT3 levels might be a marker of postoperative complications. Preoperative hormones except of fT3 should not be routinely tested.

7110

The effect of carotid endarterectomy on cognitive function regarding cerebral hypoperfusion

Sándor Á. D.¹-A. Szabó¹, Z. Mihály², Z. Czinege², P. Sótorny², J. Gál¹, A. Székely¹ Department of Anaesthesiology and Intensive Therapy Semmelweis University Budapest Hungary¹ Városmajor Heart and Vascular Centre Semmelweis University Budapest Hungary²
¹Semmelweis University Department of Anesthesiology and Intensive Therapy - Budapest (Hungary)

Background and Goal of Study: There is no consensus in the literature regarding the effect of the change in cerebral oxygenation during carotid endarterectomy on cognitive function. The aim of our study was to assess this effect using near infrared spectroscopy (NIRS) as a monitor of cerebral hypoperfusion.

Materials and Methods: We enrolled prospectively 54 patients undergoing carotid endarterectomy (CEA) at Semmelweis University, Városmajor Heart and Vascular Centre, Budapest. The surgeries were performed under general anesthesia. Patient's cognitive evaluation for general cognitive impairment detection included the Mini-Mental State Examination (MMSE) and Montreal Cognitive Assessment (MoCA).

Results and Discussion: All 54 patients (31 men, mean age of 68,77±7,87 years, Vasc. Possum: 19,73 ±3,52) were asymptomatic. 37 patients underwent eversion endarterectomy and 17 thrombendarterectomy were performed applying shunt. All the patients completed the MMSE (28,59±1,25) and the MoCA tests (27,59±1,65) preoperatively and three months after the operation (MMSE: 28,59±1,47, MoCA: 27,42±1,88) supervised by the same physician. The maximum desaturation during the clamping period (compared to the mean of the 2 minutes long preclamping period) was calculated postoperatively (median of the desaturation:15%, Q1: 12,035%, Q3:21,595%). The maximum desaturation was correlated significantly with the occurrence of cognitive decline, confirmed by the MoCA (p: 0,000, Spearman rho: -0,571), and the MMSE (p:0,037, Spearman rho: -0,285) tests. Therefore, our preliminary results suggest that significant cognitive decline could appear when the change was more than 15% (p: 0,001 -using Mann-Whitney test) in the rate of regional oxygen saturation. Complications occurred in the case of two patients, one developed cardiological and another developed neurological complications during the postoperative hospitalization. We found no statistically significant connection between the occurrence of these complications and the degree of desaturation.

Conclusion: Our preliminary results suggest, that NIRS can have an important role in patient safety during carotid endarterectomy. A remarkable desaturation (more than 15% compared to the preclamping period) might indicate postoperative cognitive decline.

7118

Lung Transplantation for Severe Post-COVID-19 Respiratory Failure – a short-term reality or long-term challenge?

Cordeiro N.¹, Almeida C.², Rolo V.², Castro M. L.²

¹Centro Hospitalar Lisboa Ocidental - Lisbon (Portugal), ²Centro Hospitalar Lisboa Central - Lisbon (Portugal)

Background:The SARS-Cov2 pandemic has brought along a plethora of clinical challenges whose management will become ever more frequent. We report a case of a double-lung transplant in a patient suffering from severe post-COVID-19 respiratory failure after 3 months of extracorporeal support and multiple complications.

Case Report: A 61-year-old man with a history of dyslipidaemia and gastritis is admitted in the emergency department with SARS-CoV-2 pneumonia. Due to clinical deterioration despite escalation of respiratory support, veno-venous Extracorporeal membrane oxygenation (ECMO) was initiated. The patient stayed on VV-ECMO for 74 days, after which a switch to Extracorporeal carbon dioxide removal (ECCO2R) was possible. Multiple complications including infectious (pneumonia, prostatitis, etc.) and haematological ones (extracorporeal membrane oxygenation-associated coagulopathy and heparin induced thrombocytopenia) occurred during this period. Over the course of those 3-months, the patient improved dramatically and following careful clinical evaluation was

accepted in our transplant centre for bilateral sequential lung-transplant. By then, the patient was on bivalirudin, a haemostatic challenge closely managed with the surgeons and clinical perfusionists. The surgery was uneventful with discontinuation of ECCO2R at the end of the procedure.

Discussion: The first small case-series of early post-transplantation outcomes in critically ill patients with COVID-19 have started to be published this year (1). Given the impact of COVID-19 worldwide, this is set to be a frequent clinical challenge soon from which we should all learn from together.

References:

1. Bharat A, Machuca TN, Querrey M, Kurihara C, Garza-Castillon R, Kim S, et al. Early outcomes after lung transplantation for severe COVID-19: a series of the first consecutive cases from four countries. *Lancet Respir Med.* 2021;9(5):487–97.

Learning points: Lung Transplantation for Severe Post-COVID-19 Respiratory Failure is a reality; The haematological complications arising from long term extracorporeal support are an intra-operative challenge.

7140

Intraoperative hypotension and its association with renal outcome of patients undergoing cardiac surgery: a large retrospective cohort study

Jung H.¹, Zittermann A.¹, Gummert J.¹, Starke H.¹, Hulde N.¹, Von Dossow V.¹

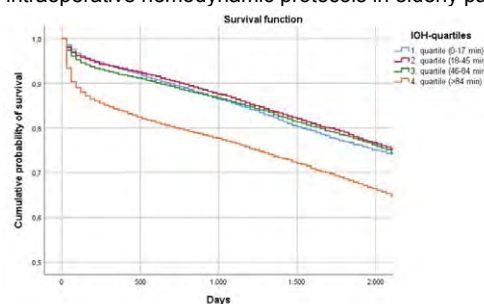
¹Herz- und Diabeteszentrum NRW Ruhr Universität Bochum - Bad Oeynhausen (Germany)

Background: Incidence of acute kidney injury (AKI) after cardiac surgery is high and has a detrimental impact on adverse outcomes. Prolonged hypoperfusion and low mean arterial pressure (MAP) levels have been discussed controversially and its clinical relevance remains unclear. The aim of this study was to clarify the association of intraoperative hypotension (IOH) in cardiac surgery with AKI and creatinine dynamics. The secondary outcome included 30-day and 1-year mortality.

Materials and Methods: This retrospective observational cohort study consisted of 29.840 patients undergoing elective cardiac surgery from 2009-2018. Using pre- and postoperative creatinine values, the creatinine dynamics and thus the occurrence of AKI were examined for the entire collective. We defined IOH as intraoperative MAP < 60mmHg for more than 2 minutes. Frequency of IOH episodes, cumulative duration of IOH as well as severity of IOH were extracted and calculated from the patient data management system. The data were analysed by using univariate and multivariate analyses.

Results and Discussion: The incidence of AKI in the entire study cohort was 23.7 % (7.081 patients) which was associated with a lower 1-year survival compared to patients without AKI (79.3% versus 93.9%, Hazard Ratio 0.380, 95% CI 0.362-0.399, p<0.001). Cumulative duration of IOH in minutes was significantly associated with AKI (OR 1.002; 95% CI, 1.002-1.003; p<0.001) and increased within the quartile groups (see figure): Compared to quartile 1 (reference group), the multivariable adjusted odds ratio for postoperative AKI was 1.2 (95%CI: 1.05-1.44). Age was identified to be an independent predictor for AKI (OR 1.044; 95 % CI, 1.041-1.047; p<0.001). Creatinine dynamic alterations (> 1.5) indicating AKI occurred more in patients > 70 years (29.8 % versus 16.3 % p<0.01).

Conclusion: This study showed a conclusive association between cumulative duration of IOH and renal morbidity and mortality after cardiac surgery in the multivariate analysis. This might have clinical implications regarding preoperative optimization with renal protection strategies and optimized intraoperative hemodynamic protocols in elderly patients.



7173

A comprehensive frailty assessment could predict mortality after cardiac and vascular surgery

Szabó A.¹, Szabó D.¹, Tóth K.¹, Szécsi B.¹, Sándor Á.¹, Székely A.¹
¹Semmelweis University - Budapest (Hungary)

Background and Goal of Study: Preoperative evaluation is undergoing revolutionary changes guided by those risk factors that used to not be handled relevant enough in past decades. The frailty syndrome is one of the most intensively examined areas of perioperative medicine because it seems to be a relevant and strong predictor of postoperative morbidity and mortality. The purpose of this study was the assessment of frailty as a risk factor for mortality of patients receiving cardiac and vascular surgery, using the comprehensive frailty index.

Materials and Methods: From 2014 through 2017 a prospective observational patient cohort was created in our tertiary cardiovascular surgical center in Semmelweis University, Budapest, Hungary. The current study was approved by IRB and registered on ClinicalTrials.gov (ID: NCT02224222). The enrolled patients were asked to fulfill a questionnaire to map their psychological and sociological state. A comprehensive geriatric assessment frailty index was used next to routinely registered data (past medical history, anthropometric data, laboratory test results). Quintiles were created according to the comprehensive frailty index. Cox regression methods were used to estimate the hazard ratio for the mortality of each group.

Results and Discussion: During the study period 164 vascular surgical and 67 cardiac surgical (a total of 231) patients were enrolled. The incidence of men was 64.0% and 64.2% in each group, respectively. The median age was 68 years, IQR: 60-73 years. During the follow-up time (median: 3.8 years, IQR: 2.8-4.7 years) 25.6% of the vascular surgical group and 20.9% of the cardiac surgical group died ($p=0.281$). The comprehensive frailty score was higher in the cardiac surgical group (Frailty Score median 7.0, IQR: 4.0-9.3 vs. 4.0, IQR: 3.0-6.0, $p<0.001$). The unadjusted hazard ratios for mortality of the whole cohort were significantly higher in the 2nd, 3rd, 4th, and 5th quintiles according to comprehensive frailty score compared to the first quintile. Hazard ratios (95%CI) were 1.245 (0.437-3.551), 1.013 (0.355-2.892), 2.535 (1.065-6.033) and 2.656 (1.090-6.494), respectively ($p=0.027$, for trend).

Conclusion: A comprehensive frailty score is an important risk estimation tool. Next to traditional and routinely used risk estimation methods comprehensive frailty score calculation could be useful for predicting mortality of these patients.

7206

Ductus arteriosus ligation in a 465g ultra-premature - how small is too small?

Nogueira G.¹, Saldanha Marques J.², Fiúza A.²

¹Hospital Vila Franca de Xira - Povos, Vila Franca de Xira (Portugal),

²Centro Hospitalar Universitário de São João - Porto (Portugal)

Background: Despite recent advances, prematurity is still a major cause of morbimortality. Gestational age (GA) and extremely low birth-weight (ELBW) represent critical prognostic factors. Rarely, this at-risk group may present for surgery, posing a serious challenge, even for the experienced paediatric anaesthesiologist. We present the successful anaesthetic management of a near viability ultra-premature (23w of GA) with ELBW (435g) for patent ductus arteriosus (PDA) ligation.

Case Report: Preterm labour motivated a CS-birth of a 23w 435g neonate. An APGAR1 of 4, respiratory distress syndrome (RDS) and instability dictated the need for invasive mechanical ventilation (IMV), dopamine support and NICU admission. Investigation revealed an intraventricular haemorrhage (IVH), PDA with L-R shunting, sepsis, bicytopenia and metabolic acidosis. At 25w+5 PMA, due to medical-therapy failure, surgical PDA closure ensued. Preoperatively RBC were administered. At the NICU, standard ASA plus central temperature, invasive AP and pre/post-ductal oximetry monitoring were used. Protective IMV (VC) was continued. We used an opioid-based TIVA with fentanyl+midazolam and full NMB with rocuronium. The rule to treat $MAP < GA + 5$ was followed, and dopamine titrated to effect. SpO₂ was kept at 91-95%. Parenteral nutrition was not stopped and loss-oriented isotonic fluid therapy was applied. LA was infiltrated. Surgery was uneventful.

Discussion: This case exposes the anaesthetic challenges of an ELBW ultra-premature with related morbidities. Organ immaturity is key to the pathogenesis - small decrements of GA/weight impact survival. Moving an unstable premature to the OR is risky. Although it is not currently clear if the ultra-premature benefits from hypnosis, nor its effect on developing brain, it is known that nociception triggers a NE stress-response. Thus, and since IMV was to be maintained, a fentanyl-based TIVA+NMB was chosen. IVH and lack of auto-regulation impose strict AP control. Optimal AP and SpO₂ targets remain ill-defined.

References: Curr Opin Anaesthesiol. 2018 Jun;31(3):308-312

Learning points: Anaesthesia cases of such small neonates are rare, complex and literature reports scant. This report intends to add to anaesthesia data regarding extreme prematurity/ELBW. Since lack of evidence precludes defining the best technique, homeostasis maintenance is the mainstay of practice. Knowledge of prematurity pathophysiology, which we briefly illustrate, is key for success.

7275

3D-echocardiographic assessment of regional right ventricular function reveals patterns associated with short-term outcomes in patients undergoing cardiac surgery

Duerr M. M.¹, Heller T.¹, Rosenberger P.¹, Magunia H.¹, Keller M.¹
¹University Hospital Tuebingen - Tuebingen (Germany)

Background and Goal of Study: While global right ventricular (RV) systolic function is well-known to be associated with the outcome of patients undergoing elective cardiac surgery, the influence of regional RV function on short-term outcome is unknown. Hence, this study aimed to investigate regional RV function using 3D transesophageal echocardiography (TEE) and speckle-tracking-derived mesh models.

Materials and Methods: In this retrospective single-center study, patients undergoing elective cardiac surgery between 2013 and 2018 with an intraoperative 3D-TEE study prior to thoracotomy were included from the institutional database. Regional RV systolic function was quantified automatically using custom-made software for volumetry of the inflow, outflow and apex part of the RV mesh models. An association of echocardiographic and clinical parameters with the endpoint (in-hospital mortality or the need for extracorporeal circulatory support) was investigated with binary logistic regression.

Results and Discussion: n=357 patients were included and n=27 patients reached the endpoint (7%). Patients that reached the endpoint had significantly decreased inflow RV ejection fraction (RVEF, 32 ± 8 vs. $37 \pm 11\%$, $p=0.01$) and inflow relative stroke volume (rel. SV, 44 ± 8 vs. $48 \pm 9\%$, $p=0.02$), while rel. SV of the apex was significantly increased (38 ± 10 vs. $33 \pm 8\%$, $p=0.01$). Measures of global left and right ventricular function did not differ between the outcome groups. In univariable logistic regression, only tricuspid regurgitation grade ≥ 2 (odds ratio (OR) 4.24 (1.66-10.84), $p<0.01$), inflow RVEF (OR 0.95 (0.92-0.99), $p=0.01$), inflow rel. SV (OR 0.94 (0.90-0.99), $p=0.02$), apex rel. SV (OR 1.07 (1.02-1.13), $p<0.01$) and apex to inflow rel. SV. Ratio (OR 5.81 (1.90-17.77), $p<0.01$) were significantly associated with the endpoint. In a multivariable model, only the presence of tricuspid regurgitation (OR 4.24 (1.66-10.84), $p<0.01$) and apex to inflow rel. SV. Ratio (OR 6.55 (2.09-20.60), $p<0.001$) were independently associated.

Conclusion: The assessment of regional RV function reveals contraction patterns associated with short-term outcome in patients undergoing elective cardiac surgery and might be helpful to optimize risk stratification.

7313

Perventricular muscular VSD closure under transesophageal echocardiography guidance with concomitant surgical repair of perimembranous VSD: A staged hybrid approach

HUNG Y. A.¹, Chang Y. T.¹¹Taichung Veterans General Hospital, Taiwan - aichung City (Taiwan)

Background: Surgical closure is the recommended approach for perimembranous ventricular septal defect (PmVSD), while percutaneous closure is the first-line therapy of muscular ventricular septal defect. Infants with large PmVSD and muscular VSD often present congestive heart failure and need surgical correction. However, surgeons often reluctant to repair muscular VSD in tiny infants concerning the relatively high risk of significant residual shunts and severe left ventricular dysfunction¹. A periventricular device closure of VSDs under transesophageal echocardiographic (TEE) guidance has been performed with excellent results².

Case Report: A nine-month-old, 5.8 kg baby girl with congestive heart failure. Preoperative TEE shows a large PmVSD with aortic valve prolapse and muscular VSD. After medium sternotomy and cardiopulmonary bypass (CPB) establishment, the surgeon punctures the RV's anterior wall and inserts a 20-gauge catheter under constant TEE guidance performed by the anesthesiologist. Under TEE guidance, pediatric cardiologists introduce the guidewire through the defect into the LV, push the Amplatzer occluder. The surgeon repairs the large PmVSD with a pericardial patch under CPB. No postoperative residual shunt from both VSD was found.

Discussion: Several studies support percutaneous closure of PmVSD has similar success rate and minor complication compared with surgical treatment. Our patient is not suitable for transcatheter closure due to large PmVSD with aortic valve prolapse. An untreated muscular VSD may worsen heart failure postoperatively. The staged hybrid approach decreases CPB time, avoids vascular access limitation in small infants, and offers seamless conversion to open surgery. A well-trained cardiothoracic anesthesiologist can provide excellent real-time guidance and minimize exposure to radiation throughout the perventricular closure.

References:

1. Asou T: Surgical management of muscular trabecular ventricular septal defects. *Gen Thorac Cardiovasc Surg* 2011; 59:723–9
2. Xing Q, Pan S, An Q, Zhang Z, Li J, Li F, Wu Q, Zhuang Z: Minimally invasive perventricular device closure perimembranous ventricular septal defect without cardiopulmonary bypass: Multicenter experience and mid-term follow-up. *J Thorac Cardiovasc Surg* 2010; 139:1409–15

Learning points: In the current case, we illustrate a hybrid transapical closure of muscular VSD under TEE guidance followed by surgical correction of a large PmVSD at the same time.

7320

Respiratory complications after robotic-assisted thymectomy in patients with myasthenia gravis – a retrospective analysis

Scheriau G.¹, Weng R.², Maleczek M.³, Matilla J.⁴, Lassnigg A.⁵, Bernardi M.⁵

¹Medical University of Vienna/General Hospital of Vienna - Vienna (Austria), ²Department of Neurology, Medical University of Vienna - Vienna (Austria), ³Department of Anaesthesiology, Intensive Care Medicine and Pain Medicine, Medical University of Vienna - Vienna (Austria), ⁴Department of Thoracic Surgery, Medical University of Vienna - Vienna (Austria), ⁵Division of Cardiac Thoracic and Vascular Anaesthesia and Intensive Care Medicine, Medical University of Vienna - Vienna (Austria)

Background and Goal of Study: Anaesthesiologic management of patients with myasthenia gravis is always delicate and is especially challenging in high risk procedures. Myasthenia gravis is an autoimmune disease leading to ocular or generalised muscle weakness and fatigue. Radical Thymectomy is indicated in patients with thymoma and should be considered in generalised non-thymomatous myasthenia gravis patients. Robotic-assisted thymectomy has been proposed as a safe alternative to

the transsternal and the video-assisted surgical approach. Postoperative myasthenic crisis with respiratory failure is a potentially lethal complication warranting careful perioperative planning and extended postoperative surveillance of patients. The aim of this retrospective single centre study was to evaluate the incidence of respiratory complications and the need of ICU capacities in patients with myasthenia gravis after robotic-assisted thymectomy.

Materials and Methods: Medical records of 72 patients with myasthenia gravis, who received a robotic-assisted thymectomy between January 2014 and December 2019 were reviewed in a retrospective manner.

Results and Discussion: Four patients (5.6%) developed postoperative respiratory failure needing non-invasive ventilation and/or intubation. Respiratory failure occurred within the first hours after extubation when patients were still under surveillance in the recovery room or in the ICU. One patient (1.4%) suffered from worsened myasthenic symptoms several days after surgery and was treated with plasmapheresis. 65 patients (90.3%) were extubated in the operating room, 35 of these (48.6%) were transferred to the ICU and 30 patients (41.7%) were primarily transferred to the recovery room. 20 (27.8%) of these patients were later transferred to the ICU and 14 (19.4% including four from the ICU) were transferred to the surgical ward. No patient suffered from respiratory failure after transfer to the ward. Our results are in line with the previously reported low incidences of postoperative myasthenic crises (1% to 5.4%).

Conclusion: After careful patient selection, planning and postoperative patient evaluation robotic-assisted thymectomy can be safely performed without postoperative surveillance in an ICU.

7338

The effect of anesthesia depth on duration and overall success of the procedure in patients undergoing ectopic focus ablation

Tunç L.¹, Akça B.¹, Yorgun H.¹, Karagöz A. H.¹¹Hacettepe University Faculty Of Medicine - Ankara (Turkey)

Background and Goal of Study: Electrophysiological study is an effective and reliable procedure for diagnosis, risk assessment and treatment of arrhythmias. In patients who will be ablation choosing an anesthesia method is very important for the success of the treatment. Because the use of anesthetic agents can reduce the inducibility of arrhythmias and increase the need for hemodynamic support during the procedure. In our observational prospective study, we aimed to examine the effect of different BIS values on mapping time and process success.

Materials and Methods: After the approval of the ethics committee, the patients who underwent ectopic focal ablation under general anesthesia between December 2020 and April 2021 were checked for mapping time, duration of the procedure, ECG rhythm at the end of the procedure, the need for vasopressor or proarrhythmogenic agents during the procedure, and the ECG rhythm in the third month after the procedure. The effect of the depth of anesthesia according to patient's BIS score on the success of the procedure was examined.

Results and Discussion: As the depth of anesthesia increased, mapping time and processing time increased, and there was a significant difference between the two groups ($p < 0.001$). No significant association was found between the depth of anesthesia and the need for proarrhythmogenic and vasopressor agents. As the depth of anesthesia increased, an increase in the incidence of arrhythmia was observed on the ECG taken at third-month controls after the procedure ($p = 0.006$), but no significant difference was found between the two groups in terms of the need for ablation and the need for shock/cardioversion observed at third-month controls after the procedure. This highly featured and work as a team and anesthesiologist at every stage of the application of elektrofizyolog considering the possibility that the initial focus of the mapping process is not found, this should be discussed with the patient before the procedure is likely and, if necessary, the reduction of the depth of anaesthesia monitoring in a controlled manner and under it, in a way that depends on the success of the process and we believe will further increase patient comfort and satisfaction.

Conclusion: In patients undergoing ectopic focus ablation under general anesthesia, it has been shown that the depth of anesthesia has a negative effect on the success of the procedure.

7342

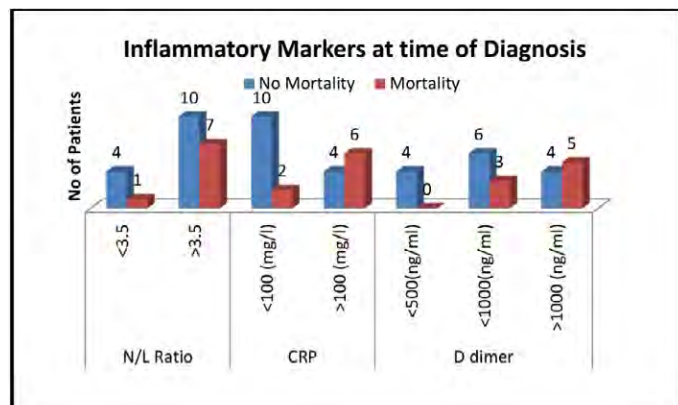
Covid 19, a pop up differential to postoperative inflammatory state and its impact on outcomes after Cardiac surgery

Ramkiran K.¹, Visharad T.¹¹BJ Medical college - Ahmedabad (India)

Background and Goal of Study: COVID-19 has dramatically affected patient care among those undergoing surgery. Considering underlying comorbidities, physical status and intricate perioperative course, cardiac surgery patients represents a vulnerable cohort. This paper describes baseline characteristics, laboratory findings, diagnosis, postoperative course and outcomes.

Materials and Methods: All patients undergoing cardiac surgery at our institute over 1 year were screened for COVID 19 with RTPCR swab test and were then posted for surgery only after corroborating negative report, except for emergency cases. Dedicated preoperative hubs and COVID appropriate measures were taken. Data from electronic patient records of those diagnosed with COVID-19 in the immediate postoperative period were reviewed retrospectively. Continuous normal distributed variables are presented as mean±SD, alternatively as median±IQR and Categorical variables as percentages.

Results and Discussion: 22 patients were infected over one year with a mortality of 36.36% (Mortality in non COVID 6.27%). Days from index surgery to diagnosis was 6(±3.75), with increased oxygen requirement as most common presentation at diagnosis (27.27%). In our study median ICU stay and hospital stay were 6(±2.75) and 10(±3) days respectively. Patients under moderate and high risk categories by EUROSCORE II showed mortality of 30% (vs expected 2.9%) and 71.4% (vs expected 11%). Laboratory values at time of diagnosis were categorized to relate with mortality as shown in figure, as they could be confounding variables of inflammatory state after cardiac surgery. Patients requiring Non invasive ventilation and mechanical ventilation were 27.27% and 31.8% respectively. 2 patients acquired AKI requiring hemodialysis and 1 patient had reexploration for bleeding.



Conclusion: Despite requisite preoperative measures, COVID infection still remained a momentous differential to postoperative complications affecting early outcomes. So more robust pre surgery protocols, better strategies for COVID free environment and early clinical suspicion and workup are required to mitigate its effect on this cohort.

7344

Ninety-day Quality of Recovery trajectory after totally endoscopic aortic valve replacement: a prospective observational cohort study

Verbist J.¹, Verbist J.¹¹Jessa Hospital Hasselt - Hasselt (Belgium)

Background and Goal of Study: New minimally invasive techniques have been implemented in cardiac surgery to facilitate a faster recovery. Totally endoscopic aortic valve replacement through 3 intercostal ports (Yil-AVR) has been introduced in the JESSA hospital, Hasselt, Belgium in October 2017. Assessment of Quality of Recovery (QoR) has been performed by using Quality of Life (QoL) questionnaires (1 month to 1 year). QoR covers many dimensions and has rarely been assessed in a broader perspective after minimally invasive cardiac surgery. The primary aim of this study was to investigate 90-day QoR profile after Yil-AVR.

Materials and Methods: From November 25th, 2020 until October 31st, 2021, patients undergoing an elective Yil-AVR were implemented in this prospective, observational, cohort study. QoR was evaluated at baseline, 14 days, 28 days and 90 days after surgery with both the EuroQOL-5D (EQ-5D) questionnaire and 36-item Short Form survey (SF-36). Statistical analyses were performed with the Friedman rank sum test, followed by Wilcoxon signed rank test adjusted with bonferonni correction.

Results and Discussion: In total, 51 patients undergoing Yil-AVR were included. Ninety days after surgery, the QoL, measured with the EQ5D VAS score, was significantly improved compared to baseline (70 (24.25) vs 80 (20), p<0.001). This improvement at 90 days was also observed in the general health and physical functioning domains of the SF-36.

Conclusion: These results suggest that patients are recovering faster after undergoing a Yil-AVR procedure and that 90 days after surgery, QoL is even improved compared to baseline.

7379

Accuracy of visual estimation of the left ventricular ejection fraction in untrained perioperative echocardiographers

Raksamani K.¹, Noirit A.¹, Chaikittisilpa N.¹¹Siriraj Hospital Mahidol University - Bangkok (Thailand)

Background and Goal of Study: Echocardiographic left ventricular ejection fraction (LVEF) is a commonly used method for LV systolic function evaluation. Although, quantitative methods such as modified Simpson's method are recommended, however, it may not always be feasible in emergency perioperative settings. Therefore, we aimed to compare visual estimation of the LVEF by non-cardiac anesthesiologists with quantitative LVEF measured using modified Simpson's biplane as a reference method.

Materials and Methods: Transesophageal echocardiographic (TEE) studies from 35 patients were selected and 3 different echocardiographic views (the mid-esophageal four chamber view, the mid-esophageal two chamber view, and the trans-gastric mid short axis view) were retrieved from each study and displayed in random order. Two cardiac anesthesiologists with certification in perioperative echocardiography independently measured the LVEF using the modified Simpson's method and categorized the LVEF into five grades: hyperdynamic (LVEF), normal, mildly reduced LVEF, moderately reduced LVEF, and severely reduced LVEF. Seven non-cardiac anesthesiologists with limited experience in echocardiography also reviewed the same TEE studies and estimated the LVEF and graded LV function. The accuracy of the LV function grading and the correlation between visual estimation of LVEF and quantitative LVEF were calculated. The agreement of measurements between the two methods was also assessed.

Results and Discussion: Pearson's correlation between LVEF estimated by participants and that quantitative LVEF using modified Simpson's method was 0.818 (p< 0.001). From a total of 245 answers, 120 (49.0%) answers were correct grading of LV function. Participants were able to grade LV function most accurately in LV function Grade 1 and Grade 5 (65.3%). For the estimates that were not matched the LV function categories as of the quantitative LVEF, 108 (44.1%) were in the adjacent categories (1 grading difference), 15 (6.1%) answers were unmatched by

two grading categories, and only 2 answers (0.8%) were unmatched by more than two gradings. The 95% level of agreement of the Bland-Altman method was -11.3-24.5, -21.9-22.6, -23.1-26.5, -20.5-22.0 and -26.6-11.1 for LV grade 1 to 5, respectively.

Conclusion: Visual estimation of LVEF in perioperative TEE has acceptable accuracy in untrained echocardiographers and can be used for rescue TEE.

7464

Migration of a contraceptive implant to the pulmonary artery: A complicated anesthetic and surgical management case report

Silva A.¹, Tiago B.¹, João M.¹

¹Centro Hospitalar Universitário de São João - Porto (Portugal)

Background: Subdermal implants have become safe and efficient widespread contraceptive options. Infrequently, contraceptive implant migration can happen. Although, its endovascular and pulmonary embolization remains a rare complication ¹. We report a case of a complicated removal of a migrated etonogestrel (Implanon NXT) device, into the pulmonary arterial tree.

Case Report: An asymptomatic healthy 18-year-old woman intended to remove a migrated contraceptive implant to the posterior basal segment of the left pulmonary artery (Figure 1). Firstly, an endovascular approach was unsuccessful accomplished. After that procedure, she was referred to our institution for surgical removal by Cardiothoracic Surgery due to persistent chest discomfort and hemoptysis. Initially, she was submitted to a Video-Assisted Thoracoscopic Surgery under balanced general anesthesia, with resection of the posterior basal segment of the left lower lobe, which was uneventful. However the contraceptive implant was not present in the resected lung. Furthermore, her status was complicated by pulmonary empyema, which was successfully managed. Due to persistence of thoracic pain and hemoptysis, she was submitted to left lower lobectomy by thoracotomy under combined general anesthesia with thoracic epidural, with a successful removal of the foreign body. Proper pain management was attained with the use of epidural catheter until hospital discharge. Nevertheless, the patient remained symptomatic with persistent thoracic pain whereby she was referred to our chronic pain department.

Discussion: A pulmonary artery migration of a contraceptive implant has an incidence of 1 in 100,000 ¹. Endovascular approaches for device extraction can be successful with minimal morbidity. However, in this case, multiple procedures were necessary increasing morbidity in a young woman.



References:

1. OHANNESSIAN, Alexandra, et al. A French survey of contraceptive implant migration to the pulmonary artery. *Contraception*, 2019, 100.4: 255-257.

Learning points: Cardiopulmonary complications after a contraceptive implant migration in pulmonary artery may be serious. A multidisciplinary approach allows successful treatment.

7494

On-table extubation after minimally-invasive adult cardiac surgery : preliminary analyses of a single-center retrospective non-inferiority trial

Gos L.¹, Amabili P.¹, Azevedo-Mendes M.¹, Hans G.¹, Bonhomme V.¹, Jaquet O.¹

¹CHU LIEGE - Liege (Belgium)

Background and Goal of Study: Preservation of sternal stability may facilitate immediate extubation after minimally invasive cardiac surgery. We hypothesized that on-table extubation is non-inferior to delayed extubation with regard to safety and may provide additional benefits.

Materials and Methods: We retrospectively reviewed the data from patients who underwent heart valve surgery through right anterolateral thoracotomy or J-hemisternotomy between January 2016 and December 2020. These patients were randomly managed by one of six cardiac anesthesiologists. In the absence of complication, they were discharged from the intensive care unit (ICU) at postoperative day 2. Since only some cardiac anesthesiologists practiced on-table tracheal extubation, their outcome could be compared with those extubated in the ICU. The primary outcome was the difference in the proportion of patients having an ICU length of stay > 2 days between the groups, with a predefined non-inferiority margin of 15 %. Secondary outcomes included the incidence of postoperative respiratory complications, atrial fibrillation, need for vasopressors, fluid balance, length of hospital stay and 30-day mortality. Continuous and categorical data were compared using student t-tests and chi-square tests, respectively. Lengths of stay were analyzed using a cox-proportional hazard model.

Results and Discussion: A total of 454 patients met inclusion criteria, of whom 142 (33.3 %) were extubated on table. The difference in the proportion of patients with a ICU stay > 2 days demonstrated non inferiority (-18%; 95%CI: -27% — -8%; P<0.001). The incidence of immediate postoperative respiratory complications (P=0.69) and atrial fibrillation (P=0.16) did not differ between the groups. Patients with on-table tracheal extubation had a significantly lower fluid balance (P=0.03) and fewer vasopressor requirements (P<0.001), as well a significantly shorter hospital stay even after adjustment of the EuroSCORE II (P=0.02).

Conclusion: On-table extubation is not inferior to ICU extubation regarding the length of ICU stay, which we considered as a global indicator of early postoperative complications. It is associated with reduced vasopressors and fluids requirements, which may facilitate postoperative recovery.

7512

Postoperative complications after Type b aortic dissection endovascular treatment.

Pérez C.¹, Williams A.¹, Coto C.¹, Vega M.², Arenas E.¹

¹Hospital Universitario Central de Asturias - Oviedo (Spain), ²Hospital Universitario San Agustín - Avilés (Spain)

Background and Goal of Study: Aortic dissection is a life-threatening condition associated with high morbidity and mortality. Type B aortic dissection, according to the Stanford classification, involves only the descending aorta. Endovascular treatment is one of the most innovative approaches of this disease. The aim of this study is to evaluate the postoperative complications after endovascular surgical treatment of type B aortic dissection.

Materials and Methods: In this descriptive, retrospective and unicentric observational study, we collected data from the electronic medical records of 25 patients undergoing endovascular surgery over a period of 5 years (January 2015 – September 2019). We analyzed different variables, such as sex, age, hospital admission, ASA-classification, mortality during hospital admission, general postoperative complications and specific postoperative complications. We performed the statistical analysis using SPSS Statistics. Data are presented in absolute values and percentages or mean ± SD.

Results and Discussion: After studying 25 patients in our hospital, we observed these overall results: 72% were men, average age was 66 (±11) years old, and ASA II and III was obtained in most patients (95%). The average hospital admission was 14 (± 11) days. Thoracic endovascular

aortic repair was performed in 23 patients (95%), 16 of which were emergent surgeries (64%). Mortality during hospital admission was 16%. We observed an incidence of general postoperative complications in 80% of the patients and specific postoperative complications in 72%. The most frequent complications were arterial hypertension (72%), delirium (32%), acute kidney injury (28%), refractory pain (24%), cardiorespiratory arrest (16%) and infection (16%).

Conclusion: Our results suggest that thoracic endovascular aortic repair in Stanford type b aortic dissections lead to an increased incidence of arterial hypertension, delirium, acute kidney injury and refractory pain in postoperative care units. Nevertheless, further investigation is needed to determine this association in larger prospective studies.

7528

The prevalence of poor distal leg perfusion in totally endoscopic cardiac surgery: a prospective cohort study

Peeters J.¹, Ceulemans A.¹, Callebaut I.¹, Van Tornout M.¹, Stessel B.¹, Vandenbrande J.¹

¹Jessa Hospital - Hasselt (Belgium)

Background and Goal of Study: Peripheral arterial cannulation is a necessity for CardioPulmonary Bypass (CPB) in Totally Endoscopic Cardiac Surgery (TECS) with the femoral artery being the preferred cannulation site in the majority of cases. However, the cannulation of the femoral artery can be associated with a risk of developing hypo-perfusion or ischemia of the cannulated leg resulting in poor clinical outcomes. The primary aim of this study is to evaluate the prevalence of poor distal leg perfusion in TECS.

Materials and Methods: From November 25th 2019 until January 21st 2021, consecutive patients undergoing TECS in the Jessa Hospital were asked to participate. Clinical relevant ischemia was defined as a minimum of 15% Tissue Oxygenation Index (TOI) drop, lasting at least 4 minutes. TOI-values were assessed using non-invasive Near-InfraRed Spectroscopy (NIRS) measurement of the skin covering the ipsilateral gastrocnemius muscles. Perioperative TOI-values were assessed at: Baseline (B, 5 minutes before insertion of the femoral arterial cannula (FAC)), Event 1 (E1, insertion of FAC), Event 2 (E2, onset of CPB), Event 3 (E3, offset of CPB) and Event 4 (E4, removal of FAC). Statistical differences were analyzed using the Wilcoxon signed-rank test.

Results and Discussion: In total, 280 patients were included. 59 patients (21.07%) suffered from ischemia in the cannulated leg, 5 (1.79%) in the non-cannulated leg and 3 (1.07%) in both legs. Figure 1 shows the comparison of the mean TOI-values of all events in the cannulated leg with the mean baseline TOI-value. Figure 2 presents the comparison of the mean TOI-values between the cannulated and non-cannulated leg.

Figure 1. Comparison of mean TOI-values of all events (E1, E2, E3 and E4) compared with mean baseline (B) TOI-value (in %) in the cannulated leg (n = 280)

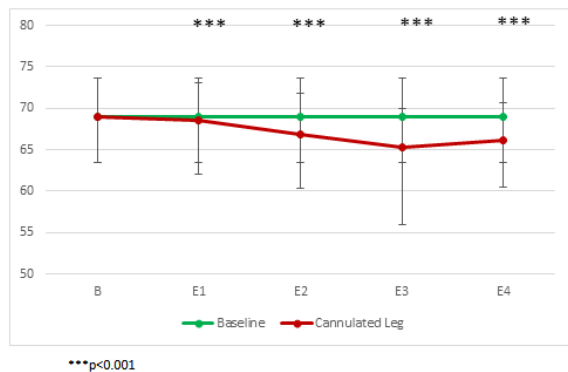
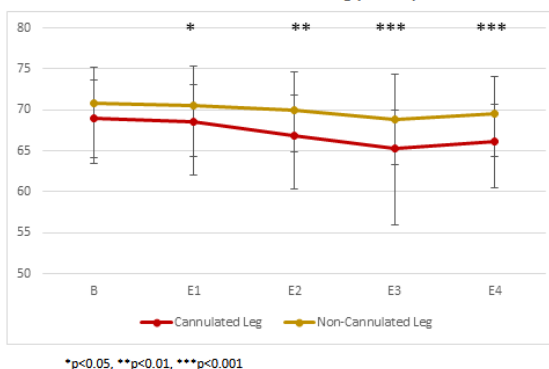


Figure 2. Comparison of mean TOI-values (in %) of baseline (B) and all events (E1, E2, E3 and E4) between the cannulated and non-cannulated leg (n = 280)



Conclusion: Only a minority of patients undergoing TECS with peripheral arterial cannulation suffered from ischemia in the cannulated leg. The risk of ischemia was highest during offset of CPB.

7560

Urological and renal complications in patients undergoing lung resection surgery in ERAS environment

Recasens García A.¹, Martín Baeza S.¹, Montaner M. D. M.¹, Armengol Hernández L.¹, Díaz Uceda L.¹, Navarro-Ripoll R.¹

¹HOSPITAL CLINIC DE BARCELONA - Barcelona (Spain)

Background and Goal of Study: The implementation of the ERAS (Enhanced Recovery After Surgery) protocols in thoracic surgery has changed the perioperative management of patients. One of the recent recommendations is to avoid systematic urinary catheterization during lung surgery. There is little evidence regarding the postoperative urological and renal complications (URC) that can occur due to this praxis. Therefore, a study was designed to evaluate the incidence of URC in video-assisted thoracoscopic lung resection surgery.

Materials and Methods: A prospective study in the Post-Anaesthesia Care Unit (PACU) of a tertiary hospital was conducted after local ethical committee approval and written informed consent. Data recorded were demographics, renal and urologic comorbidities, pre and postoperative creatinine, type of anesthesia and analgesia, opioid consumption, fluid therapy, sonographic estimated bladder volume in PACU, first postoperative micturition, need of perioperative urinary catheterization and URC (defined as urinary retention, urinary infection, vesical globe, acute kidney injury [AKI]). Vesical symptomatology was assessed by patients through a self-evaluation form. Univariate statistical analysis of the variables was performed, with a 95% confidence interval.

Results and Discussion: 76 patients were included and urinary catheterization was performed intraoperatively in 14 (18%). Among the 62 patients that were admitted to the PACU without urinary catheter, 5 (8%) developed URC (Table 1). 4 needed postoperative urinary catheterization and 1 patient developed AKI. These URC didn't have a clinically relevant impact on kidney function during hospital stay. There was no clear difference in urinary volume at admission or discharge from PACU amongst both groups, neither in anesthesia type, fluids or opioid administration (Table 1).

Conclusions: Avoiding systematic urinary catheterization during lung resection surgery seems to be a safe practice despite a noteworthy incidence of immediate postoperative URC. We didn't identify any modifiable factor related to the appearance of URC which might be related to baseline patients' characteristics.

7611

A left atrial myxoma with a giant Eustachian valve giving the appearance of cor triatriatum dexter.

Cugat Torres C.¹, Bartakke A.², Domínguez M.¹, Pérez S.¹, Barturen F.¹
¹Hospital Universitari Son Espases - Palma de Mallorca (Spain),
²Hospital Universitario Reina Sofía - Palma de Mallorca (Spain)

Background: Eustachian valve (EV) is a remnant of the right sinus venosus valve which is noted in about 0.2% of adults during echocardiography. [1] It can be easily mistaken for cor triatriatum dexter (CTD), thrombus or vegetations. We present the case of a 79-year-old female patient undergoing elective left atrial mass excision who presented with an incidental finding of a giant EV mimicking CTD during perioperative transesophageal echocardiography (TEE).

Case Report: The patient presented to Cardiology department with progressive dyspnea on exertion and occasional paroxysmal nocturnal dyspnea and peripheral edema. The patient underwent transthoracic echocardiography (TTE) and a left atrial mass was detected arising from the interatrial septum (IAS) with no thrombi and moderate mitral regurgitation and a suspected persistent foramen ovale (PFO). There was no other significant pathology on echocardiography. During elective excision of the left atrial mass (myxoma), perioperative TEE demonstrated a septum apparently dividing the right atrium into two compartments on mid-esophageal four chamber and right ventricular inflow-outflow view. Bicaval view demonstrated a very long EV with membranous appearance, and the presence of a PFO. Three-dimensional (3d) TEE was used to confirm that the structure was a giant flap-like EV. The giant EV was taken into account did not cause any problems during cannulation, and hence left intact during the surgical procedure.

Discussion: Eustachian valve is a partial remnant of the right sinus venosus valve (RSVV) which can potentially cause multiple complications like endocarditis, thrombus, and difficult cannulation including a PFO, as in our case, or occasionally an atrial septal defect (ASD). Sometimes it is mistaken for the ASD and surgically closed instead of the true ASD. CTD (incidence 0.025% of congenital heart diseases) is the persistence of the whole RSVV and is associated with major anomalies including ASD, and IVC obstruction.

References:

1. Schuchlenz HW, Saurer G, Weihs W, Rehak P. Persisting eustachian valve in adults: relation to patent foramen ovale and cerebrovascular events. *J Am Soc Echocardiogr.* 2004;17:231e233. <https://doi.org/10.1016/j.echo.2003.12.003>

Learning points: Multiple views should be obtained while performing comprehensive TEE so as to differentiate and confirm structural anomalies. 3d TEE provides an invaluable modality when reviewing doubtful structures during perioperative TEE.

7614

Measurement of cardiac output by transpulmonary thermodilution is equivalent to continuous measurement by pulmonary artery catheter in an animal model of left ventricular assist.

Vega V. E.¹, Duran M.¹, Fernandez-Lopez I.¹, Almaraz E.¹, Gaudioso A. M.¹, Begofía Q. V.¹
¹HOSPITAL GREGORIO MARAÑÓN - Madrid (Spain)

Background and Goal of Study: Left ventricular assist devices (LVADs) represent a powerful therapeutic option for patients with advanced heart failure. Perioperative cardiac output (CO) monitoring in these patients is a priority for haemodynamic management, and the pulmonary artery catheter (PAC) is the gold standard method of (CO) measurement. Transpulmonary thermodilution (TPTD) using the PICCO monitor have become a less invasive alternative to PAC. Our group has recently validated continuous CO (CCO) monitoring using PAC in an animal model¹. The aim of this study was to validate the measurement of CO by TPTD with the CCO (PAC) in the continuous flow LVAD in partial support in a swine experimental model.

Materials and Methods: The study was performed with six healthy minipigs. Under general anesthesia a Biomedicus 540 centrifugal pump was implanted in the minipigs undergoing continuous-flow support for

partial left ventricular assistance. Cardiac output measurements were made simultaneously with PAC, continuous cardiac output and bolus TPTD (TPTDb using PICCO 2 monitor) in four different moments of the study: immediately before starting into the LVAD (basal cardiac output), meanwhile the LVAD, in a hypovolemia status and finally in a model of hypovolemia. Bland-Altman method was used for validation of the TPTD. All procedures were approved by the Ethics Committee of Hospital General Universitario Gregorio Marañón, Madrid, Spain.

Results and Discussion: Comparing CCO with TPTDb, the Bland-Altman analysis demonstrated a percentage of error of 10% (Bias 0.062) in the basal moment, 9% (Bias -0.058) in the LVAD moment, 10% (Bias 0.097) in the hypovolemia status, and 24% (Bias 0.2) in the hypovolemia model.

Conclusion: The results described above show that CO measured by TPTDb is feasible and reliable methodology in the determination of CO in comparison to CCO by PAC in continuous flow LVADs in partial assist in a swine model.

References:

1. Quintana-Villamandos, B., Barranco, M., Fernández, I., Ruiz, M., & Del Cañizo, J. F. (2021). New Advances in Monitoring Cardiac Output in Circulatory Mechanical Assistance Devices. A Validation Study in a Porcine Model. *Frontiers in physiology*, 12, 634779. <https://doi.org/10.3389/fphys.2021.634779>

7624

Metabolic Alkalosis in the Paediatric Cardiac Intensive Care - A Prospective Observational Study

Thomas D.¹, P Raman S.¹, S Dharan B.¹

¹Sree Chitra Tirunal Institute for Medical Sciences and Technology - Trivandrum (India)

Background and Goal of Study: Although metabolic alkalosis is reported as the most common acid base disorder to occur in the intensive care unit, its incidence, causation and morbidity outcome have not been explored sufficiently especially in the pediatric post cardiac surgery patients. The newer methods of arterial blood gas assessment have further challenged the existing data in this regard and call for a detailed research in this field. Our primary objective was to study the incidence of metabolic alkalosis in post-surgical infants admitted in the paediatric cardiac intensive care unit (PCICU). We have also tried to determine the factors associated with development of metabolic alkalosis and study its effect on duration of mechanical ventilation and ICU stay.

Materials and Methods: This was a prospective observational study done on infants undergoing elective cardiac surgery on cardiopulmonary bypass. Postoperative serial ABG monitoring was done for 3 days or till cessation of mechanical ventilation, whichever occurred earlier. Berend's three step approach and partitioning of base excess method was used for analysis of ABG. Incidence of metabolic alkalosis was assessed and patients were classified as group MA and group No MA for analysis. Causative preoperative, intraoperative and postoperative factors were assessed along with morbidity profile.

Results and Discussion: Metabolic alkalosis was detected in 22.1 % (23 out of 104) of subjects. In group MA 73.9 % infants belonged to RACHS 3 and above (43.2% in group No MA, P=0.009). Intraoperative factors: longer CPB time (200.04 ± 83.35 min vs 144.59 ± 64.77, P<0.001*), longer cross clamp time (119.78 ± 63.12 min vs 84.95 ± 48.8, P= 0.006*), application of modified ultrafiltration (91.3% vs 60.5%, P=0.005*) and larger volume of modified ultrafiltrate removal (60 (44.4,70) ml/kg vs 44.44 (32.9,54.3), P=0.003*) were noted in group MA. Partitioning of base excess showed negative SBEFW and SBECl in both groups, suggestive of the presence of acidifying agents. A longer period of ventilation, ICU stay and hospital stay were found in group MA.

Conclusion: Children with a higher RACHS-1 score, requiring conventional ultrafiltration and a higher volume of modified ultrafiltration intra-operatively, an increased urine output in the postoperative period and a more fluid depleted state tended to develop metabolic alkalosis, with additional metabolic acidosis.

7637

Infection marker in perioperative medicineHrazdilova O.¹, Spáčilová H.¹¹Centre for cardiac surgery and transplantation - Brno (Czech Republic)

Background and Goal of Study: The goal was to verify, that intensive care infection score (ICIS) as a biomarker differentiates infection from systemic inflammatory response syndrome (SIRS) after cardiac surgery.

Materials and Methods: We have enrolled 291 cardiac surgery patients in this prospective study. The cohort was divided into infected and non-infected patient groups for evaluation. Intensive care infection score (ICIS), derived from five blood - count parameters, characterizes the immune response in routine blood samples.

Results and Discussion: Elevated level of ICIS had been proved in patients with positive microbial cultures in contrast to patients with postoperative SIRS (elevated CRP and negative microbial screening) after surgery. Except after the surgery CRP, PCT and ICIS values are in correlation ($p=0,001$). We confirmed the cut - off ICIS level 5. CRP is not predictive for infection after the surgery

Conclusion: ICIS helps us differentiate between infection and SIRS in critically ill patients. The important difference between patients with sepsis and SIRS has been seen in 48 hours from the first symptoms. In this time, ICIS level 5 has sensitivity 90% and specificity 86 % In contrast to CRP and PCT, the ICIS score can be obtained routinely without extra blood sampling and with lower costs, yielding results very fast (within 15 minutes). ICIS helps to avoid antibiotics overuse

References:

Weimann K, Zimmermann M, Spies CD, et al. Intensive Care Infection Score - A new approach to distinguish between infectious and noninfectious processes in intensive care and medicosurgical patients. *Journal of International Med Research* 2015, Vol43(3) 435-451

Van der Geest PJ, Mohseni M, Linssen J, et al. The intensive care infection score - a marker for the prediction of infection and its severity. *Critical Care* 2016, 20:180

7641

Role of Elective Peritoneal Dialysis in Infants and Children undergoing Congenital Cardiac SurgerySachde D. J.¹¹I.N.Mehta Institute of Cardiology and Research Centre - Ahmedabad (India)

Background and Goal of Study: Postoperative third spacing of fluid is a common problem in congenital cardiac surgery with cardiopulmonary bypass (CPB). Risk for postoperative acute kidney injury (AKI) and fluid overload, which further aggravated with prolonged CPB time. Management of such problem is challenging as immature kidney in these patients are unable to remove this excess fluid and compromises pulmonary, cardiac, and gut function, concentrate the intravascular compartment leading to hypernatremia and uremia. The aim of this study was to investigate the effect of peritoneal dialysis (PD) on fluid balance and outcome, blood urea, serum creatinine. Hemodynamic, ionotropic requirement, ventilatory period etc.

Materials and Methods: Prospective study done in 60 neonatal patients, age < 5 months, weighing 2.5 -5.5kg, peritoneal catheter inserted prophylactically at the end of surgery. In group 1, elective PD started within 2 hours after shifting the patient in ICU (20 ml/kg/cycle- repeated hourly). In group 2, PD started as a sort of treatment whenever the patient deteriorates in terms of renal function or hemodynamic status.

Results and Discussion: Total intake (ml/day) of fluid was comparable on POD1,2 and 3 in both the groups. The Total output (ml/day) in group 1 was significantly higher (569.9±72.73, 562.7±80.34 and 606.4±36.83 on POD 1,2 and 3 respectively), as compared to group 2 (457.9±153.18, 445.0±92.80 and 496.40±122.88 on POD 1,2 and 3 respectively). The Urine output (ml/day) of 524.15±78.91 on POD1, 518.55±78.34 on POD2 and 557.35±41.21 on POD3 in group 1, as compared to group 2, which was 252.10±104.08 on POD1, 207.63±104.81 on POD2, 228.75±144.22 on POD3 and was statistically significant. The serum urea in group 1 was 19.84±2.04, 20.29±2.27 and 20.7±2.89 as compared to group 2, which was 29.05±12.41, 40.74±11.59 and 42.98±12.52 on POD 1,2 and 3 respectively which was found to be significantly higher ($P < 0.005$). The

serum creatinine of 0.43±.07 on POD1, 0.442±.07 on POD2, 0.438±.06 on POD3 as compared to control group which was 0.64±.16 on POD1, 0.73±.20 on POD2, 0.68±.24 on POD3 which was significant ($P < 0.0001$).

7654

Renal tissue oxygen monitoring to predict early kidney injury to improve outcome in neonatal cardiac surgeryVerma A.¹, Pujara J.¹¹UN Mehta institute of cardiology and research centre, Ahmedabad, Gujarat - AHMEDABAD (India)

Background and Goal of Study: Acute kidney injury (AKI) develop after cardiopulmonary bypass is a common and serious complication in neonatal cardiac surgery. Many blood and urine biomarkers are available to detect AKI but required frequent sampling and use of economic resources. This study compares serum creatinine and real time non invasive mean renal oximetry to predict early ongoing AKI in neonatal cardiac surgery

Materials and Methods: It is prospective observational study, in which total 60 neonates undergoing cardiopulmonary bypass for congenital cardiac surgery were taken. Serum creatinine and mean renal oximetry measured at 4, 8, 12 and 24 hours.

Results and Discussion: 21 (35%) patients develop AKI in post operative period according to pRIFLE criteria. Both serum creatinine and renal oximetry taken at same interval and mean renal oximetry predict AKI early than serum creatinine (p -value < 0.005 at 8 hours for renal NIRS and 24 hours for serum creatinine). So early management of AKI decrease hospital and ICU stay in AKI patient.

Conclusion: As neonates are vulnerable for AKI after cardiac surgery. Renal oximetry shows a promising role in detecting AKI and early intervention helps to decrease ventilation time and ICU stay in AKI patients. Further work should be focus to develop a protocol based management AKI with use of renal oximetry.

7662

Klippel Trenaunay Syndrome - when risk meets cardiac surgeryMorais L.¹, Pratas A.¹, Fernandes S.², Bernardo R.²¹Hospital Espírito Santo de Évora - Evora (Portugal), ²Centro Hospitalar Universitário Lisboa Norte - Lisboa (Portugal)

Background: Klippel Trenaunay Syndrome (KTS) is a rare complex congenital disorder marked by the triad of capillary malformation, venous malformation and limb overgrowth.^{1,2} It's associated with hemorrhagic risk and difficult airway.²

Case Report: We report a case of a 64-year-old female with KTS planned for left atrial myxoma excision under cardiopulmonary bypass (CPB). Preoperative evaluation revealed preserved biventricular function and mild thrombocytopenia. The thromboelastogram was otherwise normal, so a platelet transfusion was planned after CPB. There were no difficult airway findings. In addition to standard ASA monitoring, bispectral index, cerebral oximetry and invasive arterial blood pressure were placed. General anaesthesia was induced with fentanyl, propofol and rocuronium, and intubation was performed uneventfully. Anaesthesia was maintained with propofol infusion and intermittent bolus doses of fentanyl. The intraoperative transesophageal echocardiogram confirmed a left atrium multilobed mass. The surgical access was made through right thoracotomy and CPB was instituted after femoral venous catheterization. The patient remained hemodynamically stable and the myxoma excision occurred without complications. Weaning from CPB was uneventful. She was transfused with one platelet concentrate. Total blood loss was estimated at 300mL. Extubation occurred 6 hours after surgery, without complications in the postoperative period.

Discussion: Cardiac anaesthesia management of KTS patients is challenging given the lack of evidence about it. KTS is not only associated with venous malformations which hold difficulties for venous cannulation (CBP and central venous access), but also with Kasabach Merritt

Syndrome (thrombocytopenia and coagulopathy) and difficult airway due to frequent soft tissue hypertrophy.^{1,2} The hemorrhagic risk is severely compounded by CPB itself and its coagulopathic potential. We present a successful approach of a KTS case for cardiac surgery emphasizing the importance of perioperative planning and risk reduction.

References:

1. George S, Anaesthesia recommendations for patients suffering from Klippel-Trénaunay Syndrome *in* Orphananesthesia, 2017;
2. Barbara *et al*, Anesthesia for Surgery Related to Klippel-Trenaunay Syndrome: A review of 136 Anesthetics, *in* Anesthesia and Analgesia, 2011

Learning points: Despite the risks and potential difficulties, cardiac anesthetic management of KTS patients can be done safely.

Acute and Chronic Pain Management and Palliative Medicine

6513

Ganglion impar block for perineal neuropathic pain after urologic surgery – the usefulness of echography

Tinoco J.¹, Eloy A.², Guímaro J.², Cortez J.²

¹Hospital São Bernardo - Setúbal (Portugal), ²Hospital São Bernardo - Setúbal (Portugal)

Background: Neuropathic pain is defined as pain resulting from an injury or illness that affects the somatosensory nervous system and has significant implications for the patient's quality of life, with social, economic and psychological consequences. Ganglion impar block is a minimally invasive technique that is usually performed to treat perineal, pelvic or visceral pain, refractory to other conservative treatments.

Case Report: 51-year-old man with a history of smoking and COPD. After being diagnosed with prostatitis, he underwent transurethral resection of the prostate 2 years ago. Since then, he complains of constant and intense perineal pain that interferes with his daily activity. He was referred to the Chronic Pain consultation after unsuccess of pain relief with NSAIDs and weak opioids. The pain was characterized as a burning sensation [numeric rating scale (NRS) 9], with worsening in the sitting position and tight underwear. We opted to perform a ganglion impar block by anatomical references, using the transdiscal approach. Due to the technical difficulty, we use ultrasound to help better locate the sacrococcygeal junction. Finally, 100 mg lidocaine with 40 mg methylprednisolone was administered. Pharmacological therapy was optimized. One week after the technique, the patient reported significant improvement in pain relieve (NRS 4).

Discussion: We present a case of postoperative perineal neuropathic pain, strong and persistent, which improved successfully after the ganglion impar block. This is a structure located in the retroperitoneal region, anterior to the sacrococcygeal joint and marks the end of the sympathetic paravertebral ganglion chain. This approach using ultrasound, facilitates the identification of the structures of interest, especially in cases of difficult identification by anatomical references.

Learning points: Ganglion impar block is a minimally invasive technique, useful in relieving perineal pain, refractory to other conservative treatments. The aid of ultrasound during the technique proved to be helpful, safe, effective and fast.

References:

1. Vydyanathan A *et al*. Atlas of Ultrasound-Guided Procedures in Interventional Pain Management. 2011
2. Ghai A *et al*. Saudi J Anaesth. 2019 Apr-Jun; 13(2): 126–130.

6526

Chronic pain burden after COVID-19 disease

Domingues S.¹, Saraiva R.¹, Xavier C.¹, Fontinhas T.¹

¹Centro Hospitalar Lisboa Norte - Hospital Santa Maria - Lisbon (Portugal)

Background: Pain is a main symptom during COVID-19, represented mostly by headache, myalgias and arthralgias. Although there is evidence that cytokine storm induced by SARS-CoV-2 may play a role in pain, the exact mechanisms are still unknown. Chronic Pain (CP) due to SARS-CoV-2 infection could be a consequence of COVID-19 itself or an exacerbation of a previous CP. A new onset of CP related to psychological stressors during pandemic should also be considered.

Case Report: A 43y old woman with previous medical history of autoimmune hepatitis during childhood and preeclampsia, tested positive for SARS-CoV-2 in November 2020. She initially had a history of headache, respiratory symptoms, anosmia, arthralgia and myalgia. About three weeks later of supportive care, the aforementioned symptoms resolved but generalized fatigue persisted combined with new onset of bilateral hip joint pain. The pain appeared to fluctuate unpredictably over time with exercise as aggravating factor. Two months later and after treatment with NSAID and acetaminophen the pain persisted. The patient was referred for consultation in a CP Unit. It was decided that tapentadol with an initial dose of 50mg twice a day would be the most appropriate to manage this pain. Exercise with muscular strengthen it was also advised. The patient was consulted two weeks, one and two months later. There was an improvement defined by a lower number of episodic pain, lower score of intensity in pain scale and an upgrade in life quality demonstrated by a higher score in EQ-5D.

Discussion: In the second half of 2020 a raised concern among scientific community about CP after SARS-CoV-2 infection was observed. It was noticed an increasing number of new cases of CP, exacerbation of previous CP and a new onset of CP related to psychological stressors during pandemic. The exact pathways involved are unknown but may be caused by the generalized inflammation state, cytokine response and also the virus ability to direct invasion of nervous system. A multimodal pharmacological care in combination with nonpharmacological treatment is the key.

Learning points: CP development after SARS-CoV-2 infection could be multifactorial and may presenting as neuropathic, nociplastic or nociceptive pain. More attention must be placed on the appropriated pain treatment during COVID-19 disease. A multidisciplinary approach with adequate pain management, physical rehabilitation and psychological therapy is essential.

6585

Continuous erector spinae block as postoperative analgesic technique for robotic-assisted thoracic surgery: preliminary results from a single center case series

Tigano S.¹, Cavaleri M.¹, La Rosa V.², Cusumano G.¹, Sanfilippo F.¹, Astuto M.¹

¹University Hospital Policlinico "G. Rodolico" - Catania (Italy),

²Humanitas Clinical Institute - Catania (Italy)

Background and Goal of Study: The ESPB is a recently implemented analgesic technique initially reported for thoracic analgesia and subsequently adopted for both intra- and post-operative pain management. Thoracic surgery is among the most painful surgical procedures, even when conducted with minimally invasive approach. RATS challenges the traditional analgesic regimens as one of its aim is to decrease patient's length of stay (LOS) whilst achieving optimal postoperative pain management[1,2]. Furthermore there is lots of growing evidence on the impact of poorly controlled PP on the development of chronic post-surgical pain (CPSP). We report our preliminary experience with postoperative pain management with continuous Erector Spinae Plane Block (ESPB) in the field of robotic assisted thoracic surgery (RATS).

Materials and Methods: We performed ESPB during surgery and catheter local anesthetic infusion in the first two postoperative days as analgesic technique in eight consecutive patients undergoing

elective RATS procedures. During the first two postoperative days the effectiveness of the ESPB was evaluated through serial pain assessment with numeric rate scale (NRS) score, both at rest and during movements every 6 hours. Moreover every rescue analgesic drug and opioids prescription were noted.

Results and Discussion: Three patients required rescue analgesic doses within the first 24 hours. As shown in Table 1, one patient who underwent a lobectomy required a low dose of morphine infusion, 0.75 mg/h, during the first 12 h of postoperative care in addition to the LA infusion through ESP catheter. Furthermore no surgical and cardiovascular complications were detected during the whole postoperative stay in this cohort of patients. No postoperative nausea and vomiting (PONV) or any kind of dizziness was reported.

Conclusion: We report a small but promising experience regarding PP management with continuous ESPB after RATS as it may offers the opportunity to further and larger studies on postoperative pain management with continuous regional blocks.

References:

1. Pedoto A, Perrino AC. Delayed recovery following thoracic surgery: persistent issues and potential interventions. *Curr Opin Anaesthesiol.* 2019
2. Heller JA et al. Robotic-assisted thoracoscopic lung surgery: anesthetic impact and perioperative experience. *Minerva Anesthesiol.* 2018

6745

Correlation of pain perception and fentanyl consumption after major abdominal surgery with cgrp 4218t/c polymorphisms

Halvi Togataveera P.¹, Saxena K. N.¹, Kapoor S.¹, Wadhwa B.¹
¹Lok Nayak Hospital, Maulana Azad Medical college - Delhi (India)

Background and Goal of Study: The calcitonin gene related peptide (CGRP) is the neuropeptide implicated in pain pathways of A δ and C sensory nerve fibres. Different genotypes of CGRP have been identified i.e., C/C, T/C and T/T genotype. Our study compared the relationship between CGRP polymorphisms and post-operative fentanyl consumption in Indian patients undergoing major abdominal surgery.

Materials and Methods: Study was conducted on 85 participants. ASA grade I/II patients of age 18-60 years, scheduled for elective major abdominal surgery under general anesthesia were enrolled. Primary Outcome: Post-operative total fentanyl consumption in first 24 hours. Secondary Outcome: Pain perception and postoperative complications monitoring like nausea and vomiting, pruritus, sedation and respiratory depression. 3 ml venous blood sample was sent for genetic evaluation. Epidural catheter was inserted. Standard general anaesthesia protocol was followed. At 20 minutes before the anticipated end of the surgery, epidural infusion of Inj fentanyl at 5 mcg/hr was started as background infusion. The study outcome variables were assessed during first 24 hours of post-operative period only. The assessment was done at 0 hrs, 6 hrs, 12 hrs and 24 hrs. Rescue analgesia - 2 cc (5mcg) bolus of Inj. Fentanyl was given via intravenous route in case of non-relief of pain, when visual analogue scale was >3/10. Total number of boluses administered on patient's demand and total amount of fentanyl consumed in the different time periods in the first 24 hours was noted.

Results and Discussion: T/T genotype-52.9%, T/C genotype-35.3%, C/C genotype-11.8%. Demographic profile of the patients which were found to be comparable among 3 genotypes. Mean total fentanyl consumption in the first 24 hours was found to be C/C group-212.00 \pm 7.53 mcgs, T/T group-182.89 \pm 9.91 mcgs and T/C group-159.67 \pm 7.54 mcgs. In C/C genotype, the mean VAS score was highest in all the time periods. In T/C group it was least among all the time periods and in T/T genotype, mean VAS scores were in between the VAS of C/C and T/C in all time periods.

Conclusion: Genotype affects the pain perception and analgesic consumption. C/C genotype had highest fentanyl consumption implying that they had the highest pain perception. T/C genotype had least fentanyl consumption implying lower pain perception. Preoperative pharmacogenetics can be extrapolated for tailored effective post-operative analgesia.

6758

Failure of US guided double block in postherpetic thoracic neuralgia

MOHAMED M.¹, Tahar A. M.¹, Nacera B.¹
¹MEDICAL UNIVERSITY OF ALGERIES - ALGERIES (Algeria)

Background: Post-herpetic neuralgia (PHN) is chronic neuropathic pain in the area of the herpes zoster (HZ) rash that persists after the skin lesions have healed. Despite numerous therapeutic advances, many patients remain resistant to current treatments and continue to suffer from pain physical and psychological distress.

Objective: assess double block in this indication (paravertebral + serratus blocks).

Case Report: This is the 68-year-old BK patient with a medical history of gastric ulcer and hiatus hernia and surgical hemorrhoids, LV, and parathyroidectomy on vitamin D. The patient presented with thoracoabdominal shingles in 2015, monitored and treated and who subsequently suffered from neuropathic pain for years. Currently, she still has postherpetic thoracic neuralgia, sleep disorders and decreased appetite, with weight loss, chronic fatigue, attention and memory disorders, and an impact on the body. quality of life. Mundane daily activities like dressing or shopping become difficult if not impossible, and anxiety and depression become social withdrawal. Several treatments were prescribed to her without success, including the last one in progress based on Erica and laroxyl, which led to the pain CPR being proposed for a complementary analgesic block. At our level, the assessment of pain finds VAS in the order of 5 to 7 under well-conducted treatment. We decide to perform a double echoguided single shoot block: serratus (20 ml bupivacaine at 1.5% +30 ug of catapressan and a paravertebral 20 bupivacain at 1.5% +30 ug of catapressan after informed consent of the patient. The evolution of the 24 hour VAS was excellent rated at 0 and then the pain resumed with a vengeance resulting in the failure of the double block.

Discussion: A precise treatment protocol has not yet been suggested for patients with NPH; the application of nerve blocks during the acute phase of shingles shortens the duration of pain associated with shingles. Several blocks can have beneficial effects.

References:

1. Shrestha, Meera, and Aijun Chen. "Modalities in managing postherpetic neuralgia." *The Korean journal of pain* 31.4 (2018): 235.
- Learning points:** Somatic blocks, including repeated continuous epidural blocks and paravertebral blocks, prevent PHN and reduce the risk of its onset, but appear to have no effects once on.

6761

Peripheral neuropathic pain. Capsaicin al 8% and Its effectiveness already demonstrated.

Palau Marti C.¹, López Alarcón M. D.¹, Fuste Rodríguez M. D.¹, Báñez Caballero Y.¹, Pascual De La Fuente F.¹, De Andrés Ibáñez J.¹
¹Consorcio Hospital General Universitario de Valencia - Valencia (Spain)

Introduction: Peripheral neuropathic pain (PND) is a difficult-to-treat disorder that requires a multidisciplinary approach. It is especially resistant to conventional analgesic treatments. In this context, Capsaicin 8% (Qutenza) applied as a patch has proven to be effective, reducing the need for other analgesics.

Objective: To evaluate the experience of the application of Qutenza in patients with DNP in our usual clinical practice.

Material and methods: A descriptive, observational, retrospective study in which all patients with DNP from the pain unit of the Consorcio Hospital General Universitario de Valencia who had Qutenza patches applied between 01/01/2020 and 03/10 were collected. / 2021. Data are collected on the etiology, location of pain, VAS, previous pharmacological treatment, performance of interventional techniques, improvement or not of pain.

Results: We collected a total of 53 patches from 21 patients. The mean age was 58 years. Only 10% men and 11% diabetic. 89% had a VAS > 6. 74% had neuromodulatory medication and 37% also had opioids. The most frequent locations were: intercostal (30%), knee (26%), foot / heel (15%) and shoulder (11.1%). The most common etiology was

surgical (75%), followed by postherpetic neuralgia (11%). 74% received some previous interventional technique (blockade, radiofrequency, etc.). Finally, 70% of the total improved with Qutenza.

Conclusions: The most frequent etiology was intercostal location postsurgical, finding greater relief in the knee. Our study reaffirms that Qutenza is a therapeutic alternative for patients with DNP with a significant reduction (> 30%).

References:

1. Frias B, Merighi A. Capsaicin, Nociception and Pain. *Molecules*. 2016 Jun 18;21(6):797. doi: 10.3390/molecules21060797. PMID: 27322240; PMCID: PMC6273518.
2. Blair HA. Capsaicin 8% Dermal Patch: A Review in Peripheral Neuropathic Pain. *Drugs*. 2018 Sep;78(14):1489-1500. doi: 10.1007/s40265-018-0982-7. PMID: 30251173.

6770

Assessment of analgesic control and intraoperative surgical stress in paediatric patients undergoing otolaryngology surgery on adenoids and/or tonsils

Ahijado Agudo J. M.¹, García-Martínez E.², Ramos-Luengo A.³

¹Hospital Universitario Infantil Niño Jesús - Madrid (Spain), ²Hospital Universitario Infantil Niño Jesús - Madrid (Spain), ³Hospital Universitario Severo Ochoa - Madrid (Spain)

Background and Goal of Study: The response to surgical stress is characterised by an increase in the secretion of pituitary hormones and an activation of the sympathetic nervous system, in turn, hormonal secretion at the pituitary level produces side effects on the hormonal secretion of target organs (1,2). Proper analgesic control and a deep anaesthetic technique could control and attenuate the physiological response caused by surgical stress (1). Moreover, the Analgesia Nociception Index® (ANI®) monitor allows objective assessment of nociception.

Materials and Methods: After obtaining approval from the Ethics Committee for Scientific Research, 44 paediatric patients scheduled for surgery on adenoids and/or tonsils were recruited in a blinded, prospective, observational study. Preoperative (T0) and postoperative basal glucose and cortisol samples (T1) and values obtained blindly by the ANI® monitor were collected during the maintenance of anaesthesia. Study subjects received the general anaesthetic technique commonly used. Nociception was monitored according to the usual technique through clinical signs. Correct analgesic control was subsequently analysed using the ANI® monitor values during anaesthetic maintenance and the degree of surgical stress suffered by patients through variations in observed plasma cortisol and blood glucose values. A descriptive statistical analysis was performed. The calculation of sample size was based on previous studies.

Results and Discussion: Plasma cortisol and blood glucose values showed significant differences between their baseline and postoperative values ($p < 0.001$ in both cases). No statistically significant correlation was found between the percentage of time with ANI® >50 values in the anaesthesia maintenance period and the decrease in plasma cortisol or plasma glucose increase ($p \times 0.34$ and $p \times 0.95$ respectively) (Fig1,2).

Conclusion: Patients undergoing otolaryngological surgery on adenoids and/or tonsils under a balanced general anaesthesia regimen based on opioids and halogenates, had adequate analgesic control, adequate control over surgical stress, as shown by the ANI® values.

References:

1. Anand KJS, Phil D, Hickey Pr. Halothane-morphine compared with high dose sufentanil for anesthesia and postoperative analgesia in neonatal cardiac surgery. *N Eng J Med*. 1992; 326: 1-9.
2. Desborough JP. The stress response to trauma and surgery. *Br J Anaesth* 2000; 85: 109-17.

6841

Nociception Level-guided balanced general anesthesia favorably influences the acute postoperative pain after elective major abdominal surgery

Cindea I.¹, Balcan A.², Gherghina V.², Samoila B.³, Prazaru M.¹, Popescu R.¹

¹Emergency Clinical Hospital Constanta - Constanta (Romania), ²Ovidius University of Constanta - Constanta (Romania), ³John Radcliffe Hospital - Oxford (United Kingdom)

Background and Goal of Study: Many patients experiencing elective major abdominal procedures complain of moderate to severe acute postoperative pain due, at least in part, to the inappropriate opioid regimen during general anesthesia. Nociception Level index (NOL) optimizes opioid administration during surgery, advantage that results in proven clinical benefits, both intra- and postoperatively. We hypothesized that NOL-guided fentanyl administration during balanced general anesthesia for major abdominal surgery improves acute postoperative pain management.

Materials and Methods: 67 patients (ASA I-III) scheduled for major abdominal procedures under balanced general anesthesia were enrolled in this prospective controlled randomized trial. They were randomly allocated to NOL-guided fentanyl regimen group (group N, n=32 patients), respectively standard care group (group S, n=35 patients). Preemptive analgesia was initiated in all subjects, 30 minutes before the end of surgery, with iv acetaminophen (1g) and nefopam (20 mg). After ICU admission, acute pain was evaluated every 10 minutes during first 2 hours postoperatively using visual analog scale (VAS). When necessary ($VAS \geq 3$), iv doses of morphine (1 mg) were administered and repeated by request every 15 minutes, until pain relief. The primary endpoints were the incidence and severity of acute postoperative pain during first 2 hours post-procedure. The secondary endpoints were time to first analgesic request and total morphine consumption throughout observation period. Statistical analysis was performed using Student t-test and ANOVA, considering $p < 0.05$ as being significant.

Results and Discussion: The incidence of early postoperative pain was significantly decreased in group N compared to group S ($p < 0.05$). VAS scores were statistically lower in group N ($p < 0.05$) during first hour after ICU admission, for the rest of the investigation period, pain intensity being similar in both groups. The documented intervals from ICU admission to first analgesic request were longer for group N by comparison to group S, at a significant difference ($p < 0.05$). The evaluation of total morphine consumption during study revealed a significant less dose in group N versus group S ($p < 0.05$).

Conclusion: NOL-based individualized analgesia regimen during general anesthesia compared to standard care considerably improves pain control in all aspects throughout immediate postoperative period, after major abdominal procedures.

6919

Development and use of the self-assessment tool "iCAN!-Pain Therapy" specially designed for undergraduate medical students attending the "Pain Therapy" class

Ntalouka M.¹, Bareka M.¹, Lasda E.¹, Ntalizou N.¹, Papaspyrou D.¹, Arnaoutoglou E.¹

¹University of Thessaly, Faculty of Medicine, Univeristy Hospital of Larissa - Larissa (Greece)

Background and Goal of Study: Barriers to effective pain management include the absence of pain education among physicians. This study investigated the knowledge of undergraduate medical students of the Faculty of Medicine of the University of Thessaly regarding pain in order to appropriately adjust the core training in pain therapy and achieve the best possible learning outcome.

Materials and Methods: We recruited 4th year undergraduate medical students before attendance of the "Pain Therapy" class. Participants completed a 49 question tool, the "iCAN!-Pain Therapy", which was

based on the learning objectives and outcomes of the class. The students were asked to complete it during their first day of class.

Results and Discussion: The response rate was 100%, as all 106 students answered the questionnaire. The highest level of agreement was observed in the "I can discriminate acute and chronic pain" statement where almost 80% of the students agreed that they can do so. Half of them reported that they are unsure if they "can describe the anatomy and physiology of pain pathways" or "can explain the basic opioid pharmacology". Fewer students (39%) were able to state the indications, contraindications and adverse effects of opioids and only 11% answered that they "can recognize and treat effectively the major and life-threatening adverse effects of chronic pain treatment".

Conclusion: Based on the results of our study the core training in pain therapy seems mandatory in order to improve the knowledge of undergraduate students in pain therapy.

6922

Pain prevalence in hospitalized patients

Jiménez Marrero P. J.¹, Becerra Bolaños A.¹, Muñío Palomar V.¹, Santana Ortega L.¹, Hernanz Rodríguez G.¹, Rodríguez Pérez A.¹
¹Hospital Universitario de Gran Canaria Doctor Negrin - Las Palmas de Gran Canaria (Spain)

Background and Goal of Study: Pain is common in hospitalized patients, increasing their personal suffering, hospital stay and costs. We aim to report pain prevalence in hospitalized patients and describe the factors related to unsatisfactory pain control.

Materials and Methods: With the approval of the Ethics Committee, we conducted a cross-sectional study in a third-level hospital, recollecting in one day data of all in-hospitalized patients through a systematic interview. Patients unable to answer the questionnaire were excluded. Pain intensity was assessed by the visual analogue scale (VAS) from 0-10. Analgesic treatment was checked from medical records.

Results and Discussion: From 513 hospitalized patients, 274 were interviewed. Mean age was 66.2±14.8. Most patients were in a non-surgical ward (66%). 76.3% of all patients were admitted through the emergency department. More than a half (52.9%) of the patients suffered pain, with a mean intensity 2.9±3.3. Most frequent pain was lower limbs (18.2%) and abdominal (9.5%). No statistically significant differences were found regarding gender, age or occupation between patients who presented pain and those who did not. Among those patients receiving treatment, 61.8% were suffering pain when they were interviewed with a mean intensity of 3.58±3.4. Pain treatment was prescribed for the 72.6% of patients. Pain treatment was more frequent in the surgical (90.3%) than in the medical ward (63.5%) with a difference statistically significant ($p < 0.0001$). Postoperative pain in our hospital is assessed by the Acute Pain Unit from the Anesthesia Service. However, there was no significant difference in pain intensity or prevalence between surgical and non-surgical wards. There was no difference in terms of treatment, pain prevalence and intensity between urgent and programmed admissions. Decrease in pain intensity during hospital stay was referred in 69.3% of patients receiving pain treatment, versus 38.7% in those who did not have treatment for pain ($p < 0.0001$). Among patients with pain, 76.6% were satisfied and among those taking treatment, 85.4% were satisfied.

Conclusions: Pain prevalence in our hospital was considerably high, however satisfaction rates in pain control were substantially acceptable. As a third-level hospital, an optimal pain management should be required and encouraged through our ward's staff to increase patient satisfaction and recovery.

References:

1. Vallano A, et al. *Eur J Pain*. 2006;10:721-31.

6928

Ilio-inguinal neuropathic pain after inguinal hernia repair treated with hydro dissection/hyaluronic acid and pulsed radiofrequency

Segers J. N.¹, Lathouwers K.¹, Mesotten D.², Van Boxem K.¹
¹ZOL Genk - Genk (Belgium), ²ZOL Genk, Hasselt University - Genk, Hasselt (Belgium)

Background: Ilioinguinal neuropathic pain has been reported idiopathic, after trauma, an abdominal operation, or inguinal hernia repair, causing a lesion in the ilioinguinal tract. Persistent postoperative inguinal pain is seen in 1-3% of patients after inguinal hernia repair. We present another cause of ilioinguinal neuralgia after this type of surgery: fibrosis around the nerve after using a synthetic mesh resulting in neuropathic pain.

Case Report: The patient, a 38-year-old male, presented with ilioinguinal neuralgia with pain intensity of 8/10 on a numerical rating scale (NRS). The pain started 3 weeks postoperatively with symptoms of paresthesia and allodynia. A PET/CT, 4 months postoperatively, found postoperative fibrosis with entrapment of the ilioinguinal nerve without an active inflammatory process. The surgeon already treated the patient with 3 cures of antibiotics and nortriptyline with no therapeutic effect.

Six months after the surgery, we treated the patient with hydro dissection using 15cc of saline solution with 150 IU of hyaluronic acid under ultrasound guidance. We aimed to separate the nerve from the fibrotic tissue (4cm long) to lower the chance of recurrence of fibrosis. After six weeks, the patient experienced a GPE of 50%, decreasing the NRS to 4/10 but needing further pain management. After six weeks, the hydro dissection was followed by a pulsed radiofrequency (PRF) treatment of the ilioinguinal nerve under ultrasound guidance. Correct needle positioning at the ilioinguinal nerve was confirmed during sensory testing (<0.5V). PRF was performed with 45V during 240 sec. A GPE of 70% was achieved six weeks after PRF-treatment with a resulting NRS score of 2/10. No complications were reported.

A PET/CT ten weeks after the first treatment described less tracer uptake over the left ilioinguinal tract, suggesting improvement of the fibrosis.

Discussion: This case report suggests that hydro dissection with saline and hyaluronic acid, combined with PRF, can improve fibrosis-induced chronic pain following an inguinal hernia repair. Further research is needed to validate this result.

Learning points: After an inguinal hernia repair using a synthetic mesh, inflammation around the ilioinguinal nerve can result in fibrosis and chronic neuropathic pain. Hydro dissection with saline and hyaluronic acid, followed by PRF, can improve fibrosis-induced neuropathic pain.

6929

Spontaneous intracranial hypotension: a role for epidural blood patch

Laranjo M.¹, Roriz C.¹, Lavado J.¹, Gomes L.¹, Fidalgo A.¹, Valet E.¹
¹Centro Hospitalar de Leiria - Leiria (Portugal)

Background: Orthostatic headache is the major symptom of spontaneous intracranial hypotension (SIH)¹. SIH is caused by spontaneous cerebrospinal fluid (CSF) leakage and brain MRI is the most sensitive imaging modality for diagnosis. The hallmark triad for SIH diagnosis comprises orthostatic headaches, low CSF opening pressure and diffuse pachymeningeal enhancement on MRI. SIH treatment can be conservative, a blind or targeted epidural blood patch (EBP) or ultimately surgical².

Case Report: A 34-yr-old man presented with orthostatic headache, chest pain below the left nipple with radiation to the back, nausea and vomiting. Physical examination, laboratory findings and cranioencephalic (CE) CT were normal. A CE and spinal MRI revealed diffuse pachymeningeal enhancement, subdural effusions, engorgement of cerebral venous sinuses, pituitary enlargement and a posteriorly located epidural fluid collection from C7-L1, all of them compatible with SIH. Initial conservative treatment only gave partial symptom relief. For this reason, a blind lumbar epidural blood patch (EBP) was performed by an anesthesiologist with injection of 20 mL of autologous blood in the epidural space. In order to obtain a rostral spread, the patient was immediately positioned in supine and trendelenburg. Gradual headache resolution occurred. Weeks later

he remained asymptomatic and control MRI showed subdural effusion reduction, partial posterior epidural collection reduction and persistence of other findings.

Discussion: A single blind EBP in this case was successful. Literature shows us that SIH is becoming better recognized, with a prevalence of 1:50.000¹. Besides several reports support EBP effectiveness and 20 mL volumes have a 95% success rate³. Also, if done early a long-term relief is achieved. Cooperation between neurologists and anesthesiologist can be crucial, in centers without neither intervention neuroradiology nor an acute pain management service, by not postponing a EBP when conservative strategies are failing and debilitating symptoms are present.

References:

1. Ferrante, E., et al. *Acta Neurolo Belg*, 2020;120(1):9-18.
2. Kranz, P. G., et al. *Neuroimaging Clin of North Am*, 2019;29(4):581-594.
3. Smith KA. Spontaneous intracranial hypotension: Targeted or blind blood patch. *J Clin Neurosci* (2015)

Learning points: An EBP solves SIH, by either creating a seal that prevents further CSF loss or by augmenting intrathecal pressure through the rise of ES pressure.

6944

Efficacy and safety of metamizole in pain management after scheduled craniotomy

Prados Martínez M. J.¹, Becerra Bolaños Á.¹, Valencia Sola L.¹, Domínguez Arbelo A.¹, Domínguez Díaz Y.¹, Rodríguez Pérez A.²

¹Hospital Universitario de Gran Canaria Doctor Negrin - Las Palmas de Gran Canaria (Spain), ²Universidad de Las Palmas de Gran Canaria - Las Palmas de Gran Canaria (Spain)

Background and Goal of Study: Pain after craniotomy has been underestimated for years and has probably been inadequately treated. Up to 80% of patients report severe postoperative pain and its appearance can lead to severe complications. Fear of opioids and NSAIDs side effects has limited their use in these patients. We aim to assess the postoperative pain management after scheduled craniotomy using intravenous metamizole and evaluate the appearance of side effects.

Materials and Methods: After the approval of the Ethics Committee, we carried out a prospective observational study including patients scheduled to supratentorial craniotomy in whom postoperative analgesic management was performed using metamizole in continuous infusion. Following data were recorded: gender, age, race, nationality, medical history, consumption of chronic analgesics/antidepressants, characteristics of surgery, perioperative pain management, pain assessment during 48h postoperatively [numerical rating scale (NRS): 1-10], and postoperative complications. Data were analysed using SPSS 24.0.

Results and Discussion: Seventy-three patients were included: 52.1% ASA 3, 62% female, mean age 55±15years old, 94.5% caucasian. The reason of surgery was glioma in 45.2% and craniotomy approach was frontal in 46.6%. All patients received intraoperative analgesia (opioids and NSAID) and 74% received corticosteroids. Postoperative drainage was left in 61.6%. Mean NRS were: 3.3±1.9 1h postop, 2.6±1.7 8h postop, 2±1.5 24h postop and 1.8±1.2 48h postop.

Postoperative complications were hypermagnesemia (20%) and presence of blood on postoperative CT scan (17.8%, 30% of these with neurological impairment). No renal impairment (mean creatinine 0.6±0.2mg/dl), agranulocytosis (mean white blood cell count 11518±3678/uL), or side effects to the use of opioids were found. No significant statistical differences were found in postoperative NRS according to the characteristics of the patient or the surgery. However, patients receiving intraoperative dexamethasone 16mg showed less NRS than those who did not received corticosteroids (p=0.007).

Conclusions: Metamizole supply adequate analgesia after scheduled craniotomy. No important bleeding, renal impairment, hypermagnesemia, or agranulocytosis were found secondary to the use of metamizole in caucasian people submitted to scheduled craniotomy.

References:

1. Iturri F, et al. Narrative review of acute post-craniotomy pain. *Rev Esp Anestesiol Reanim*. 2020;67:90-8

6969

Epidural dexamethasone for thoracic and lumbosacral radicular pain, a single center audit.

Witdouck A.¹, Mesotten D.¹, Puylaert M.¹, Buyse K.¹, Pieter D. V.¹, Koen V. B.¹

¹Ziekenhuis Oost-Limburg, Genk - Genk (Belgium)

Background and Goal of Study: Preservative-free dexamethasone is a non-particulate corticosteroid solution that is widely used for epidural transforaminal injections in patients with radicular pain. It can be safely used if patients report a contrast allergy or at higher levels (above L3) where there is a higher risk for accidental intravascular injections (1).

We performed an audit in our center on the efficacy of dexamethasone on pain reduction for patients with thoracic and lumbosacral radicular pain.

Materials and Methods: We retrospectively retrieved the medical files of patients treated in our center with transforaminal epidural injections (mostly 2 to 3) between February 2019 and November 2020. All patients were seen before and 6 weeks after the final procedure. Pain was registered with a numerical rating scale (NRS) and global perceived effect (GPE, %), where clinical success was defined as at least 50% pain reduction. All procedures were performed under fluoroscopy, with a 10 cm needle with an extension tube. If no contrast allergy was present, the correct needle position and lack of intravascular injections were confirmed by contrast injection during real-time imaging (2). Pain reduction as measured by NRS was analyzed with a student T-test.

Results and Discussion: We retrieved the records of 79 patients. In 46 patients the indication to use dexamethasone was contrast allergy. In 33 patients a level above L3 (thoracic level in 3 patients) was treated. Ten patients were lost to follow-up. The mean NRS score before the procedure was 7.6 compared to 4.9 after the treatment (student T test, p<0,05), a clinically relevant pain reduction. Clinical success was reported in 45% of the patients. In a worst-case analysis were all lost to follow-up patients were considered as failures, this becomes 38%. The literature reports similar success ratios (3). No serious complications were documented.

Conclusion: This audit shows a significant pain reduction by transforaminal dexamethasone in patients with radicular pain and a contraindication for particulate corticosteroids. Clinical success occurred in 38-45% of the cases. No complications were noted. Dexamethasone, therefore, seems a safe and valuable alternative to particulate corticosteroids.

6973

Lidocaine patch for localized neuropathic pain: a single center audit.

Kellens S.¹, Vanneste T.¹, Van Lantschoot A.¹, Van Zundert J.¹, Van Boxem K.¹

¹ZOL Genk - Genk (Belgium)

Background and Goal of Study: Neuropathic pain (NP) is defined as "pain arising as a direct consequence of a lesion or disease affecting the somatosensory system" (1). Localized NP arises when lesions occur in the peripheral nerve system, affecting a specific area of the body.

Versatis is a dermal patch, delivering the local anesthetic lidocaine directly at the affected site (2). Lidocaine is a sodium channel blocker, preventing stimulation of nerve endings and signal conduction in peripheral nerves (3). This study aims to retrospectively assess the effectiveness of Versatis 5% to treat localized NP in our multidisciplinary pain center.

Materials and Methods: We reviewed medical files of patients who received Versatis as a treatment for peripheral localized neuropathic pain over the course of 2 years. We recorded age, gender, indication, Numeric Rating Scale (NRS, 0-10) pre- and post-treatment, Global Perceived Effect (GPE, % pain reduction), and complications. Clinical success was defined as a GPE > 50% at 6 weeks. Patients with missing data or who received additional therapies were excluded.

Results and Discussion: Fifty-four patients were included. The mean age was 62.1 years. 37 out of 54 patients were female (68.5%). The indications are summarized in figure 1. The mean NRS was reduced from 6.93 (pre-treatment) to 4.39 after 6 weeks which is a clinically relevant pain reduction. Clinical success was registered in 31 out of 54 patients (57.4%). Figure 2 shows NRS-evolution. No complications were

recorded.

Conclusion: Versatis appears to offer short-term treatment success in more than 50% of the patients. There were no serious adverse events. This retrospective study demonstrated that a topical the Versatis patch can be considered for patients with peripheral neuropathic pain.

References:

1. IASP Taskforce on Taxonomy. 2011.
2. Mick G, Correa-Illanes G. Topical pain management with the 5% lidocaine medicated plaster--a review. *Curr Med Res Opin.* 2012 Jun;28(6):937-51. doi: 10.1185/03007995.2012.690339. Epub 2012 May 24. PMID: 22551228.
3. Hermanns H, Hollmann MW, Stevens MF, Lirk P, Brandenburger T, Piegeler T, Werdehausen R. Molecular mechanisms of action of systemic lidocaine in acute and chronic pain: a narrative review. *Br J Anaesth.* 2019 Sep;123(3):335-349. doi: 10.1016/j.bja.2019.06.014. Epub 2019 Jul 11. PMID: 31303268.

6989

Defining chronic postsurgical pain: Pain intensity versus patient reported pain-related outcomes

Hofer D.¹, Lehmann T.², Harnik M.¹, Meissner W.³, Stüber F.¹, Stamer U.⁴

¹Department of Anaesthesiology and Pain Medicine, Inselspital, Bern University Hospital, University of Bern - Bern (Switzerland), ²Department of Biostatistics, University Hospital of Jena - Jena (Germany),

³Department of Anaesthesiology and Intensive Care, University Hospital of Jena - Jena (Germany), ⁴Inselspital, University Hospital Bern - Bern (Switzerland)

Background and Goal of Study: In the new ICD-11, chronic postsurgical pain (CPSP) is defined as pain significantly influencing quality of life. Previous trials, however, included only cut-offs for pain intensity. Further, to be considered as CPSP, pain at the surgical site must be newly developed or have increased in intensity after the procedure. This study evaluated the incidence of CPSP as defined by a composite measure of patient-reported outcomes (PROs) including pain intensity and pain-related interference.

Methods: Ethics approval was obtained for analysis of anonymised data from the PAIN OUT registry. Composite PROs for the 1st day after surgery (PRO1 score) and 12 months after surgery (PRO12 score) were analysed (NRS 0-10). Based on pain intensity and pain-related physical and affective interference with function, patients were allocated to the group No CPSPF, Mixed (mild symptoms), or CPSPF (moderate to severe pain and interference). To compare the primary endpoint "incidence of CPSPF" to published results, previously used definitions were also applied to the cohort. Variables associated with the dependent 3-stage variable CPSPF were analysed by ordinal regression analysis (OR (95% CI)).

Results: Of 2319 patients, 58.9%, 32.5% and 8.6% were allocated to the groups No CPSPF (PRO12 score: 0), Mixed (1.0 (0.5-1.8)) and CPSPF (4.3 (3.3-5.3)), respectively. When diagnosis was extended to include the new ICD-11 requirement for an increase in pain intensity at the surgical site, only 3.3% of the patients were categorized as having CPSPF. Focusing on patients without any pre-existing chronic pain, 4.2% developed CPSPF. Using previous definitions with cut-offs for pain NRS >0, ≥3 or ≥4, rates amounted to 37.5%, 9.7% and 5.7%. Pre-existing chronic pain (1.6 (1.3-2.0)), opioids before admission (1.9 (1.2-2.8)), orthopaedic surgery (2.6 (2.0-3.4)), postoperative opioids (1.5 (1.2-1.8)) and nonopioid analgesics (0.6 (0.5-0.7)) as well as PRO1 scores (1.2 (1.1-1.3)) were associated with CPSPF.

Conclusion: Using a more stringent definition of CPSP led to a lower incidence than previously reported. Adding pain-related functional interference to the definition more specifically describes the patient cohort and has implications for an individualised treatment approach in patients suffering from CPSPF and those allocated to the Mixed group. Possible risk factors for CPSPF should be carefully evaluated, to provide individualised care to patients at risk of CPSPF.

6991

The role of capsaicin 8% patch in treating neuropathic pain: an observational retrospective study

Korwin-Kochanowska K.¹, Vanneste T.¹, Mestrum R.¹, Van Zundert J.¹, Van Boxem K.¹

¹Ziekenhuis Oost-Limburg, Genk - Genk (Belgium)

Introduction: QUTENZA® 8% is a patch containing the active ingredient capsaicin. This is a selective agonist for the transient receptor potential vanilloid-1 receptor (TRPV1) [1]. Activation of this receptor leads to a brief initial sensitization followed by desensitization and defunctionalization of the nociceptor fibers. This results in a sustained analgesic effect [2]. Qutenza 8% is indicated in adults for the treatment of peripheral neuropathic pain. The goal of this study is to assess the effectiveness of Qutenza 8% application in clinical practice as a treatment for peripheral neuropathic pain [3].

Methods: In this retrospective study, the medical records of patients treated with capsaicin 8% patch between 6/11/2018 and 22/12/2020 at the Multidisciplinary Pain Centre of Ziekenhuis Oost Limburg, Genk, were analyzed. We collected the following data: demographic data, DN4 score at baseline, Numerical Rating Score (NRS) before and after treatment, the Global Perceived Effect (GPE, % pain reduction) and side effects of the treatment. Clinical success was defined as a GPE≥50% at 6 weeks post-treatment.

Results: Thirty-seven patients were screened, of which 3 patients were excluded due to missing data. The study included 18 men and 16 women. The most typical indication was post-surgical neuropathic pain. The mean baseline DN4 score was 6.19. The mean NRS in the whole group of patients was 6.91 before and 5.97 after treatment. In the responder group, NRS was respectively 7.66 and 2.92. In 12 patients (35%), clinical success was achieved after applying the patch for the first time. In the first 24 hours after application, 7 patients developed mild and transient side effects.

Conclusion: Short-term improvements were noted in 35% of the patients. There were no serious adverse events. This retrospective study demonstrated that a topical 8% capsaicin patch can be considered for patients with localized peripheral neuropathic pain.

References:

1. Derry S, Rice AS, Cole P, Tan T, Moore RA. Topical capsaicin (high concentration) for chronic neuropathic pain in adults. *Cochrane Database Syst Rev.* 2017 Jan 13.
2. Anand P, Bley K. Topical capsaicin for pain management: therapeutic potential and mechanisms of action of the new high-concentration capsaicin 8% patch. *Br J Anaesth.* 2011 Oct.
3. Simpson DM, Robinson-Papp J, Van J, et al. Capsaicin 8% patch in painful diabetic peripheral neuropathy: a randomized, double-blind, placebo-controlled study. *J Pain.* 2017.

7020

Chronic postsurgical pain after breast cancer surgery and related risk factors

Rodrigues D.¹, Barros M.¹, Nogueira S.¹, Menezes M.², Guimarães L.³

¹Centro Hospitalar Universitário de São João - Porto (Portugal),

²Faculdade de Medicina da Universidade do Porto - Porto (Portugal),

³Centro Hospitalar Universitário de São João/Faculdade de Medicina da Universidade do Porto - Porto (Portugal)

Background and Goal of Study: Breast cancer is the most common type of cancer among women.[1] Oncological breast surgery is associated with significant chronic postsurgical pain (CPSP). Early identification of those patients at higher risk could help inform optimal management. [2,3] The present study has been designed to study the incidence of CPSP after oncological breast surgery and related risk factors.

Materials and Methods: Prospective cohort study of female patients scheduled for oncological breast surgery between November 2019 and December 2020. Pain Catastrophizing Scale (PCS) was applied in the preoperative period (T0) and Brief Pain Inventory (BPI) at T0, second postsurgical day (T2) and 90 days after surgery (T90). Descriptive statistics were expressed with percentages (%) and medians (M). Nonparametric tests and chi-squared test were performed for analysis.

Results and Discussion: A total of 43 women patients were enrolled (mean age: 58.3 years; ASA physical status II: 92.9%; regional anesthesia: 2.3%; postoperative opioids use: 72.1%). The incidence of CPSP was 32.0%. Regarding intensity, 16% had mild CPSP and 16% moderate CPSP. Patients with CPSP presented higher pain catastrophizing scores at T0 (median score: 23.0 vs 6.0; p=0.049). Regarding specific PCS items, patients with CPSP had higher scores in items 1 (M: 2 vs 1; p=0.027), 3 (M: 2 vs 0; p=0.037) and 8 (M: 3 vs 2; p=0.049). The presence of preoperative pain (37,5% vs 62,5%, p = 0,283) and acute postoperative pain (100,0% vs 0,0%, p = 0,121) were not associated with the presence of CPSP.

Conclusion: A relevant proportion of patients presented CPSP after oncological breast surgery and catastrophizing was the only risk factor identified in our study, which emphasizes the importance of this psychological factor in the development of CPSP after oncological breast surgery.

References:

1. Journal of Surgical Oncology, 2020. 122(7): 1307–1314
2. CMAJ, 2016. 188(14): 352–361
3. Regional Anesthesia and Pain Medicine, 2019. 44(2): 192–199.

7028

Percutaneous lumbar sympatectomy as a treatment for acrocyanosis. About a case.

Lara-Jiménez A.¹, Méndez-Martínez E.², Rubio-Baines I.¹, Luque-Peláez M.¹, Escribano-Arranz A.¹, Varela N.¹

¹Clinica Universidad de Navarra - Pamplona (Spain), ²Hospital Universitario Donostia - San Sebastián (Spain)

Background: Acrocyanosis is a condition caused by arterial vasospasm after exposure to cold or stressful stimuli, more common in young women. At present, it lacks specific and effective treatment. Although its efficacy has not been proven, pharmacological treatment with calcium antagonists is used to improve arterial vasodilation.

Case report: We present a 21 years old female with acrocyanosis, hyperhidrosis and distal coldness of the four extremities, which worsened in winter and when standing and improved during the summer and in decubitus. She denied myalgia, xerophthalmia and xerostomia and highlighted acne and food allergies. She reported a family history of lupus erythematosus. On examination, the peripheral pulses were preserved in all four extremities. Initially, Raynaud's phenomenon was ruled out and Nifedipine was started but ineffective. Fluoxetine, aspirin and Gingko Biloba extract were also prescribed after anticardiolipin IgG antibodies were found positive, without noticing improvement. Later, she presented a picture of acute right hemifacial paralysis that was resolved with corticosteroids and Acyclovir after the imaging tests were negative. Further laboratory tests revealed a factor V Leiden deficiency and a positive lupus anticoagulant. The rest of the parameters were within

normal limits. Due to the progression and refractoriness to medical treatment, a diagnostic lumbar sympathetic block was programmed with good results, subsequently performing a percutaneous lumbar sympathectomy using conventional radiofrequency. The patient was referred for consultation months later, reporting a clear improvement in symptoms.

Discussion: The benefit of percutaneous sympathectomy for the treatment of Raynaud's syndrome and hyperhidrosis has been described, but to date there is no strong evidence for acrocyanosis.

This technique is performed in the radiology room, with the patient monitored and under local anaesthesia. The procedure was carried out bilaterally at L2-L4 levels, these being the sympathetic ganglionic levels involved in the vasoconstriction of the lower limb. At the end of the intervention, an increase in temperature and reddening was observed at the distal level of both lower extremities.

References:

1. Anne M Stack MD. Approach to cyanosis in children. 2019.

Learning points: Percutaneous lumbar sympathectomy.

7031

Impact of surgery and pain in quality of life in patients with breast cancer

Rodrigues D.¹, Barros M.¹, Nogueira S.¹, Menezes M.², Guimarães L.³

¹Centro Hospitalar Universitário de São João - Porto (Portugal),

²Faculdade de Medicina da Universidade do Porto - Porto (Portugal),

³Centro Hospitalar Universitário de São João/Faculdade de Medicina da Universidade do Porto - Porto (Portugal)

Background and Goal of Study: Breast cancer and the presence of pain has implications in quality of life (QoL). Breast cancer treatment, namely surgery, has vastly improved its outcome [1]. The present study has been designed to study the impact of surgery and pain in QoL in patients with breast cancer.[2]

Materials and Methods: Prospective cohort study of female patients scheduled for oncological breast surgery between November 2019 and December 2020. Validated questionnaires were applied in preoperative period (T0) and 90 days after surgery (T90): Brief Pain Inventory (BPI) and European Organization for Research and Treatment of Cancer Quality of Life Questionnaire and its Breast Cancer Module (EORTC QoLQ-C30 and QoLQ-BR23). Descriptive statistics were expressed with percentages (%) and medians (M). Nonparametric tests and chi-squared test were performed for analysis.

Results and Discussion: A total of 43 women patients were enrolled (mean age: 58.3; ASA physical status II: 92.9%; preoperative chemotherapy: 25.6%; preoperative radiotherapy: 11.6%). Thirty two percent of women presented chronic postsurgical pain (CPSP), of which 100% had interference on general activity and disposition, 46% referred sleep disturbance and 64% felt depressed[LG1]. General self-health and self-QoL assessments were similar between T0 and T90 (M: 5 vs 4; p=0.095 and M: 5 vs 4.5; p= 0.087, respectively). Sexual life self-assessment improved at T90 (M: 11 vs 3; p<0.001). The presence of preoperative pain was associated with worse self-QoL (M: 5 vs 4; p= 0,014) and with higher rating in items 47-53 (breast and arm symptoms) of QoLQ-BR23 (M: 10 vs 8; p=0.019) at T90. Patients with CPSP presented higher ratings in items 31-43 (general symptoms) of QoLQ-BR23 at T90 (M: 29 vs 24; p=0.042).

Conclusion: Sexual life dimension of QoL improved after breast cancer surgery. However, an important impact on QoL remains present. Preoperative pain and CPSP are frequent and contribute to QoL reduction in this setting.

References:

1. Journal of Surgical Oncology, 2020. 122(7): 1307–1314
2. Contemporary Oncology, 2018. 22(1): 20–26

7068

AMAZONE Prevention of persistent pain after breast cancer treatment - development of a web-based cognitive behavioural therapy application

Lukas A.¹, Van Noyen L.², Theunissen M.³, De Korte-De Boer D.³, Buhre W.³, Madelon P.²

¹Maastricht University Medical Center MUMC+ - Maastricht (Netherlands), ²Faculty of Psychology & Neuroscience, Maastricht University - Maastricht (Netherlands), ³Department of Anesthesiology & Pain Medicine, MUMC+ - Maastricht (Netherlands)

Background and Goal of Study: Persistent pain after breast cancer treatment (PPBCT) is highly prevalent. Young age, radiation therapy, axillary lymph node dissection, intense perioperative pain and psychological distress have been identified as risk factors. Strategies to reduce postoperative pain-intensity by intensifying perioperative pain management failed to reduce the prevalence of PPBCT. The AMAZONE study is designed to examine the preventive effect of perioperative internet-based cognitive behavioural therapy (e-CBT) on the prevalence of PPBCT six months after surgery.

Materials and Methods: In a RCT, 138 patients scheduled for unilateral breast cancer surgery with high anxiety (HADS-a, CARS, SFI) or pain catastrophizing levels (PCS) are randomized to receive e-CBT or an education intervention (EDU). Patients scoring low for anxiety/catastrophizing receive treatment as usual (TAU). E-CBT and EDU consist of five online sessions – one before surgery and 4 during the 6 postoperative weeks. The online intervention is accompanied by 3 appointments with a psychologist to monitor progress of the intervention and the motivation. Primary endpoint is the prevalence of PPBCT (NRS ≥ 3) at 6 months. Secondary endpoints are pain intensity and interference, psychological distress and pain sensitivity assessed by QST and CPM at 2, 6, and 12 months.

Results and Discussion: The structure of the e-CBT is based on protocols to decrease pre-operative anxiety, pain catastrophizing and fear of cancer recurrence. Main ingredients are cognitive restructuring, relaxation exercises, coping with anxiety, activity-rest balance, pleasant activity scheduling all targeting cognitive, emotional, behavioral and physiological aspects of psychological distress. The intervention is hosted on a specialized eHealth platform (Karify®). Before implementation e-CBT is evaluated by patient representatives of the Dutch breast-cancer society with PPBCT. An acceptability and feasibility study is planned with the first 12 participants of the e-CBT.

Conclusion: With perioperative e-CBT targeting psychological distress, we expect to reduce the prevalence of PPBCT by reducing anxiety and thereby the sensitization of the nociceptive system in the perioperative period. The online option might increase accessibility and feasibility.

Acknowledgements: Supported by ESAIC & Pink Ribbon/KWF

7088

Postoperative Analgesia After Open Liver Surgery: A systematic review

Dudek P.¹, Zawadka M.¹, Andruszkiewicz P.¹, Ibrahim R.¹, Pugliese F.², Bilotta F.²

¹Medical University of Warsaw - Warsaw (Poland), ²Department of Emergency Medicine, Anesthesiology and Intensive Care, Policlinico Umberto I, "Sapienza" University of Rome - Rome (Italy)

Background and Goal of Study: Pain after liver surgery remains a clinical challenge due to its multifactorial nature. Although current recommendations were recently published (2019), they contain limited evidence on the role of locoregional analgesic techniques [1]. A comprehensive review that included fourteen studies, published between November 1966 and September 2013, was in favor of epidural analgesia as the principal alternative [2]. The aim of this systematic review (SR) is to present data on systemic or blended postoperative analgesia for prevention or treatment of postoperative pain after open liver surgery. Included studies were published after September 2013.

Materials and Methods: This SR was performed in accordance with Preferred Reporting Items for Systematic Reviews and Meta Analyses (PRISMA) statement recommendations. PUBMED and EMBASE were used to search for suitable trials. Inclusion criteria for this study were randomized control trials (RCTs), prospective (POS), and retrospective (RO) studies published between October 2013 and December 2020. The primary endpoint in this SR is evidence for pain reduction in patients through nominal or semiquantitative scales with respect to tested analgesic therapy. The follow-up period ranged from the immediate postoperative period up to 6 months after surgery.

Results and Discussion: 36 studies were included in this SR, 24 were RCTs, 5 were POS, and 7 were RO. 9 analgesic modalities and their combinations were assessed: wound infiltration, transversus abdominal plane block, thoracic epidural analgesia, non-steroidal anti-inflammatory drugs (NSAIDs), intrathecal morphine, paravertebral block, quadratus lumborum block, dexmedetomidine and ketamine use.

Conclusion: Current evidence favors blended, multimodal approaches with systemic analgesic infusion in conjunction with locoregional therapies. This approach is associated with highest effectiveness and least side effects. NSAIDs should be administered on a pre-scheduled basis and opioids show the highest efficacy and safety profile when administered as patient-controlled analgesia.

References:

1. Dieu A et al. Pain management after open liver resection: Procedure-Specific Postoperative Pain Management (PROSPECT) recommendations. 2021;46:433-445.
2. Hughes M et al. Effect of analgesic modality on outcome following open liver surgery: a systematic review of postoperative analgesia. *Minerva Anestesiologica*. 2015 May;81(5):541-56.

7139

Short-term effects of opioids on size and vulnerability of murine atherosclerotic lesions

Hermann A.¹, Janssen H.¹, Kummer L.¹, Stefan K.¹, Weigand M. A.¹, Larmann J.¹

¹University Hospital of Heidelberg - Heidelberg (Germany)

Introduction: Opioids are commonly used in clinical practice for anesthesia and perioperative analgesia with morphine being the most used opioid worldwide. However, opioids are also associated with increased risk for myocardial infarction. We previously demonstrated that morphine increased the adhesion of monocytes to activated endothelial cells. A high proportion of monocytes is widely accepted as a marker for atherosclerotic plaque instability. The aim of the present *in vivo* study was to evaluate the effect of a short-term morphine regimen on size and vulnerability of atherosclerotic lesions.

Methods: With approval of the animal care and use committee, 12 week old ApoE^{-/-} deficient mice were set on a high-cholesterol Western diet (WD) for 8 weeks to induce atherosclerotic lesions. For the last 4 days of WD, mice received 2 daily subcutaneous injections of either morphine (n=11), morphine + naloxone (n=11) or saline (n=12). Furthermore, we also investigated the effect of synthetic opioids, such as fentanyl and

sufentanil on the progression of atherosclerotic plaques as an explorative approach. For the immunohistochemical analysis of the plaques, serial cross-sections through the entire length of the brachiocephalic artery were prepared and stained to quantify lesion size and cellular composition. Data were normalized to the saline group and statistical evaluation was performed using Kruskal-Wallis test.

Results: Mice, who received morphine had a significant increase in size of the stenosis of the brachiocephalic artery (163.36%, $p < 0.03$) compared to saline, while the addition of the mu-opioid-receptor antagonist naloxone diminished this effect (118.01%, n.s.). No difference was observed in the size of the CD68⁺ plaque area as a marker of monocyte proportion (morphine 81.43%, morphine + naloxone 80.49%, n.s.). However, morphine led to significantly more apoptotic monocytes in the atherosclerotic lesions (326.81%, $p < 0.04$) compared to saline. This effect was attenuated by the administration of morphine + naloxone (276.97%, n.s.). We could not observe similar effects on plaque size or vulnerability after administration of synthetic opioids versus saline.

Conclusion: Morphine leads to an increased size of atherosclerotic lesions and drives apoptosis of monocytes within the plaque, resulting in a higher plaque vulnerability. These effects are likely mediated via the mu-opioid-receptor.

7203

Parsonage-Turner Syndrome, a case report and literature review.

Madroñero Melo F.¹

¹Hospital General de Tomelloso - Tomelloso, (Spain)

Background: Brachial plexus neuropathy, or Parsonage-Turner Syndrome, is a form of neuritis that affects mainly the shoulder girdle. The Syndrome is bilateral in 25% of patients. The typical form of this syndrome is of no cause, although triggering factors have been described and the syndrome sometimes coexists with immune processes.

Case Report: We present the case of a man 36 y.o. with a chronic bilateral pain in upper extremities mainly in the left arm accompanied with progressive muscle atrophy and history of denervation in electromyography. The study of magnetic resonance didn't give any positive information about the case because normalization of data. Despite of regular evolution of this patient, there was a subtle recovery with a left stellate ganglion block performed in two times.

Discussion: The Parsonage-Turner Syndrome is a rare condition that has an unknown etiology, it is characterized by a muscle weakness in upper extremities with a good prognosis in the long time, with gradual recovery in the initial six months from debut, because of that, a delay in the diagnosis will be of worst prognosis, as it occurred in this case report. Several authors have described about the possible infectious cause of this syndrome, our patient have had a clinical condition compatible with a myopericarditis in 2004, but the certain cause of the syndrome remains unknown.

References:

1. Scalf RE, Wenger DE, Frick MA, Mandrekar JN, Adkins MC. MRI findings of 26 patients with Parsonage-Turner Syndrome. *AJR Am J Roentgenol* 2007; 189(1): W39-44.
2. Rubin DI. Neuralgic amyotrophy, clinical features and diagnostic evaluation. *Neurologist*, 2001;7:350-6.
3. Conway RR. Neuralgic amyotrophy: uncommon but not rare. *Mo Med*. 2008;105:168-9.

Learning points: The objective of our study is to comment this syndrome and its complications when a delayed diagnosis is performed.

7271

The opioid-sparing effect of bilateral superficial cervical plexus block (BSCP) in thyroid surgery patients

Tarasenko S.¹, Dubrov S.¹, Suslov G.¹, Yefimova O.², Voitenko V.²

¹Bogomolets National Medical University - Kyiv (Ukraine), ²Ukrainian Scientific and Practical Center of Endocrine Surgery, Transplantation of Endocrine Organs and Tissues of the Ministry of Health of Ukraine - Kyiv (Ukraine)

Background and Goal of Study: regional analgesia as important techniques within a multimodal approach, which afford to have an opioid-sparing effect, is going. BSCP is widely used for pain control in thyroid surgery. The aims: Assessment of using combine method anaesthesia with co-analgesics on the intra- and post-op opioid requirement in thyroidectomy patients under sevoflurane general anaesthesia.

Materials and Methods: 933 patients with thyroid pathology with low risk PONV were randomized into 2 groups: SEV_BSCP (n=453) was used sevoflurane general anaesthesia (SEV_GA) with tracheal intubation (TI) under myorelaxation and BSCP; SEV_MONO (n=480) was used SEV_GA with TI and no BSCP. In SEV_BSCP before surgery 30-40' was used pre-emptive analgesia (PEA) complex with BSCP 0,5% bupivacaine, dexamethasone (DXM) 8 mg IV, dexketoprofen (DKP) 50 mg IV and 2% lidocaine (L) 1,0-1,5 mg/kg IV, metamizole (M) or paracetamol (P) 1 g IV. Ketamine 25 mg IV was used for induction anaesthesia in both groups. In SEV_MONO only opioid with P or M or DKP were used for PEA before induction to GA. Duration of surgery (DoS) & anaesthesia (DoA), opioid consumption, time from the operation ending until the trachea extubation (ExTr), pain level by NRS after 3, 6, 12, 24 hours post-op. All data M±σ.

Results and Discussion: DoS for SEV_BSCP and SEV_MONO was respectively 72.6±21.6 and 74.6±22.3 min (NS), DoA was respectively 95.1±22.8 and 94.2±22.9 min (NS). ExTr was 8.0±4.3 and 8.3±3.8 min respectively for SEV_BSCP and SEV_MONO groups (NS). Intraoperatively, the opioid consumption (fentanyl, F) was 270.4±71.4 mcg in SEV_BSCP vs 396.4±81.7 mcg ($p = 0.021$). In SEV_BSCP NRS was 18.8±3.4, 22.8±4.2, 24.1±4.3 and 20.3±3.7 mm; in SEV_MONO, pain level was 44.9±4.1, 32.4±5.3, 23.1 ± 3.9 and 21.2 ± 3.9 mm respectively after 3,6,12 and 24 hours. SEV_BSCP had less NRS level ($p = 0.0238$) in the first 6 hours vs SEV_MONO. 382 (84,3%) patients didn't have PONV and 246 (51,3%) respectively in the SEV_BSCP and SEV_MONO groups ($p = 0,0095$). No need opioid in post-op period in SEV_BSCP, whereas 52,7% received 10 mg morphine SC in first 3 h ($p = 0,00013$, χ^2 criteria)

Conclusion: Combine methods GA with BSCP have some benefits vs mono GA such as intraoperative opioid-sparing effect, better post-op pain control, avoiding post-op opioid using and better PONV control level.

7272

Characterization of chronic pain in patients with inflammatory bowel disease: investigation of a potential neuropathic component.

Degeves M.¹, Hardy P. Y.¹, Dominique L.¹, Edouard L.¹, Jean J.¹
¹CHU Liège - Liège (Belgium)

Background and Goal of Study: The aim of this observational study (NCT04488146) was to characterize pain of patients with inflammatory bowel disease (IBD). Abdominal pain, a common symptom in patients with IBD, is traditionally associated with inflammatory flare-ups. However, pain persists in 20% to 40% of patients in clinical remission. The existence of a neuropathic component of abdominal pain has never been explored.

Materials and Methods: 200 patients were studied. Pain was assessed using the Saint-Antoine and Neuropathic Pain 4 questionnaires and by clinical examination with Von Frey filaments. Its impact on the quality of life, depression, and anxiety was assessed by the Health-Related Quality of Life (HRQoL) and Hospital Anxiety and Depression Scale (HAD) questionnaires.

Quantitative variables (median [p25-p75]) were compared using the Mann Whitney test and qualitative variables (n (%)) were compared by the chi-square or Fisher exact test. $p < 0.05$ = statistically significant.

Results and Discussion: The characteristics of our cohort are: 93 men (46.5%), age (min-max) 44.6 (19-87) years, 134 Crohn's (67%) with PRO2 score = 10 [5-16], and 66 RCUH (33%) with PRO2 score = 1 [0-2.5]. 151 (75.5%) patients reported chronic pain, treated with analgesics in 144 patients. 124 patients reported abdominal pain (82.1% of patients with chronic pain). The impact on the quality of life, anxiety and depression, and the incidence of neuropathic pain are presented in Figure 1. The prevalence of pain is high in IBD patients ($\pm 75\%$) and higher in Crohn's patients than in RCUH patients. Significant impact on quality of life, anxiety and depression is confirmed. More than 25% of patients with abdominal pain (Crohn's and RCUH) described a neuropathic component responsible for more intense pain than in its absence and not necessarily related to prior abdominal surgery.

	Total n = 200	Pain n = 151 (75.5%)	No pain n = 49 (24.5%)	p
Quality of life (HRQoL) (0-70)*	18 [6-34.2]	22 [11-40]	4 [0-14]	<0.001
Depression (0-21)*	4 [2-8]	5.5 [3-9]	2 [1-3]	<0.001
Anxiety (0-21)*	7 [4-10]	9 [6-11]	4 [2-6]	<0.001
Crohn / RCUH	134 / 66 (67% / 33%)	112/39 (74.2% / 25.8%)	22/27 (44.9% / 55.1%)	<0.001
	Abdominal pain n = 124	Neuropathic pain n = 35 (28.2%)	No neuropathic Pain n = 89 (71.8%)	
Crohn / RCUH	92 / 32 (74.2% / 25.8%)	28 / 7 (80% / 20%)	64 / 25 (71.9% / 28.1%)	0.35
Abdominal surgery	53 (42.7%)	12 (34.3%)	41 (46.1%)	0.23
Average pain score during the last month (VAS 0-10)	4 [2-6]	6 [5-8]	3 [1.5-5]	<0.001

Data : n (%) ; median [p25-p75]. * : 0 = no impact.

Conclusion: These results open the way to a specific management of pain in IBD patients.

References:

1: Inflamm Bowel Dis. 2013;19(6):1210-1217.

7406

Impact of the COVID-19 lockdown on patients with Fibromyalgia in an LMIC.

Haylock-Loor C.¹, Dominguez D.², Busmail A.³, Pineda G.⁴, Chinchilla-H M. C.³, Medical Students Of Fifth Year, Unicah: Kristhel Gaitán, Andrés Chinchilla-H, Andrea Durón, Maria Ramirez, Valeria Arita *.⁵

¹Hospital Del Valle - San Pedro Sula (Honduras), ²Departamento de Anestesiología, Instituto Hondureño de Seguridad Social - San Pedro Sula (Honduras), ³Facultad de Medicina, Universidad Latina de Costa Rica - San José (Costa Rica), ⁴Universidad Nacional Autónoma de Honduras, Posgrado de Anestesiología Reanimación y Dolor - Tegucigalpa (Honduras), ⁵Escuela de Medicina, Universidad Católica de Honduras - San Pedro Sula (Honduras)

Background and Goal of Study: Fibromyalgia (FM) is a disorder mainly characterized by pain, fatigue, sleep disruption, cognitive impairment, depression, and anxiety. In December 2019, Covid19 started in Wuhan, China, and rapidly spread worldwide which led to many countries implementing lockdown. This unexpected pandemic brought many conditions such as anxiety and stress disturbances.

To describe the impact generated by Covid-19 lockdown, as referred by patients with FM managed in the Interventional Pain Unit #209 (UNID#209), San Pedro Sula, Honduras, from March 2020 to March 2021.

Materials and Methods: Descriptive, cross-sectional study, a questionnaire-type survey was applied with previously informed consent, using a form with variables like pain exacerbation, economic and physical impact, symptoms of anxiety, depression, and other features, on UNID#209 FM patients assessed from March 18th, 2020 up to March 17th, 2021.

Results and Discussion: From forty-one (41) FM patients assessed during this period, only 19 answered the survey, all were females (50 \pm 15 years old), 84.2% had a decrease in physical activity, 84.2% of the respondents lacked or had a reduction of professional psychological support, 73.6% had a significant diminish in their economic incomes; 68.4% referred their chronic pain increased compared to 2019, symptoms of anxiety in 68.4% ($p=0.03$) and 52.6% symptoms of depression ($p=0.04$). Due to confinement, 68.6% had difficulties receiving a face-to-face medical assessment for chronic pain therapy; by restricted transportation and limited finances, half of them had problems obtaining their medications or medical treatments.

During the pandemic, respondents referred they faced psychological stress, causing anxiety, depression, worsening of their chronic pain. Several factors during the lockdown may have triggered these clinical features, such as fear of the disease and the potential risk of contamination, family transmission and eventual death, aggravated by economic problems, and difficulties in attaining health care.

Conclusion: We continue seeing the stressful impact of the lockdown during the COVID-19 pandemic on patients suffering from chronic pain like Fibromyalgia, worsening their condition compared to the previous year. Further studies with a more significant number of patients are needed to describe the challenges lived by Fibromyalgia patients during this unprecedented situation.

7415

Opioid Free-Anaesthesia in lumbar spine surgery: a prospective randomized single blinded trialMillemann H.¹, Clanet M.², Latrech B.², Touihri K.²¹Service d'Anesthésiologie CHU Erasme - Bruxelles (Belgium),²Department of Anaesthesiology CHIREC Delta Hospital - Auderghem (Belgium)

Background and Goal of Study: Spine surgery may be associated with severe postoperative pain and usually requires significant amounts of opioids for adequate analgesia. Multimodal opioid sparing analgesia is established as care model that reduces acute postoperative pain, minimizes perioperative opioid consumption and promotes positive outcomes in a variety of surgical interventions. Opioid-free anaesthesia is a technique that may achieve similar goals, however there are few reported studies regarding its efficacy for lumbar spine surgery. This study aims to compare, for lumbar spine surgery, the impact on postoperative pain and opioid requirements, in a cohort of patients managed with opioid-sparing to an opioid-free anaesthesia intraoperative protocol.

Materials and Methods: This is a prospective, randomized controlled, single blind, monocentric cohort study. Adults patients programmed for lumbar spine surgery (decompression and/or fusion) were enrolled between April 1st and August 31st 2021. 36 patients were matched into two intraoperative fixed protocol groups: first was managed with multimodal opioid-sparing technique (MOSA n = 18) as control group and the other with opioid-free technique (OFA n = 18).

Results and Discussion: Demographic and surgical data for the two groups were comparable. The total opioids consumption (converted to oral morphine mEq) throughout the hospital stay was significantly higher (t=3.14; p=0.003) in the MOSA group (93.22±41.76) compared with the OFA group (54.67±41.76). Opioid PACU consumption was not significantly different between the two cohorts (MOSA 8.50±8.55 vs OFA 7.50±8.33; p=0.724). A slightly higher postoperative opioid consumption within 24 hours was found in the MOSA cohort (19.56±18.22) compared to OFA (16.89±12.58), although this was not statically significantly different. Even if the worst PACU pain score, at rest and movement, was slightly lower in the OFA group, but not statically significant, pain scores during the first 24 post-operative hours and PACU length of stay did not differ between the two groups. No significant differences in the perioperative frequency of arrhythmias, hypotension or bradycardia were noted.

Conclusion: Opioid-free lumbar spine surgery, including lumbar fusion, is feasible and is very similar to traditional opioid-sparing regiment. OFA for lumbar surgery represents an opportunity to minimize perioperative exposure without adversely affecting pain control or recovery.

7476

Pain levels and patient comfort after lower-limb arthroplasty comparing i.v.-patient controlled analgesia, continuous peripheral nerve block or neuraxial analgesia: a retrospective analysisYurutkina A.¹, Klaschik S.¹, Gass A.¹, Link C.¹, Coburn M.¹, Hilbert T. C.¹¹University Hospital Bonn - Bonn (Germany)

Background: Poorly controlled pain after lower-limb arthroplasty (LLA) results in delayed recovery and hospital discharge. However, ideal modality of analgesia is still debated. We compared patient comfort and pain levels after primary and revision LLA using i.v.-patient controlled analgesia (PCA), continuous peripheral nerve block or neuraxial analgesia in a German university hospital.

Methods: Protocols from the inhouse acute pain service from 2016 and 2018 were retrospectively evaluated. All patients received general anaesthesia. Since pain management changed during 2017, patients undergoing hip arthroplasty (HA) received either continuous epidural Ropivacain infusion (0.133%; *Epi*) or PCA with the Wurzbürger Pain Drip (Tramadol, Metamizole and Droperidol, continuous and bolus application; *WPD*) or with Pirtramide (bolus application only; *Pir*). After knee arthroplasty (KA), patients received either continuous femoral and sciatic nerve block (Ropivacain 0.2%; *PNB*) or *Pir*. PCA was combined with preop. single-shot fascia iliaca or adductor canal block. One-way ANOVA or unpaired Student's t test were used.

Results: After HA (n = 453), WPD resulted in significantly increased frequency of positive feedback, compared to *Pir* and *Epi* (.93 (SD .13) vs. .85 (.21) vs. .86 (.13), p <.0001), while negative feedback (nausea/dizziness/senso-motoric weakness) was decreased (.07 (.14) vs. .14 (.21) vs. .16 (.19), p <.0001). Mean Numeric Rating Scale (NRS) values at rest (.95 (.80) vs. 1.67 (1.09) vs. 1.27 (1.03), p <.0001) as well as max. NRS scores were reduced (2.40 (1.21) vs. 3.32 (1.47) vs. 3.15 (1.27), p <.0001). In WPD group, the overall need for PCA-based analgesia was significantly shorter. After KA (n = 328), PNB resulted in prolonged need for analgesia (3.63 (1.75) vs. 2.86 (1.63) d, p <.0001) and higher patient round frequency (2.32 (.56) vs. 2.09 (.42) per day, p <.0001), compared to *Pir*. Positive feedback was significantly less frequent. Mean NRS scores at rest were decreased using *Pir* (1.43 (1.01) vs. 1.70 (1.05), p = .02). No differences were found between primary and revision LLA. Female (n = 465) compared to male patients had significantly increased NRS values after LLA. Patient age, height or weight had no impact.

Conclusion: In the assessed population, use of WPD after HA offered best pain control and patient comfort. After KA, use of *Pir* seemed to be superior to PNB. Optimizing postoperative analgesia may be more challenging in female patients.

7492

Pericapsular nerve group block for postoperative pain management in bilateral direct anterior total hip arthroplastyLaranjeira J.¹, Reis G.¹, Resende A.¹¹Centro Hospitalar Lisboa Norte - Lisbon (Portugal)

Background: Over the past years, popularity of anterior hip surgical approach has grown. It provides several benefits, including reduced tissue trauma and pain, allowing early mobility after surgery and improved recovery times. Patients submitted to direct anterior total hip arthroplasty are frequently asked to stand the day after surgery, making motor sparing analgesia techniques more appealing for these cases. Pericapsular nerve group (PENG) block is an ultrasound-guided technique that targets the hip articular branches of femoral nerve, obturator nerve and accessory obturator nerve, providing analgesia for the anterior aspect of the hip capsule, while preserving muscle strength.

Case Report: We describe the case of a 58-year-old male submitted to elective bilateral total hip arthroplasty, using the anterior approach. The patient had history of anterior ischemic optic neuropathy but was currently under no medication. To optimize surgical conditions, general anaesthesia was induced. Before surgery, an ultrasound-guided PENG block was performed bilaterally using single-shot technique with Ropivacaine 3.75mg/mL, 25cc each.

In the postoperative period the patient presented with adequate pain control and absent motor blockade, allowing early mobilization and controlled pain while standing in the first postoperative day. No rescue conventional analgesic medication was necessary, including opioids. Overall, the patient reported high satisfaction regarding pain control.

Discussion: In summary, we report a case of bilateral PENG block successfully used for postoperative pain management in direct anterior total hip arthroplasty, providing adequate pain control and absent motor blockade.

References:

Aliste J, Laya S, Bravo D, et al. Randomized comparison between pericapsular nerve group (PENG) block and suprainguinal fascia iliaca block for total hip arthroplasty. *Reg Anesth Pain Med*. Published Online First: 20 July 2021. doi: 10.1136/rapm-2021-102997.

Connolly KP, Kamath AF. Direct anterior total hip arthroplasty: Comparative outcomes and contemporary results. *World J Orthop*. 2016;7(2):94–101. doi: 10.5312/wjo.v7.i2.94.

Girón-Arango L, Peng PWH, Chin KJ, et al. Pericapsular Nerve Group (PENG) Block for Hip Fracture. *Reg Anesth Pain Med*. 2018;43(8):859-863. doi:10.1097/AAP.0000000000000847

7501

Undergraduate medical students' knowledge and attitude toward care of dying patient; results from a Medical School

Ntalouka M.¹, Brotis A.¹, Papaspyrou D.¹, Ntalarizou N.¹, Bareka M.¹, Arnaoutoglou E.¹

¹General University Hospital of Larissa, Mezourlo - Larissa (Greece)

Background and Goal of Study: Assessment of medical attitude regarding end of life care constitutes a fundamental aspect care in palliative care medicine. Our study focused on the medical students' attitude toward caring of dying patient.

Materials and Methods: We focused on undergraduate medical students from a single University of Greece during the academic year 2019-2020. We used the Frommelt Attitude Toward Care of Dying Scale form B (FATCOD-B) questionnaire just before "Pain Therapy" course. This self-reported questionnaire consists of 30 randomly ordered questions (Q) scored on a three-point Likert scale (1=disagree, 2=uncertain, 3=unsure). Half of the questions are positively worded and half are negatively worded. The scores are reversed for the negative items. The results of the analysis were summarized using means and standard deviation, according to the available data.

Results and Discussion: 106 medical students were included. The mean scores for the "positive attitude towards caring for the dying patient" and "perception of patient and family centered care" were 2.01 (± 0.49) and 2.46 (± 0.49), respectively. Providing care to the terminal patient was a high priority among our students (Q1=2.8), and the family was welcome to be engaged in the physical care of the patient (Q12=2.9). Families should receive emotional support to handle the psychological distress associated with the patient (Q16=2.8). The role of the families extends to making the best of the remaining life of the dying patient worthy (Q18=2.9). Equally important, expression of patient's feelings is of utmost importance (Q21=2.8). Contrarywise, our students disagreed to avoid caring of a dying patient (Q5=1,1) and non-family caregivers to talk about death with the dying patient (Q6=1.6). Likewise, non-family care givers should not be withdrawn from the care near the patient's death (Q17=1,3). Above all, there was a strong disagreement on not allowing the dying patient to make his own decisions regarding the received physical care.

Conclusion: Medical students before attending the "Pain Therapy" course showed a positive attitude toward caring of dying patient, with a significant role of the advocated the family.

7533

Chronic postoperative inguinal pain: a stepwise approach for pain control

Rodrigues Roque dos Santos D. J.¹, Silva Sousa B. C.¹, Pedro A.¹
¹Hospital Prof. Dr. Fernando Fonseca - Amadora (Portugal)

Background: Nowadays, post-surgical chronic pain is the most frequent late complication of inguinal hernia repair surgery (1). With this case report, we aim to discuss a rare case with need of multiple invasive techniques for chronic postoperative inguinal pain (CPIP) control.

Case Report: Female, 27 years old, surgical history of right inguinal hernioplasty, surgical correction of right hernial recurrence, right neurectomy and left inguinal hernioplasty. She was referred to the Chronic Pain Unit (CPU) due to bilateral chronic postoperative inguinal pain (CPIP) with 1 year of evolution. Pregabalin, topical capsaicin and metamizole SOS was started. She underwent diagnostic block of the right and left ilioinguinal (II) nerve (0.2% ropivacaine 6mL + dexamethasone 4mg), under ultrasound guidance, with VAS 2 on the right and VAS 0 on the left, at rest, for 3 months. Evolution to pulsed radiofrequency (pRF) (38°, 120 sec) of nerve II at the right and left (1st - 1 cycle; 8 months interval; 2nd - 2 cycles; 4 months interval; 3rd - 2 cycles), under ultrasound control, with administration of lidocaine 2% 3mL, ropivacaine 0.2% 10mL and dexamethasone 4mg. Pain controlled with bilateral VAS 2-3 for 3 months. Progression to pRF (38°, 135 sec) of L1-2 dorsal root ganglion (DRG) at the right and left (1st - 2 cycles; 12 months interval; 2nd - 2 cycles), under fluoroscopy, with administration of 4mg dexamethasone at each level.

The patient remains in the CPU with 5 years of clinical follow-up.

Discussion: Contrary to Andresen and Rosenberg (2), in which the next step after injection with local anesthetics is surgery, we propose the performance of neuromodulatory techniques such as pRF.

This technique should be performed with an increasing level of invasiveness, starting with peripheral nerves, and progressing to the dorsal root ganglion from T12 to L2, if necessary. The option for the pRF DRG, only in L1-2, is justified by the need for fewer punctures, greater tolerability and lower risk of complications.

References:

- Jenkins JT, O'Dwyer PJ. Inguinal hernias. *BMJ*. 2008 Feb 2;336(7638):269-72.
- Andresen K, Rosenberg J. Management of chronic pain after hernia repair. *JPR*. 2018 Apr;Volume 11:675-81

Learning points: Invasive techniques for the control of CPIP must be part of the therapeutic weapons available to each patient. A diagnostic and therapeutic approach at levels of increasing complexity / risk must be followed.

7565

Comparison of the postoperative analgesic effects of nefopam and tramadol in females undergoing caesarean section: A randomized clinical trial

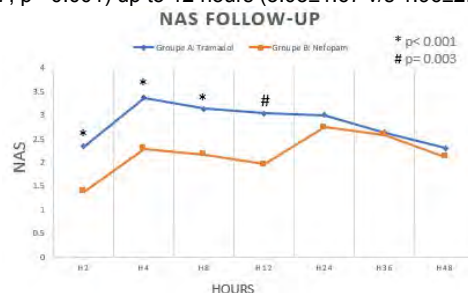
Stephan J. C.¹, Atoui H.¹, Barakat H.¹, Souheil C.¹, Saba H.²

¹Centre Hospitalier Universitaire Notre Dame des Secours - Byblos (Lebanon), ²Ftouh Keserwan Governmental Hospital - Bouar (Lebanon)

Background and Goal of Study: Tramadol and Nefopam are both analgesics used to improve post operative pain management. To our knowledge no study has compared the anti-nociceptive activity of both drugs in human. Our aim in this study is to compare the additional analgesic effect of Nefopam or Tramadol postoperatively following c-section, as a component of multimodal post operative pain management.

Materials and Methods: 61 eligible women undergoing c-section were randomized to one of two groups and received their respective treatments immediately after surgery: Group A (n=30) (2 mg/kg tramadol, i.v., q6h) and Group B(n=31) (20mg nefopam, i.v., q4h), in addition to standard postoperative analgesia comprising paracetamol, diclofenac upon request and Pethidine as a rescue if NAS >6. The anesthesia technique was standardized with a spinal anesthetic using hyperbaric bupivacaine 10mg (0, 5%) with fentanyl 25 mcg and 0,1 mg of preservative free morphine. The investigators assessing the subjects post-operatively were blinded to group assignment. The primary outcome was the pain score measured with NAS in the PACU and ward at 2,4,12,24,48 hours postoperatively and secondary end points were side effects occurrence and satisfaction rating. Data were analyzed using t test and chi square test.

Results and Discussion: In patients receiving spinal morphine, Nefopam given postoperatively, compared with Tramadol, reduced post operative NAS pain score significantly 2 hours postoperatively (2.33 \pm 0.5 v/s 1.38 \pm 1.17; p<0.001) up to 12 hours (3.03 \pm 1.67 v/s 1.96 \pm 2.03; p=0.003)



Incidence of Nausea/vomiting was reduced in patients receiving nefopam compared to tramadol (22.5% v/s 56.6%; p= 0.006), but no statistically significant difference in terms of tachycardia (p= 0.12), sweating(p=0.316) or diclofenac administration postoperatively (p=0.344). Patients' overall satisfaction score in Group B was significantly higher than Group A (8.03 \pm 1.09 v/s 7.23 \pm 1.56; p=0.009).

Conclusion: In conclusion, this study suggests that nefopam produces better postoperative analgesia compared with tramadol in females undergoing c-section.

7627

Postoperative respiratory depression associated with sufentanil perfusion in major oncologic surgery

Zamora Trovisco S.¹, Dias S.¹, Mendes Castro A.², Neves I.¹

¹Instituto Português de Oncologia Francisco Gentil, Porto - Porto (Portugal), ²Centro Hospitalar e Universitário de São João - Porto (Portugal)

Background and Goal of Study: Sufentanil is a synthetic, potent opioid with highly selective binding to μ -opioid receptors. Sufentanil could be used as part of multimodal postoperative analgesia strategy of moderate to severe pain associated with major surgery, despite concerns about possible side effects, such as postoperative respiratory depression (PRD). PRD associated with the use of opioids is estimated between 1.2 and 11.5%, although PRD prevalence associated with endovenous perfusion of sufentanil (EPS) is unknown. Our goal is to determine the prevalence and risk factors to PRD associated with EPS in patients submitted to major oncologic surgery.

Materials and Methods: Retrospective cohort study that included patients with more than 18 years old submitted to major oncologic surgery and EPS as postoperative analgesia in 2020. PRD was defined as the presence of one or more of these events: arterial desaturation ($SpO_2 < 90\%$, $FiO_2 21\%$), bradypnea (< 10 rpm), hypercapnia ($PaCO_2 > 50$ mmHg). Parametric data was described as means and standard deviations. Nonparametric data as median and minimum-maximum. Statistical tests were used as appropriate.

Results and Discussion: From 302 patients included, 34 (11.3%) developed PRD associated with EPS. PRD was higher in older patients [mean (SD) - 69.3 (10.4) vs 63 (12) years old, p-value 0.004], and longer duration of EPS [(median-minimum-maximum) 2 (1-8) vs 2 (1-2), p-value 0.003] and in the head and neck surgery group (n=20, 58.8%). There were no significant differences between survival at 30 days (p-value 0.373), body mass index (kg/m²), gender, glomerular filtration rate (mL/min/1.73 m²), neurologic disease, diabetes, smoking habits, surgical and anesthesia duration, intraoperative use of opioid and chronic use of sedatives and/or opioids. Those with PRD had lower SpO_2 values at postanesthetic care unit admission (PCUA) without statistical differences between groups (p-value 0.246). Median (minimum-maximum) time until PRD was 22 (1-60) hours. Therefore, pulse oximetry monitoring and level of consciousness at PCUA could be insufficient strategy to predict development of PRD and continuous monitoring must be ensured.

Conclusion: In our study, the prevalence of PRD associated with EPS PRD associated with EPS in patients submitted to major oncologic surgery is 11,3% and the major risk factors associated with the event are older age and longer duration of EPS.

Intensive Care Medicine

6525

Postoperative complications of lung transplant surgery: a single centre retrospective study

Costa D.¹, Aguiar F.², Rodrigues J.³

¹SESARAM - Funchal (Portugal), ²Hospital Santa Marta - Lisbon (Portugal), ³Hospital São José - Lisbon (Portugal)

Background and Goal of the Study: Lung transplantation surgery is one of the most complex challenges. The perioperative management is delicate, and many factors play a role in determining the outcome of these patients. With this study we intended to retrospectively evaluate the perioperative period and identify factors associated with increased postoperative complications.

Materials and methods: We conducted a retrospective observational study by consulting anaesthetic charts and other informatic patient information of all lung transplants occurred between 2016 and 2019. Information regarding patient and surgery characteristics, hemoderivates, anaesthetic agents, ECMO usage and postoperative complications (atrial fibrillation, surgical reintervention, sepsis, need for renal replacement therapy and pulmonary embolism) were collected. For the statistical analysis, only the postoperative complications from the top 5 diagnoses were considered.

Results and Discussion: A total of 126 lung transplants were performed. 78.6% (n=99) of patients had one of five main diagnoses leading to transplant: cystic fibrosis (13.5%, n=17), idiopathic pulmonary fibrosis (14.3%, n=18), COPD (27%, n=34), hypersensitivity pneumonitis (12.7%, n=16) and bronchiectasis (14.1%, n=14). Regarding postoperative atrial fibrillation, it was present in 27.3% (n=27) patients. There was a significantly higher number of cystic fibrosis patients without this complication (94.1%, n=16). Patients with hypersensitivity pneumonitis had a higher chance of atrial fibrillation (50%, n=8; adjusted residual 2.2, $X^2(4)=8,753$; p-value $< 0,10$). Surgical reintervention for haemostatic control (n=2) was exclusive to patients diagnosed with bronchiectasis (14.3%; adjusted residual 2.1, $X^2(4)=4,245$, p-value $< 0,05$). This complication was also associated with higher intraoperative need for hemoderivates (p-value $< 0,05$). Sepsis (10.1%, n=10) and need for renal replacement therapy (6.1%, n=6) were not significantly associated with any diagnosis, but the latter was also associated with higher intraoperative need for hemoderivates (p-value $< 0,05$). Pulmonary embolism (5.1%, n=5) risk was higher in patients with shorter surgeries (427.5 vs. 540 min, p-value $< 0,05$).

Conclusion: These findings will further increase our knowledge on the management of these patients and increase awareness to the most common postoperative complications associated with certain diagnoses and patients.

6527

Continuous long term wireless measurement of right ventricular pressures and ePAD in patients with severe COVID-19 ARDS using a novel right ventricular pressure transducer

Gärtner M.¹, Glocker F.², Hopf H. B.¹

¹Asklepios Kliniken Langen-Seligenstadt - Langen (Germany), ²emka MEDICAL GmbH - Aschaffenburg (Germany)

Background and Goal of Study: In patients with severe COVID-19 ARDS development of pulmonary artery hypertension (PAH) and right ventricular hypertension might be associated with a worse prognosis. We continuously measured RVP's and the estimated diastolic pulmonary artery pressure (ePAD) as an indicator for left heart failure for up to 30 days in mechanically ventilated patients with severe COVID-19 ARDS to detect and treat right ventricular and pulmonary artery hypertension using a transcutaneous inserted right ventricular pressure probe.

Materials and Methods: We retrospectively evaluated RVP's and the ePAD measured by CorLog Probe 1P, (emka MEDICAL GmbH, Aschaffenburg, Germany), a wireless high fidelity pressure measurement

system with a non metallic probe of 1.1 mm diameter, in 30 mechanically ventilated COVID-19 ARDS patients between October 1st 2020 and March 31st 2021. Median recording time was 22 days (range 7-30). In all patients We retrospectively divided the patients into survivors and non survivors based on their 60 day mortality. Primary outcome variables were the values of RVP's and the ePAD over time after insertion of the RVP probe.

Results and Discussion: There was no difference in biometrical and clinical data between survivors and nonsurvivors. There was a significant decrease in systolic right ventricular pressure (RVSP) over time in the survivors (estimate: -0,38; 95% CI: -0,59 – -0,17; $p < 0,001$) but not in the non survivors. 16/22 survivors and 7/8 non survivors received sildenafil orally, one survivor received additionally inhaled nitric oxide and one survivor and one non survivor each inhaled iloprost. RVSP was significantly lower on the first and the last measurement day in the survivors compared to the non survivors (day 1: 38 vs. 46, $p = 0,036$; last day: 36 vs. 51, $p = 0,006$ survivors vs. non survivors, respectively). On the last measurement day both right ventricular pressure amplitude (RVPAMPL, 31 vs. 38, $p = 0,027$) and ePAD (22 vs. 31, $p = 0,043$) were significantly lower in the survivors compared to the non survivors

Conclusion: RVSP was significantly lower in the survivors with a decrease over time suggesting successful lowering by pulmonary vasodilators. Compared to survivors the ePAD was higher in non survivors. The use of continuous long-term monitoring of RVSP and ePAD might enable early therapy of right and left heart failure in patients with severe COVID-19 ARDS.

6545

Ischaemic Complications In Patients With Extracorporeal Membrane Oxygenation

Gaertner M.¹, Fichte J.², Hopf H. B.¹

¹Asklepios Klinik Langen - Langen (Germany), ²University Hospital Frankfurt - Langen (Germany)

Background and Goal of Study: During ECMO therapy ischemia of the limbs or internal organs are potential lethal complications. This study analysed incidence and type of ischemic complications during ECMO therapy, divided in limb, mesenteric, cardiac and neurological ischemia.

Materials and Methods: In this single-centre retrospective observational study 348 patients treated with V-V, V-A or V-V-A ECMO from April 1st 2011 until March 31st 2020 were screened, of whom 321 with diagnosis of ARDS, cardiogenic or septic shock were included. Primary outcome variable was the type of ischemic complication. Secondary outcome variables were serum lactate levels 24h before and immediately after diagnosis of the ischemic complication, duration of ICU and hospital stay, ECMO therapy and duration of invasive ventilation. The descriptive statistics were performed with medians and interquartile ranges (IQR; 25th-75th percentiles). Univariate tests were performed using the χ^2 test, Mann-Whitney-U test, Kruskal-Wallis test, Fisher's exact test and Friedman's test. The data were processed within a multivariate logistic regression to the primary outcome variable in order to identify possible predictors, by using odds ratio and 95% confidence intervals. The regression was carried out stepwise backwards. All tests were two-sided and with a significance level of $p < 0,05$.

Results and Discussion: 62/321 patients (19.3%) were diagnosed with an ischemic complication. Most common areas were limbs ($n = 32$) and mesenteric ischemia ($n = 21$). Patients who were diagnosed with a septic shock had the highest rate of ischemic complications (36.2%). No difference was found in survival between patients with and without ischemic complication ($p = 1,0$). Using multivariate logistic regression, age ≥ 50 years ($p = 0,029$; OR=2.793; CI 1.109-7.033), use of haemodialysis ($p = 0,003$; OR=3.283; CI=1.513-7.124) and initial diagnosis of a septic shock ($p = 0,049$; OR=2.144; CI=1.003-4.583) could be identified as predictors for ischemic complications.

Conclusion: Ischemic complications are frequent during ECMO therapy. An age of at least 50 years, the use of haemodialysis and diagnosis of a septic shock were predictors of ischemic complications. No correlation between ECMO mode and ischemic complications was found. There was no difference in survival between patients with and without ischemic complications.

6568

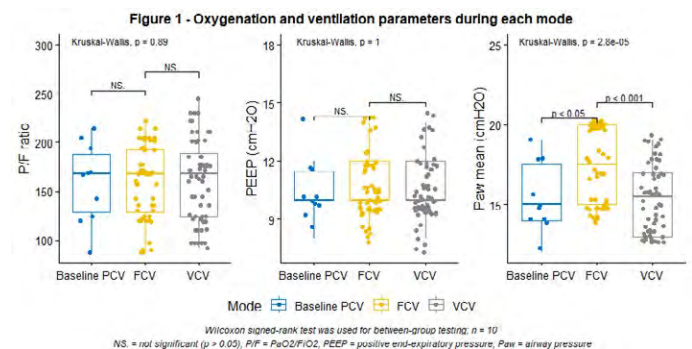
Effect of flow controlled ventilation on oxygenation in COVID-19 ARDS

Van Dessel E.¹, De Meyer G.¹, Morrison S.¹, Jorens P.¹, Schepens T.¹, Departments of critical care medicine and anaesthesiology ¹Antwerp University Hospital - Edegem (Belgium)

Background and Goal of Study: Flow controlled ventilation (FCV) arises from constant inspiratory and expiratory flow. Pre-clinical studies indicate that active expiratory flow results in more efficient alveolar gas exchange.[1] In this prospective crossover open clinical trial we aimed to compare FCV with volume controlled ventilation (VCV) and pressure controlled ventilation (PCV) on oxygenation in adult ARDS patients.

Materials and Methods: Following institutional review board approval and informed consent, 11 patients with moderate ARDS due to COVID-19 were recruited (4 men, 7 women; median age 59yr.; median BMI 28kg/m²). One subject had obstructive lung disease. Patients were ventilated with PCV (I:E ratio 1:1.5) for 5 minutes before switching to FCV (Evone, Ventinova Medical, The Netherlands) and then to VCV, each for 30 minutes. Inspired oxygen fraction (F_IO₂) and positive end expiratory pressure (PEEP) were held constant throughout. FCV (I:E ratio 1:1) used the same set peak inspiratory pressure as baseline PCV. VCV (I:E ratio 1:1.5) used the same tidal volume and respiratory rate as baseline PCV. Arterial blood gas analysis was performed every 15 minutes. One patient was excluded due to a protocol violation. Groups were compared with the Kruskal-Wallis signed-rank test (R, Vienna, Austria).

Results and Discussion: No difference in P/F ratio ($p = 0,89$) was observed between the ventilation modes. Mean airway pressure was significantly higher during FCV ($p < 0,001$, figure 1). Technical differences in pressure measurement might explain these differences, as a separate no-flow line directly measures tracheal pressure during FCV. Contrary to previous studies in lung-healthy patients, the increased mean airway pressure did not lead to improved oxygenation.[2]



Conclusion: At comparable levels of PEEP and despite higher mean airway pressures during FCV, oxygenation in moderate COVID-19 ARDS was not significantly different with PCV, FCV or VCV.

References:

- Schmidt et al. Crit Care Med 2019
- Weber et al. Acta Anaesthesiol Scand 2019

Acknowledgements: Schepens T. is supported with a grant from the Research Foundation Flanders (FWO-TBM T004620N)

6647

Postoperative prophylactic intermittent noninvasive ventilation versus postoperative standard of care for patients at high risk of pulmonary complications: a multicentre, randomized, open clinical trial.

Abrard S.¹, Rineau E.², Seegers V.³, Beloncle F.², Lasocki S.², Dupouiron D.³

¹Hôpital Edouard Herriot - CHU de Lyon - LYON (France), ²University Hospital of Angers - Angers (France), ³Integrated Center for Oncology Paul Papin - Angers (France)

Background and Goal of Study: In critically ill patients, noninvasive ventilation (NIV) used for treatment of acute respiratory failure (ARF) failed to prevent tracheal reintubation in 10%–50% of patients. Pragmatically, the systematic use of NIV before the occurrence of ARF (prophylactic NIV) is questionable. This study evaluated whether postoperative NIV was more effective for preventing ARF and other pulmonary complications in high-risk patients than standard care.

Materials and Methods: This open, multicentre, randomized, controlled clinical trial included patients scheduled for elective or semi-urgent surgical procedures considered high risk for postoperative pulmonary complications (PPC) based on preoperative ARISCAT scores (Reference) of ≥ 45 at three French hospitals between November 2017 and October 2019. Patients were randomly assigned to receive either standard care or prophylactic intermittent NIV. The occurrence of an ARF within the 7 days after surgery was validated by the adjudication comity. The incidences of PPC and reintubations within 7 days of surgery were evaluated.

Results and Discussion: Of 266 randomized patients, 253 were included in the intended-to-treat analysis (mean age, 67.5 years [SD 10.5]; 203 men [80.2%], mean preoperative ARISCAT score 53 [SD 6]), 94% were undergoing cardiac or thoracic surgeries, 125 received prophylactic NIV and 128 received standard care. Fifty-nine patients (53.6% of the prophylactic NIV group) discontinued the protocol before its scheduled termination. Discomfort linked to NIV use occurred in 38 patients (34.5%) in the prophylactic NIV group. Thirty patients (24.0%) in the prophylactic NIV group versus 35 (27.3%) in the standard-of-care group experienced postoperative ARF (OR = 0.967 [95%CI = 0.896-1.043], $p = 0.543$), with similar incidences of other PPC in the two groups. Nine patients (7.2%) in the prophylactic NIV group versus 8 (6.3%) in the standard-of-care group required reintubation ($p = 0.763$).

Conclusion: Postoperative prophylactic NIV in patients considered high risk for PPC as determined by their preoperative ARISCAT score is difficult to implement because of a high discontinuation rate and did not prevent postoperative ARF nor other PPC with superior efficacy than standard care; thus, these findings do not support use of NIV in this setting.

Reference:

1. Canet J et al: Prediction of postoperative pulmonary complications in a population-based surgical cohort. *Anesthesiology* 2010.

6655

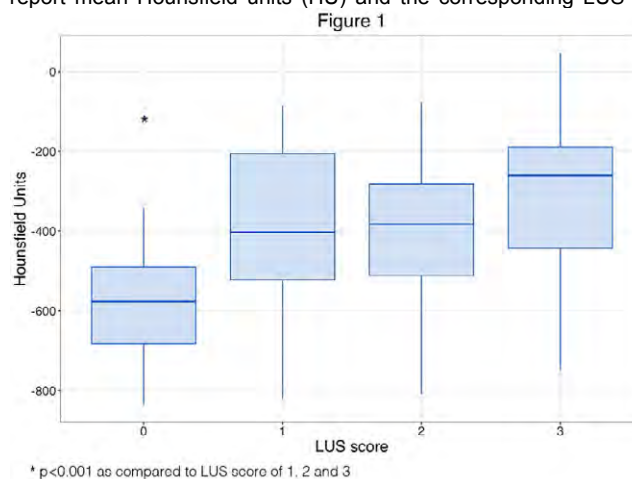
Detection of loss of aeration by lung ultrasound in obese ARDS patients

Steinberg I.¹, Costamagna A.², Arina P.¹, Veglia S.², Fanelli V.¹, Brazzi L.¹
¹University of Turin - Torino (Italy), ²Città della Salute e della Scienza' university hospital - Torino (Italy)

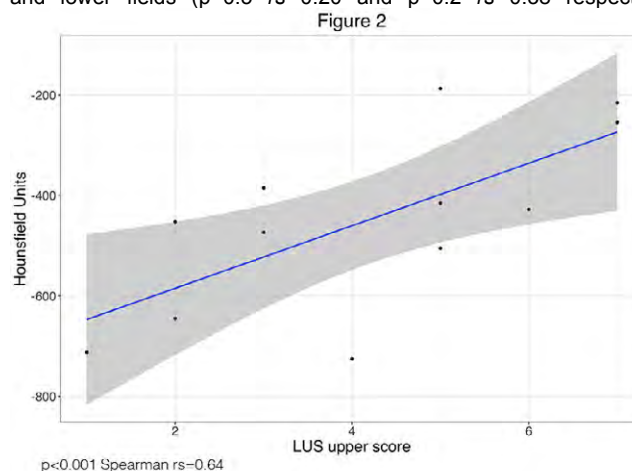
Background and Goal of Study: Lung ultrasound (LUS) allows bedside evaluation and LUS score correlates with loss of aeration at Computer Tomography (CT) quantitative analysis in Adult Respiratory Distress Syndrome (ARDS). However, to date, due to an increased subcutaneous tissue, obese patients were excluded *a priori* from these analyses. Considering the prevalence of obesity, we aimed to assess accuracy of LUS in this population.

Materials and Methods: During a prospective observational trial assessing LUS score and CT measured loss of lung aeration in ARDS, obese patients (BMI>30) were also enrolled. LUS score was assessed in 12 fields, 6 for hemithorax, immediately after and with the same ventilatory setting of CT scan. Quantitative analysis was performed in 12 slices corresponding to LUS fields according to anatomical landmarks. The study was approved by local ethical committee.

Results and Discussion: Over 3 years, 11 out of 47 patients enrolled had BMI>30, median 34.9 (31.9-46.0). Leading cause of ARDS was bacterial pneumonia, median PaO₂/FiO₂ ratio at study entry was 160 (106- 210). Median LUS total score was 20 (16-25). In Figure 1 we report mean Hounsfield units (HU) and the corresponding LUS score.



Overall correlation between LUS score and mean HU was 0.32 ($p < 0.001$). Considering LUS regional score and mean HU, LUS was more accurate in the upper fields ($p < 0.001$, $r_s 0.64$; Figure 2) compared to intermediate and lower fields ($p = 0.5$ $r_s 0.20$ and $p = 0.2$ $r_s 0.38$ respectively).



In this analysis, LUS was accurate in assessing loss of lung aeration in obese ARDS patients. A difference was found between LUS score of 0 (normally aerated tissue) and 1, 2 and 3 (different degrees of loss of aeration). LUS performed more accurately in the upper lung fields.

Conclusion: In obese ARDS patients LUS was feasible and identified loss of lung aeration compared to gold standard lung CT.

6725

Green urine after propofol infusion: a case report

Pinto M.¹, Cunha F.A.A.D.¹, Sacramento S.¹, Ribeiro S.¹
¹Centro Hospitalar Tondela-Viseu - Viseu (Portugal)

Background: Urine analysis is part of patient's evaluation and the colour change can be a concern because it can be difficult to differentiate between benign and pathological causes.¹ Green colour urine is an unusual and intriguing rare occurrence seen in the setting of intensive care and anaesthesia. The common causes of greenish discoloration of urine must be excluded like the administration of phenol containing compounds (promethazine, propofol), amitriptyline, cimetidine, indomethacin and others like biliverdin and pseudomonas infection.²

Case Report: We present a case of 21 year old male with second and third degree burns injury in 36% of total Body Surface Area after an accident with fire. He was admitted in a Burn Intensive Care Unit and needed mechanical ventilation and sedation with a propofol infusion. In the fifth day, the urine of the patient turned green without any other new symptom or signal associated. After three days of discontinuation of propofol, the colour of urine became normal.

Discussion: An uncommon side effect of propofol is green urine discoloration, which is reported most frequently after prolonged infusions. Propofol is mainly metabolized and conjugated in the liver and excreted in urine predominantly as 1- glucuronide, 4-glucuronide, and 4-sulfate conjugates of 2,6-diisopropyl-1,4 quinol.^{1,2} The green colour of urine is believed to be attributed to the presence of these phenolic metabolites. The discoloration appears when the elimination of propofol through the hepatic route is exceeded and extrahepatic elimination occurs.¹

References:

1. Rawal G, Yadav S. Green Urine Due to Propofol: A Case Report with Review of Literature. *J Clin Diagn Res.* 2015;9(11).

2. Blakey SA, Hixson-Wallace JA. Clinical significance of rare and benign side effects: Propofol and green urine. *Pharmacotherapy.* 2000;20:1120–22.

Learning points: The transient presence of green urine that resolves after propofol discontinuation is benign and self-limited. Usually, unnecessary testing should be avoided and the greenish discoloration of urine can be recognized by taking a detailed history of the drugs given.

6763

Atrioventricular disruption after mitral valve replacement secondary to rheumatic valvular disease, use of ECLS and early ventricular thrombosis.

Rodríguez Lago M.¹, Martínez Salgado A.¹, Rial Munin M. V.¹, Francisco Iglesias C.¹, Vázquez Tojo S.¹, Regueira Cuiña J.¹
¹Hospital Clínico Universitario de Santiago de Compostela - SANTIAGO DE COMPOSTELA (Spain)

Background: Atrioventricular disruption is a rare fatal complication of mitral valve replacements. Extracorporeal life support (ECLS) has been described as a beneficial tool that allows effective ventricular unloading and helps with surgical management and stabilization of the patient.

Case Report: A 56-year-old woman with rheumatic valvulopathy was operated on for mitral replacement surgery. She arrived at the ICU-anaesthesia with low doses of norepinephrine. After half an hour, she entered rapid atrial fibrillation with increasing hemodynamic instability. On bedside TTE sudden severe pericardial effusion is observed, evolving to cardiac arrest. Immediate re sternotomy was performed in the unit and direct cardiac massage. On examination, there was a rupture on the left AV groove. An attempt was made to repair, progressing the rupture, so it was decided to pack and establish VA ECLS. As an early complication, the patient develops complete thrombosis of the left chambers, already seen in first EET 6h later.



After a torpid evolution, complicated with intracranial bleeding, the patient was deceased on postoperative day 5.

Discussion and learning points: AV disruption is a rare life-threatening complication, typically seen in rheumatic mitral valves because of the extensive calcification of the annulus and subvalvular apparatus. The management is based on immediate control of the wall defect. ECLS partially excludes the damaged area from the systemic circulation. Being an emergent situation, a fast initial control by packing and establishment of ECLS would allow performing the surgery in a second time, under more stable conditions. Thrombosis is a possible complication that needs to be watched.

References:

1. Sodian R. Repair of left atrioventricular disruption after mitral valve replacement using extracorporeal life support system. *Eur J Cardiothorac Surg* 2015;47:1103–4

6802

BMI modifies increased mortality risk of post-PCI STEMI patients with AKI

Schvartz R.¹, Gal-Oz A.¹, Lupu L.¹, Frydman S.¹, Banai S.¹, Shacham Y.¹
¹Tel Aviv Sourasky Medical Center - Tel Aviv (Israel)

Background and Goal of Study: Mortality from acute ST elevation myocardial infarction (STEMI) was significantly reduced with the introduction of percutaneous catheterization intervention (PCI), but remains high in patients who develop acute kidney injury (AKI). Previous studies found that overweight has a protective effect from mortality in patients suffering from STEMI and AKI separately but not yet when they occur concurrently. This study aimed at establishing the relationship between AKI and mortality in STEMI patients after PCI and whether body mass index (BMI) has a positive impact on mortality.

Materials and Methods: Between January 2008 and June 2016 two thousand one hundred and forty-one patients with STEMI who underwent PCI were admitted to the Tel Aviv Medical Center Cardiac Intensive Care Unit (CICU). Their demographic, laboratory and clinical data were collected and analyzed.

Results and Discussion: We compared all-cause mortality in patients who developed AKI after PCI for STEMI and those who did not. 250 (11.7%) patients died. 178 patients (10%) developed AKI and had a higher mortality ($p < 0.001$). Logistic regression analysis was performed to determine the relationship between AKI, BMI and mortality. AKI was significantly associated with both 30-days and overall mortality while BMI had a significant protective effect. Survival analysis found a significant difference in 30-days and overall survival between patients with and without AKI with a significant protective effect of BMI on survival at 30-days.

Conclusion: AKI presents a major risk for mortality and poor survival after PCI for STEMI, yet it is modified by a beneficial effect of increased BMI.

6822

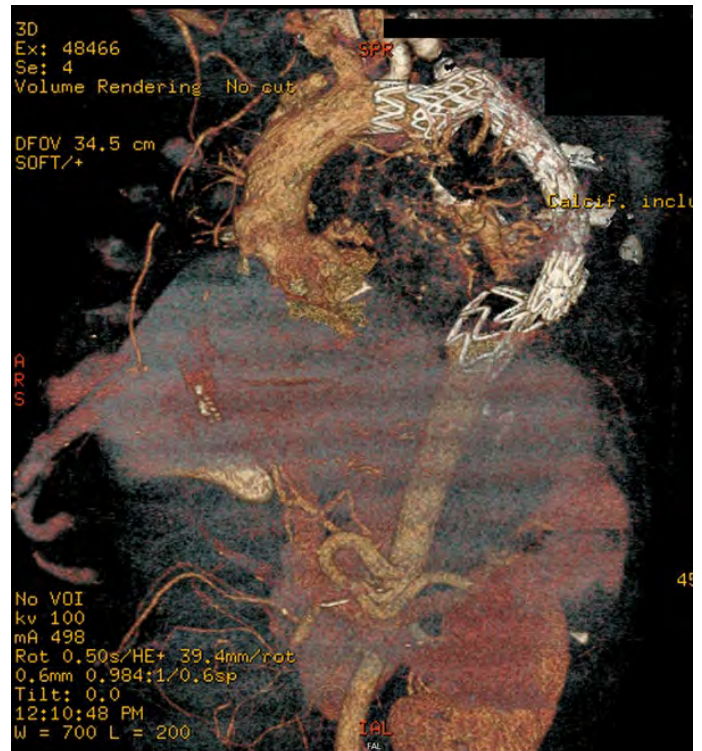
Sengstaken-Blakemore tube controls massive bleeding in aorto-esophageal fistula after first endovascular repair.

Vazquez Tojo S.¹, Cariñena Amigo A.¹, Francisco Iglesias C.¹, Rodríguez Lago M. M.¹, Regueira Cuiña J.¹, Aneiros Peña F.¹

¹Complejo Hospitalario Universitario de Santiago - Santiago (Spain)

Background: Aorto-esophageal fistula (AEF) is a rare but often fatal cause of upper GI bleeding. Most common causes of AEF are thoracic aortic surgery and aortic aneurysms. We report successful control of massive bleeding in an AEF after first thoracic endovascular aortic repair (TEVAR) with a Sengstaken-Blakemore Tube (SBT).

Case Report: A 53 year old man arrived at the emergency department with hematemesis and interscapular pain. His medical history revealed an aortic coarctation repaired at 10 years old with an extra-anatomical bypass from the origin of left subclavian artery to the aorta distal of the coarctation. The CT scan showed a postcoarctation aneurysm with fistulization to the esophagus. The patient underwent emergency surgery implanting an endoprosthesis from the left carotid to the descending thoracic aorta through the previous bypass. Minutes after the arrival to the SICU he presented massive hematemesis requiring polytransfusion and high doses of vasopressors. In this context we placed a SBT, successfully controlling the bleeding and improving hemodynamics. The patient was transferred to the OR extending the endoprosthesis proximally to the brachiocephalic trunk and implanting a left carotid stent. Removal of the SBT was attempted in the OR, but bleeding resumed when deflating. After 24h a new CT scan showed clotted blood severely expanding the gastric lumen. We assumed the bleeding was due to accumulated blood inside the stomach/excluded aneurysm. The SBT was removed with no further bleeding. No significant direct complications appeared because of the SBT. Esophageal side of the fistula was covered with a stent. The patient spent 41 days in the SICU due to AKI requiring RRCT, bowel hypoperfusion and compartmental abdominal syndrome, ARDS and ventilation associated pneumonia. Total hospital stay was 78 days.



Discussion and Learning points: Sengstaken-Blakemore tubes have been widely used for controlling upper GI bleeding due to esophageal varices. AEF treatment usually involves TEVAR, esophagoscopy and open surgery. When these are not possible or immediately available the Sengstaken-Blakemore tube can be used as a bridge to definitive treatment.

6845

Concomitant intrathecal and intravenous injection of tigecycline in treatment of multidrug-resistant Klebsiella pneumoniae meningitis: a case report.

Nastasovic T.¹, Milakovic B.¹, Stosic M.¹, Ladic I.¹, Jovanovic V.¹

¹Clinical Center of Serbia - Belgrade (Serbia)

Background: Intrathecal use of colistin for multidrug resistant *Acinetobacter baumannii* meningitis is well-established. We report on the case of the intraventricular administration of tigecycline for multidrug-resistant *Klebsiella pneumoniae* meningitis.

Case Report: 53-years-old woman was admitted to neurosurgical intensive care unit one month after coiling of ruptured aneurysm of vertebral artery and external ventricular drainage followed by ventriculoperitoneal shunt implantation. She was soporous with fever, body temperature of 39 degrees Celsius and neck rigidity. She was intubated and mechanically ventilated. Empirical antibiotic intravenous regimen with meropenem, colistin and teicoplanin was initiated. Ventriculoperitoneal shunt was converted into external ventricular drainage and lumbar puncture was done. Five days after, the result showed *Klebsiella pneumoniae* in cerebrospinal fluid (CSF) isolation sensitive only on tigecycline. Because there was increasing in blood parameter inflammation, we decided to start intrathecal tigecycline administration. 4 weeks later, we discontinued tigecycline administration, after we confirmed sterile CSF culture with no blood cells.

Discussion: After intrathecal administration of colistin for multidrug resistant *Acinetobacter baumannii* and *Klebsiella pneumoniae* meningitis and according to existing literature, intrathecal use of tigecycline was expected to happen. When the patient responds poorly to the initial treatment with an intravenous infusion of tigecycline, intrathecal use should be considered. In our patient, we didn't decide to discontinue intravenous infusion of tigecycline and the medication was administered via two routes.

References:

1. Wang L, Zhang J, Yu X, Wang J, Cheng L, Hu C, Han G. Intrathecal

injection of tigecycline in treatment of multidrug-resistant *Acinetobacter baumannii* meningitis: a case report. *Eur J Hosp Pharm.* 2017 May; 24(3): 182–184.

2. Chen J, Liu L. The treatment of nosocomial meningitis and brain abscess by carbapenem-resistant *Klebsiella pneumoniae*. *Br J Neurosurg.* 2019 Jul 25;1-3.

Learning points: When intravenous tigecycline infusion fails to be effective, addition of intrathecal tigecycline is reasonable solution for multidrug-resistant *Klebsiella pneumoniae* meningitis in neurosurgical intensive care unit.

6866

Deformities of Arterial Catheter in Perioperative Period: Preliminary Observation.

U. Adachi Y.¹, Satomoto M.²

¹Shizuoka Saiseikai General Hospital - Shizuoka (Japan), ²Toho University - Tokyo (Japan)

Background: Arterial catheterization of small cannula is commonly inserted the radial artery in perioperative patients for continuous monitoring of blood pressure and frequent withdrawal of blood samples. Although, the placement is one of popular practices in intensive care unit, the chronological changes in the form of catheter are not evaluated until now.

Materials and Methods: After discontinuing the monitoring and the need of placement, the arterial catheter was gently removed. The period of placement (Fig.1), the shape of macroscopic findings and the deformity of the catheter's tip and the changes in the color using microscopic observation were recorded. The shaping change in the catheter was classified as Fig. 2. The each point was assigned following the shape of catheter for statistical analysis.

Results and Discussion: The 40 catheters after the removal from intensive care patients were collected in 2 months. All catheters were placed into radial artery and 22-G plastic cannula was used. The placement periods varied from 2 to 7 days. The results were shown in Fig. 2. The placement period of non-deformed catheters was only 1 day. In other catheters placed more than 1 day, some deformities were observed. The sum of assigned points was significantly correlated with the placement period ($r^2 = 0.45$, $P < 0.005$). The detailed observation of peripherally inserted cannula was limited including both venous and arterial catheters, in contrast with central lines. We sometimes encounter the obstruction during sample withdrawal and the poor monitoring wave of arterial line, however, the condition of the catheter was mostly neglected. In the current preliminary study, all catheter placed more than 1 day showed detectable changes

Conclusion: In daily clinical settings, severe complication has not been found, however, we would be better to pay much attention the problems.

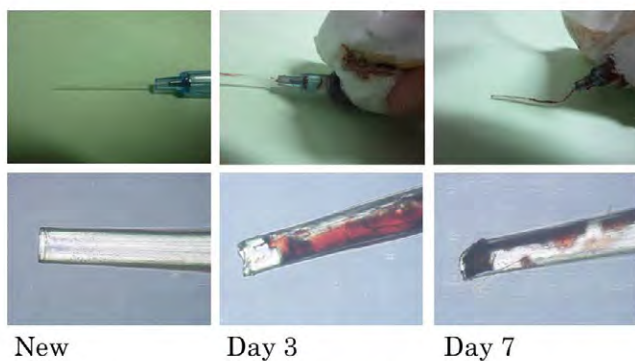


Fig. 1. The changes of the shapes of arterial catheter (typical 3 catheters including unused one).

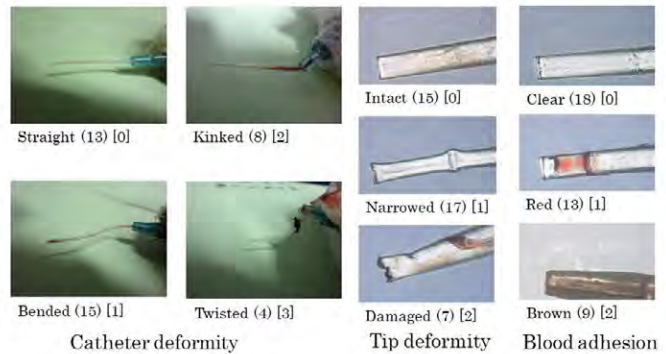


Fig. 2. The changes of the shapes of arterial catheter. We classified the changes using each grade of the 3 elements shown in the upper pictures. (Observed number of catheters), and [each assignment point for statistic analysis].

6959

Propofol Infusion Syndrome or Not? A case report

Fernandes J.¹, Machado A.², Cunha P.¹, Príncipe N.¹

¹Department of Emergency and Intensive Care Medicine, Centro Hospitalar Universitário de São João - Oporto (Portugal), ²Centro Hospitalar de Sao Joao - Porto (Portugal)

Background: Propofol infusion syndrome (PRIS) is a rare potentially life-threatening condition. Although first described in paediatric population, it has been increasingly reported in critically ill adult patients who are receiving it at doses $>4\text{mg/kg/h}$ or for a time $>48\text{h}$. It's characterised by fever, cardiac failure, metabolic acidosis, rhabdomyolysis, acute kidney injury, hyperkalaemia, hypertriglyceridaemia, elevated liver enzymes, raised lactate and ECG changes.¹

Case Report: A 70-year-old male with history of diabetes and chronic kidney disease was admitted in our ICU due to severe COVID-19 complicated with septic shock caused by *K. oxytoca* pneumonia. He was treated with propofol (maximum of 2mg/Kg/h), fentanyl, rocuronium, invasive mechanical ventilation, noradrenaline (NA), continuous veno-venous hemofiltration (CVVHF) and amoxicillin/clavulanic acid, with resolution of the bacterial coinfection and initial septic shock. On day 11, still on CVVHF, an abrupt elevation on liver enzymes (TGO/TGP 75/50 to 1600/650U/L), DHL ($420 \gg 2900\text{U/L}$), CK ($449 \gg 634\text{U/L}$), blood lactate ($2.31 \gg 5.6\text{mmol/L}$) were observed along with a restart of NA. No obvious clinical infection focus was suspected. Cultural microbiology samples were taken, empirically broad-spectrum antibiotics started and all the invasive catheter replaced. A body CT scan was performed showing no relevant alterations. Since rapidly escalating NA requirements were observed, a switch from propofol to midazolam was made. Few hours after propofol's suspension it was possible to stop NA and two days later all the analytical changes seen were normalised. The microbiologic study was all negative and antibiotics stopped. PRIS complication was suspected without its full clinical picture maybe because of the pre-existing CVVHF treatment.

Discussion: Although rare, PRIS should be considered as a possible complication in critical care patients treated with this drug for several days. Once the diagnosis is considered and no obvious other complication is identified, it's imperative to stop propofol infusion and ensure adequate supportive care.

References:

1. HEMPHILL et al, Propofol infusion syndrome: a structured literature review and analysis of published case reports, *BJA*, 2019.

Learning points: PRIS is a rare entity but physicians who use propofol for sedation should be aware of its existence and its clinical features. Positive outcomes depend on early recognition, suspension of the infusion and adequate supportive care.

6974 Incidence of acute kidney injury in abdominal surgery. Could it be improved?

Lara-Jiménez A.¹, Echarri-González G.¹, Monedero P.¹
¹*Clinica Universidad de Navarra - Pamplona (Spain)*

Background and Goal of Study: Postoperative acute kidney injury (AKI) is associated with increased morbidity and mortality. The incidence of acute kidney injury in abdominal surgery is unknown in our population. Changes in the definition of acute kidney injury in recent years (RIFLE, AKIN, KDIGO) make it difficult to compare results. It is important to evaluate modifiable intraoperative risk factors to reduce the incidence of AKI.

Materials and Methods: We conducted a retrospective study on the incidence of AKI in patients undergoing major abdominal surgery in a period of 6 months between October 2020 and April 2021. Patients with a history of chronic kidney disease stage 4 or 5, nephrectomy, and kidney or liver transplantation were excluded.

Results and Discussion: We collected data from 196 patients with major abdominal surgery. The incidence of AKI was 18.4%, of which 86.1% were KDIGO 1. The variables related to increased AKI in our cohort were general surgery, ASA PS 3-4, longer surgical time, laparoscopic surgery, urgent surgery, arterial hypertension, diuretics use and decreased preoperative renal function (Basal creatinine, urea and MDRD < 60). The multivariate analysis revealed that patients with longer surgical time, urgent surgery and higher basal creatinine had greater chance of developing postoperative AKI.

Conclusions: We have found a high percentage of AKI. Although most of the patients developed KDIGO 1, the risk of chronic kidney disease in the medium term is high. Therefore, it is necessary to detect modifiable factors in order to act early and thus prevent AKI. Biomarkers of AKI may play an important role in this regard.

References :

1. Park, S, et al. 2020. Simple Postoperative AKI Risk (SPARK) Classification Before Noncardiac Surgery: A Prediction Index Development Study With External Validation

6996 Descriptive study of patients and mortality rate in the Burn Unit of a tertiary care Portuguese Hospital

Rato F.¹, Novo Pereira S. P.¹, Lakhani R.¹, Xambre F.¹
¹*Centro Hospitalar Lisboa Norte - Hospital Santa Maria - Lisbon (Portugal)*

Background and Goal of Study: Burn injuries can result in psychological and physical sequelae, negative social effects, long hospitalization and increased costs. These injuries represent a serious healthcare problem and require specialized multidisciplinary approach. The aim of this study was to characterize burn victims admitted in a Portuguese hospital burn unit between 2015 and 2020 and to determine the mortality rate.

Materials and Methods: A retrospective study of patients admitted in the burn unit from 2015 to 2020 was conducted. All patients admitted with burn lesions were included. Exclusion criteria consisted of age less than 18 years and readmissions. Demographic data, total burned surface area (TBSA), length of stay and admission severity scores (Acute Physiology and Chronic Health Evaluation (APACHE II), Sequential Organ Failure Assessment (SOFA), Simplified Acute Physiology Score (SAPS II), Baux Score and Abbreviated Burn Severity Score (ABSI)) were collected from existing records. The mortality rate was then determined.

Results and Discussion: 283 patients were included in this study. Of these, 180 were male (63.6%) and the mean age was 54.5 years. Mean severity scores were: APACHE II: 14.5; SOFA: 4.5; SAPS II: 35.8; Baux Score: 78.15; ABSI: 6.5. Mean TBSA was 20.4% and mean length of stay was 31 days. The mortality rate was 8.5% (24 patients), 15 were male (62.5%), mean age was 67.9 years, mean TBSA was 53.8%, mean length of stay was 26.6 days and mean severity scores at admission were: APACHE II: 33.3; SOFA: 11.8; SAPS II: 66.6; Baux Score: 126.13; ABSI: 11.5. The number of deaths remained consistent over the years. Burn victims were relatively young and more frequently males. The

mortality rate in this unit is in accordance with mortality rates determined in other centers (4%-14%)^{1,2}.

Conclusion: In this study we characterized the patients of a Burn Unit in Portugal in a time period of 6 years and determined the mortality rate, which was similar to the one reported in previous studies. Further studies would be important to determine the factors and the severity scores that best predict outcome.

References:

1. Ryan, C. et al. (1998). Objective Estimates of the Probability of Death from Burn Injuries. NEJM.
2. Macedo, J. et al. (2007). Predictive factors of mortality in burn patients. Revista Instituto de Medicina Tropical de São Paulo.

7038 Guillain-Barré syndrome in a COVID-19 ventilated patient – An entity to be suspected

Frias P.¹, Bezerra de Lima Novo J.², Conceição C.³, Osório J.³, Pais Martins A.³
¹*Hospital Divino Espírito Santo - Ponta Delgada (Portugal)*, ²*Centro Hospitalar São João, EPE - Porto (Portugal)*, ³*Hospital São Francisco Xavier, Centro Hospitalar Lisboa Ocidental - Lisboa (Portugal)*

Background: The mechanism of GBS in patients with COVID-19 is still unclear but literature has shown a clear association between both pathologies, with SARS-CoV-2 potentially triggering GBS.[1] The diagnosis is based on patient clinical history, electrophysiological and cerebrospinal fluid examinations.[2] We describe a case of late GBS diagnosis in a COVID-19 ventilated patient.

Case Report: A 75-years-old male with severe COVID-19 pneumonia was admitted to ICU and mechanically ventilated after 4 days of oxygen therapy with High Flow Nasal Cannula. The patient had a septic shock and a barotrauma related pneumothorax, both successfully resolved. Due to inability to wean off from the ventilator, he underwent an uneventful tracheostomy. He was able to open eyes during sedation breaks, but without following commands or mobilize extremities, spontaneously or to painful stimuli. Repeated head-CT and head-MRI ruled out acute brain lesions. CSF showed albuminocytologic dissociation and EEG excluded epileptiform activity. The electromyography confirmed a demyelinating polyradiculoneuropathy consistent with motor axonal variant of GBS. After evaluation by the Neurology department, immunoglobulin therapy was started, which was completed after 5 days of treatment. Nevertheless, there wasn't immediate significant neurological improvement and the patient ended up dying 1 week of GBS directed therapy.

Discussion: This case draws attention to the occurrence of late GBS diagnosis in COVID-19 patients who don't experience motor or sensory symptoms before or at the time of intubation. In our case, GBS was suspected when the patient failed consecutive weaning trials after significant respiratory clinical improvement. The clinical interferences contributed to extension of ventilatory support, delaying the hypothesis of GBS and consequent initiation of IGIV.

References: [1]Trujillo GLM et al. Relación entre COVID-19 y síndrome de Guillain-Barré en adultos. Revisión sistemática. Neurología 2020;35:646—654;[2]Mandarakas et al.Diagnosis and management of Guillain-Barré syndrome in ten steps. NatRev Neurol15,671–683(2019)

Learning points: This case underlines the challenges of GBS diagnosis in a ventilated patient. GBS may lead to failure of weaning trials in COVID-19 patients and needs to be differentiated from a possible ICU-acquired miopathy as early as possible. Early recognition of GBS associated COVID-19- is vital to initiate immunoglobulin therapy and improve the outcome.

7051

Correlation between mechanical power and lung inflammation assessed by positron-emission tomography in experimental acute lung injury in pigs

Scharffenberg M.¹, Wittenstein J.¹, Zhang Y.¹, Ran X.¹, Gama De Abreu M.², Huhle R.²

¹University Hospital Carl-Gustav-Carus - Dresden (Germany),

²Department of Intensive Care and Resuscitation, Anesthesiology Institute; Department of Outcomes Research, Anesthesiology Institute, Cleveland Clinic, Cleveland, Ohio, USA - Cleveland (United States)

Background: During mechanical ventilation, mechanical power (MP) describes the transferred energy per unit of time to the respiratory system. Recently, MP has been shown to be associated with different measures of lung damage. Despite the fact that neutrophilic inflammation is cornerstone in the pathology of the acute respiratory distress syndrome (ARDS), the association of MP with pulmonary neutrophilic inflammation, as assessed by positron-emission tomography (PET), has not been investigated. We hypothesised that the degree of neutrophilic inflammation correlates with MP.

Materials and Methods: In this pre-planned sub-protocol of a larger experimental study, lung injury was induced by repetitive lung lavages in eight anaesthetised and mechanically ventilated juvenile pigs. Following baseline PET and computed tomography (CT) scans, animals were ventilated according to the ARDS network recommendations using the lowest combinations of positive end-expiratory pressure and inspiratory oxygen fraction that allowed sufficient oxygenation. Ventilator settings were adjusted hourly, and physiological measurements were performed every 6 h. After 24 hours, PET/CT measurements were repeated. Pulmonary neutrophilic inflammation was assessed by normalized uptake rate of [¹⁸F]-fluoro-desoxy-glucose (K_{is}) and the difference between the two measurements was calculated (ΔK_{is}). Lung aeration was assessed by lung CT scans at mean lung volume. MP was calculated from pressure-volume-curves. Statistics included Wilcoxon tests and non-parametric spearman correlation.

Results: K_{is} increased significantly from first to second PET/CT ($P=0.012$). ΔK_{is} correlated with median MP ($\rho=0.738$, $P=0.037$), as well as its elastic and resistive components, but neither with median peak, plateau, end-expiratory, driving and transpulmonary driving pressures, nor respiratory rate, elastance or resistance. Lung mass and volume significantly decreased while relative hyper-aerated lung compartment mass increased after 24 h ($P=0.012$, $P=0.036$, and $P=0.025$, respectively). Resistance and $PaCO_2$ were significantly higher, while respiratory rate and MP were lower after 18 h compared with start of intervention.

Conclusions: In this model of experimental acute lung injury in pigs, pulmonary neutrophilic inflammation assessed by PET/CT increased over 24 hours of mechanical ventilation and correlated with MP.

7071

Guillain-Barre Syndrome as first presentation of non-Hodgkin lymphoma.

Luque Peláez M.¹, Lara Jiménez A.¹, Montero López P.¹, Sala Trull C.¹, Escribano Arranz A.¹, Mondero Rodríguez P.¹

¹Clinica Universidad de Navarra - Pamplona (Spain)

Background: Guillain-Barre syndrome (GBS) is a neuropolyradiculoneuropathy and the most common cause of flaccid paralysis in occidental countries. Most cases are preceded by an infection the previous 2-3 weeks but many more causes have been defined (including COVID19). GBS as a paraneoplastic manifestation is a very rare entity and there are few cases described in the literature.

Case report: A 52-year-old man was admitted to the hospital for weakness and altered sensation of lower limbs. Two weeks earlier, he had suffered an episode of fever and cough with self-limited diarrhoea. A lumbar puncture was performed showing albuminocytological dissociation and a diagnosis of Guillain-Barré syndrome was established. Treatment with i.v. immunoglobulins was started and, despite the treatment, he did not improve his neurological status and required invasive mechanical ventilation in an intensive care unit (ICU) before transfer to our ICU. After admission to our ICU, he presented an episode of upper gastrointestinal

bleeding that required endoscopy, showing mucosal infiltration, and a CT with adenopathies compatible with a lymphoproliferative process. He required laparotomy due to bowel perforation with pneumoperitoneum, and was diagnosed with B line marginal non-Hodgkin lymphoma and treated with chemotherapy (r-cyclophosphamide). Immediately after chemotherapy the neurological symptoms began to improve rapidly.

Discussion: GBS as a paraneoplastic manifestation of non-Hodgkin lymphoma is an extremely rare situation, but it should be suspected when faced with GBS without response to treatment and without a history of infection. Most neurologic paraneoplastic syndromes are rare, even in the presence of solid tumours such as small cell lung, breast, ovarian cancer. Hematological cancers do not usually produce neurological symptoms and when they are present it is mainly due to the toxicity of the treatment of the neoplasm itself. The presence of GBS before the diagnosis of lymphoma is very rare and the diagnosis is very important because the neurological symptoms will not disappear until we treat the cause, the tumour.

Learning Points: Guillain barre syndrome. Non-Hodgkin Lymphoma.

References:

1. Shahrzaila, N., C Lehmann, H. and Kuwabara, S., 2021. Guillain-Barré syndrome. *Lancet*, (397), pp.1214-28.

7089

The use of Mid-Regional pro-Adrenomedullin as prognostic biomarker in ICU COVID-19 patients: preliminary data of Italian "second wave" of pandemic

Lombardo D.¹, Montrucchio G.¹, Giaccone A.¹, Balzani E.¹, Sales G.², Brazzi L.¹

¹Department of Surgical Science, University of Turin, Italy - Turin (Italy),

²Department of Anesthesia, Intensive Care and Emergency, 'Città della Salute e della Scienza' Hospital - Turin (Italy)

Background: A prognostic biomarker to evaluate disease progression in COVID-19 intensive care unit (ICU) patients' is still missing. Mid-Regional Pro-Adrenomedullin (MR-proADM) is a well-known endothelium-related peptide previously used in septic shock and respiratory infections¹. Since the SARS-CoV-2 seems to induce a severe endothelial dysfunction, the aim of this study is to test the effectiveness of MR-proADM to describe patient's severity and predicting mortality. A first phase of the study (March-June 2020) showed encouraging results, pending more definitive confirmations².

Methods: All consecutive COVID-19 adult patients admitted between September 2020 and March 2021 to the ICUs of 'Città della Salute e della Scienza' Hospital were enrolled. MR-proADM and routine laboratory test were measured within 48 hours from ICU admission, on day 3, 7 and 14. Univariate analysis was conducted, and variables were compared using the Wilcoxon-Mann-Whitney test, t test and Fisher exact test.

Results: 94 patients were enrolled. ICU and overall mortality were 55,3% and 62,8%, respectively. No differences were found in demographic characteristics or comorbidities between survivors and non-survivors (table 1A). MR-proADM values were found statistically significant between survivors and non-survivors both in the first 48h of ICU admission, both in the subsequent times (table 1B). In contrast, no significant differences emerged in C-reactive protein, D-dimer, NT-proBNP, LDH, lymphocyte count. Although PCT and IL6 showed a statistical significance at arrival, MR-proADM was the only biomarker to maintain a significant difference during time ($p=0.0106$). A higher mortality characterized patients with MR-proADM >1.6 nmol/L ($p = 0.0189$).

Conclusions: In COVID-19 ICU-patients, MR-proADM seems to confirm the ability of stratifying disease severity and mortality risk. A higher value of MR-proADM at admission appears to depict patients with a negative outcome. Further studies are needed to better define severity cut-offs and to fully comprehend variables influencing trends over time.

References:

1. Elke G, *Crit Care* 2018; 22(1): 79
2. Montrucchio G, *PLoS One* 2021; 16(2): e0246771.

TABLE 1A – Patients' characteristics and comorbidities

	Overall	Survivor	Non survivor	p value
N (%)	94 (100)	35 (37.23)	59 (62.76)	
Age, yrs, median (IQR)	62.88 (56 - 72)	62.34 (55 - 71)	63.20 (57 - 73)	0.6386
Gender, male, n (%)	69 (73.4)	28 (80)	41 (69.49)	0.265
Lactate, mean \pm std	1.8 (1.3)	1.4 (1.0)	2.1 (1.4)	0.0009
SOFA on admission, median (IQR)	7.0 (5-9)	7 (4-8)	7 (5-11)	0.0906
SAPS II, median (IQR)	52 (40-61)	46 (36 - 58)	54 (43 - 63)	0.0817
Patients with underlying comorbidities, n				
Central Obesity, n (%)	49 (52.13)	20 (57.14)	29 (49.15)	0.4534
Arterial hypertension, n (%)	60 (63.83)	22 (62.66)	38 (64.42)	0.8798
Cardiovascular disease (others), n (%)	17 (18.9)	5 (14.29)	12 (20.34)	0.461
Chronic lung disease, n (%)	14 (14.89)	3 (8.57)	11 (18.64)	0.1848
Active smoker, n (%)	5 (5.32)	2 (5.71)	3 (5.08)	1.0
Invasive mechanical ventilation, n (%) -	87 (92.55)	32 (91.43)	55 (93.22)	1.0
IMV days of n=87, median (IQR)	12.2 (5-18)	11.09 (4-12)	12.85 (5-18)	0.00379
iNO, n (%)	25 (26.6)	3 (8.57)	22 (37.29)	0.0023
RRT during our ICU stay, n (%)	10 (10.64)	-	10 (16.95)	0.0119
Vasopressors during our ICU stay, n (%)	70 (74.47)	17 (48.57)	53 (89.83)	<0.001
ECMO at arrival, n (%)	23 (24.47)	2 (5.71)	21 (35.59)	0.0011
ECMO during our ICU stay, n (%)	25 (26.6)	2 (5.71)	23 (38.98)	0.0004

TABLE 1B – Results

Pro-ADM at arrival, nmol/L, mean \pm std	1.98 \pm 2.71	1.08 \pm 0.56	2.54 \pm 3.30	0.0008
Pro-ADM at day 3, nmol/L, mean \pm std	1.71 \pm 1.87	1.14 \pm 0.67	2.08 \pm 2.28	0.0051
Pro-ADM at day 7, nmol/L, mean \pm std	2.09 \pm 2.04	1.13 \pm 0.63	2.73 \pm 2.39	0.0001
Pro-ADM at day 14, nmol/L, mean \pm std	2.04 \pm 1.59	0.95 \pm 0.28	2.68 \pm 1.70	<0.001
Pro-ADM >1.6, nmol/L, n (%)	87	33 (37.9)	54 (62.1)	0.0189
PCT at arrival, ng/ml, mean \pm std	2.23 \pm 7.16	0.66 \pm 1.32	3.06 \pm 8.75	0.0465
PCR at arrival, mg/L, mean \pm std	116.94 \pm 97.04	106.64 \pm 100.13	122.76 \pm 94.68	0.2701
NT-proBNP at arrival, mean \pm std	1869.49 \pm 4496.3	853.2 \pm 1133.44	2651.54 \pm 5727.75	0.0626
Lymphocyte at arrival, ng/L, mean \pm std	698.35 \pm 437.51	703.42 \pm 306.22	690 \pm 502.20	0.2829
IL6 at arrival, pg/ml, mean \pm std	400.13 \pm 1633.38	43.10 \pm 59.32	520.3 \pm 1869	0.0008
LDH at arrival, mean \pm std	915.95 \pm 424.55	784.57 \pm 329.75	892.37 \pm 456.76	0.0055

At arrival: first available results within 48 hours from ICU admission

Abbreviations: IMV, Invasive Mechanical Ventilation; iNO, Inhaled Nitric Oxide; RRT, Renal Replacement Therapy; ECMO, ExtraCorporal Membran Oxygenation

7096

Indwelling device-associated biofilms in oncological critically ill patients

Lungu O.¹, Grigoras I.¹, Iancu L. S.¹, Dorneanu O. S.¹, Lunca C.¹, Grigore T. Popa² University of Medicine and Pharmacy - Iasi (Romania)

Background and Goal of Study: Rapid pathogen detection is a major challenge in health care-associated infections' (HCAI) management and a main condition for a positive outcome. In critically ill cancer patients, the use of indwelling devices (ID) is standard of care, promoting biofilm formation and HCAIs, often of unknown origin. The study's main objectives were to detect biofilm-associated pathogens using standard microbiological procedures on four ID (arterial catheter (AC), central venous catheter (CVC), endotracheal tube (ET) and urinary catheter (UC)) and to identify pathogens involved in ID biofilm formation in septic critically ill oncological patients.

Materials and Methods: A prospective, observational, non-interventional, single centre study was designed to assess biofilm-associated pathogens in this particular category of patients. Immediately after aseptic extraction, a sterile sampling of the distal part of each collected ID was performed. The samples were processed by the roll-plate technique. Microbiological analysis was performed by standard method: sample inoculation on standard culture media, biochemical identification test and antimicrobial susceptibility testing using MicroScan WalkAway 40 plus®, Beckman Coulter automatic system compatible panels.

Results and Discussion: We screened 200 patients admitted to the ICU, out of which 33 patients met the inclusion criteria: sepsis and all 4 ID inserted. 30.3 % of the included patients associated medullary aplasia. Pneumonia was the most frequent cause of sepsis, Klebsiella pneumoniae being the most often identified pathogen. Half of these strains were multidrug-resistant. When culturing the ID, in 80% of patients new strains with pathogenic potential were discovered. The etiological agents most frequently responsible of biofilm formation on the ET probe were Klebsiella pneumoniae, Pseudomonas aeruginosa and Escherichia coli, on the AC Pseudomonas aeruginosa, Klebsiella pneumoniae and Stenotrophomonas maltophilia, the same gram-negative bacilli on the CVC in addition to coagulase-negative staphylococci and on the UC Klebsiella pneumoniae, Pseudomonas aeruginosa, Escherichia coli, Proteus mirabilis.

Conclusion: With its limitations (single-center, non-interventional, small sample size), this preliminary data of the study reveals a high percentage of biofilm formation on ID, with high rates of multidrug-resistant strains among patients with sepsis/septic shock of unknown origin.

7119

Covid 19 can cause large intracranial Hemorrhage

Arslan M.¹, Memon Z.¹

¹Our Lady of Lourdes Hospital Drogheda - Drogheda (Ireland)

Background: Intracranial hemorrhage is one of the unusual complications related to Covid-19 virus. This case illustrates the vasculopathic consequences of SARS-CoV-2 infection and proposes a possible overactive immune response /depletion of ACE 2 receptors.[1]

Case Report: A 78 year old male admitted to ED on 2/11/2020 with increased confusion and previously diagnosed as Covid 19. He was diagnosed as covid +ve by a private hospital 5 days back after abdominal pain and diarrhea. He was a known case of CLL,IHD with 2 stents,VZV,Gout. He was mechanically ventilated after 7 days of admission due to drop in GCS .His CT scan was normal on day of admission and 1 week after admission as well.However,on day 14,after cessation of sedation fro 5 days,MRI brain was performed which showed large intracranial bleed.No surgical intervention .Poor prognosis. His BP remained within normal limits throughout the course of hospital stay.

Discussion: With the increasing number of COVID-19 cases around the world, more and more cases with neurological manifestations are being unfolded. Prior to this, there are only a small number of cases reported with SAH and IPH, including the study from Wuhan.(2,3)

The possible association and pathophysiology behind the occurrence of SAH in patients with SARS-CoV-2 is still to be determined. There are multiple, not mutually exclusive, and possible mechanisms that may suggest that association. As demonstrated by Tang et al, severe COVID-19 has been related to systemic hyperinflammatory state (cytokine storm) and hyperviscosity. This pro-inflammatory state is associated with vascular injury, including breakdown of collagen and increased permeability of blood-brain barrier (BBB).

References:

- Front. Aging Neurosci., 22 October 2020 | <https://doi.org/10.3389/fnagi.2020.600172>
- Mao L, Jin H, Wang M, et al.: Neurologic manifestations of hospitalized patients with coronavirus disease 2019 in Wuhan, China. JAMA Neurol. 2020, 77:683-690. 10.1001/jamaneurol.2020.1127
- Al-Olama M, Rashid A, Garozzo D: COVID-19-associated meningoencephalitis complicated with intracranial hemorrhage: a case report. Acta Neurochir (Wien). 2020, 162:1495-1499. 10.1007/s00701-020-04402-w

Learning points : Since Covid 19 is associated with vasculitis,early screening and radiological investigations(MRI) should be considered to rule out intracranial bleeding and reduce the mortality .

7142

Pharmacokinetic and metabolism of remimazolam are stable and not affected under conditions of long-term infusion and inflammation

PESIC M.¹, Petersen K. U.¹, Schmalix W.¹, Horst K.², Bläsius F.², Stoehr T.¹

¹PAION Deutschland GmbH - Aachen (Germany), ²Uniklinik Aachen - Aachen (Germany)

Background and Goal of Study: Remimazolam (RMZ) is a new ultra-fast acting benzodiazepine for procedural sedation and general anaesthesia. The pharmacokinetics (PK) of many anaesthetics change during long infusions and/or surgically induced inflammation, as a consequence of an altered tissue distribution or metabolism of the drug. This can translate to unreliable titration of the anaesthetic depth and compromise patient safety. The goal of this work was to investigate if long term infusion and/or inflammation influence the PK and metabolism of RMZ.

Materials and Methods: In a first study, designed to investigate if PK of RMZ changes over time during long infusion, RMZ was continuously infused to healthy Cynomolgus monkeys for 7 days. In a second study conducted in vitro in primary and cryopreserved human hepatocytes, the effects of various inflammatory mediators on CES1 mRNA expression and activity, quantified by formation of RMZ's principal metabolite (CNS7054) over time, were studied. A third study was designed to investigate if multiple traumata and the subsequent inflammatory response have

influence on the PK and metabolism of RMZ during long term infusion. In this study, German Landrace pigs were continuously infused with RMZ for 69h, which included 2h baseline phase, followed by polytrauma or sham, stabilisation, and ICU sedation. Blood samples (first and third study) and tissue samples (only third study) from fat, liver, muscle and skin were collected over time to determine the concentrations of RMZ and CNS7054.

Results and Discussion: In the first study, no changes were noted in the PK of RMZ and CNS7054 throughout the dosing period, indicating that long term infusion of RMZ in healthy monkeys does not affect its metabolism over time. In the second study, inflammatory mediators had neither effect on CES1 mRNA expression nor on RMZ hydrolase activity. In the third study RMZ and CNS7054 plasma and tissue profiles were comparable between sham and trauma animals, indicating that induced polytrauma had no significant impact on their PK. Moreover, no plasma or tissue accumulation over time was observed confirming that long term infusion of RMZ had no impact on its metabolism and tissue distribution.

Conclusion: PK of RMZ remain stable under conditions of long-term infusion and under the influence of inflammatory mediators such as after post-surgical stress in the intensive care unit.

7177

Evaluation of peripheral perfusion to fluid response using remote photoplethysmography imaging and automatized Capillary refill time technique in COVID - 19 patients. A Pilot study

Klibus M.¹, Marcinkevics Z.², Rubins U.³, Laksa E.⁴, Sabelnikovs O.⁵
¹Pauls Stradins Clinical University Hospital, Rīga Stradiņš University - Rīga (Latvia), ²University of Latvia, Department of Human and Animal Physiology - Rīga (Latvia), ³University of Latvia. Institute of Atomic physics and Spectroscopy - Rīga (Latvia), ⁴Blazar - Rīga (Latvia), ⁵Rīga Stradins University - Rīga (Latvia)

Background and Goal of Study: Fluid overload in SARS-Co2 (COVID-19) pneumonia, ARDS have potential for rapid clinical deterioration and can become life-threatening therefore the aim of fluid resuscitation is to restore peripheral perfusion. Tissue perfusion could be objectively evaluated using remote photoplethysmography- a cost effective technique for contactless blood perfusion monitoring in addition to improve the dynamic assessment, the automated objective capillary refill time measurement technique (aCRT) was developed. The present study aims to investigate use of remote photoplethysmography and automated CRT as alternative techniques for peripheral perfusion assessment in critically ill patients.

Materials and Methods: In the single-centre prospective study comprising seven intensive care COVID-19 patients macrohemodynamic variables and microcirculation was assessed before and during a passive leg raising tests and after volume expansion. The signals were acquired utilizing remote photoplethysmography from palm and in parallel manual and automated CRT measurements were applied to the finger. RPPG using 540nm green light, was adapted for non-contact monitoring of blood volume changes in skin. The automated CRT provided temperature and capillary refill time related parameters: Where T90 represents the time taken for the light intensity to reach 90% from pressure release to Tst and Tst is stabilization of signal or the maximum capillary refill after the following pressure release. The signal processing was performed on custom developed matlab based software.

Results and Discussion: Out of seven patients, three were fluid-responsive (FR) and four fluid-non-responsive (F-nR). In FR group mean blood pressure increased from baseline to after volume expansion by 6% from 93,0 +/-6,0 to 98,6 +/-0,9mmHg. Manual CRT decreased by 34% from 2,65s+/-0,7 to 1,76s+/-0,6. T90 decreased by 10%, from 2,21s +/-0,92 to 2,00s +/-1,30 and Tst decreased by 10% from 3,85s +/-1,43] to 3,5s +/-2,7. Mean perfusion index increased by 9% from 0,58 +/-0,31 to 0,69 +/-0,39. Lactate level decreased by 10%. from 1,96 +/-0,37 to 1,56 +/-0,68 mmol/l. The fluid non-responsive group didn't exhibit any significant changes in aforementioned parameters.

Conclusion: This pilot study results confirm that remote photoplethysmography and automated CRT technique is feasible for peripheral perfusion evaluation in critically ill patients.

7198

How do intraoperative and postoperative events influence the development of delirium in cardiac surgery?

de la Varga Martinez O.¹, Tamayo Gómez E.², Gómez Sánchez E.², Marcos Vidal J. M.³, Álvarez Refojo F.⁴, Ramasco F.⁵

¹Hospital Universitario Infanta Leonor - Madrid (Spain), ²Hospital Clínico Universitario Valladolid - Valladolid (Spain), ³Hospital Universitario León - León (Spain), ⁴Hospital Universitario de A Coruña - A Coruña (Spain), ⁵Hospital la Princesa - Madrid (Spain)

Background and Goal of Study: Postoperative delirium (PD) is a clinical syndrome defined as an acute and fluctuating alteration in the level of consciousness, together with disorganised thinking and an impaired attention span. The objective is to evaluate the influence of factors occurring during the intraoperative and postoperative periods on the risk of developing delirium in patients undergoing cardiac surgery, as well as to evaluate whether its inclusion in a preoperative model would improve its predictive power.

Materials and Methods: a multicentre prospective observational study in which a total of 689 patients were registered between January 2018 and May 2019 in six ICUs in Spain, we studied the predictive influence of data collected during the intraoperative and postoperative period on the development of PD. 344 patients formed the predictive model development group and 345 validated it.

Results and Discussion: the result of the multivariate backward step analysis reveals as independent risk factors in the postoperative period: a SOFA score in the 24 first hours ≥ 8 (odds ratio [OR] 3.06, 95% confidence interval [CI] 1.24–7.56, $p = 0.015$), a lactic acid value >2.2 mmol/l in the first 24 h (OR 3.54, 95% CI 1.73–7.25, $p = 0.001$). The preoperative risk factors were: an MMSE score of 25–26 (OR 7.07, 95% CI 3.01–17.24, $p < 0.001$) or < 25 (OR 4.68, 95% CI 1.79–12.22, $p = 0.002$), low physical activity (OR 2.23, 95% CI 1.02–4.87, $p = 0.044$) and age > 65 years (OR 3.56, 95% CI 1.16–10.9, $p = 0.026$). These factors were transferred to a risk prediction model based on the weight of each variable by its regression coefficient. The predictive capacity of one model composed only of intraoperative factors (model 1) and other composed of preoperative and postoperative factors (model 2) was compared. Model 2 predicted that 87.3% of patients will develop delirium, while model 1 did so with 85.9%. Thus, the inclusion of postoperative variables only increases the predictive power of the model in 1.4% of patients

Conclusion: when predicting the risk of developing delirium, the consideration of intraoperative and post-operative factors does not substantially improve the predictive capacity of a preoperative model. The usefulness of this second model is limited by the fact that it requires predictors obtained during the first 24 h of admission to the ICU, and the preventive measures should be applied as soon as possible.

7244

Association of mechanical energy and ventilator induced lung injury in experimental acute lung injury in pigs – Contribution of the computation of PEEP

Huhle R.¹, Wittenstein J.¹, Zhang Y.¹, Ran X.¹, Gama De Abreu M.¹, Scharffenberg M.¹
¹University Hospital Carl Gustav Carus Dresden - Dresden (Germany)

Background and Goal of Study: During controlled ventilation, mechanical energy (ME) is transferred to the respiratory system, and either dissipated or transferred back to the ventilator. The rate of this transfer is the so-called mechanical power (MP). MP comprehends and congregates most ventilatory variables known to promote ventilator induced lung injury. However, positive end-inspiratory pressure (PEEP) as a linear part in the widely used equation of ME is flawed (ME_{PEEP}), since PEEP does not contribute directly to the transfer of energy. We aimed to determine how the computation of PEEP affects the correlation between ME and lung inflammation assessed by positron emission tomography (PET).

Materials and Methods: Data used in this investigation derived from a previous experimental study. Lung injury was induced by repetitive lung lavage in 24 anaesthetised and mechanically ventilated juvenile pigs. The normalized uptake rate of [¹⁸F]-fluoro-desoxy-glucose (K_{is}), as measured with PET, was determined initially at a PEEP of 10 cmH₂O, and after 24 hours at a higher or a lower PEEP. The end-expiratory lung volumes (EELV) were calculated from static end-expiratory computed tomography (CT). K_{is} and EELV gradients was determined (ΔK_{is} and $\Delta EELV$, respectively). The static effect of PEEP on ME was calculated as $ME_{stat} = \frac{1}{2} \Delta EELV \cdot \Delta PEEP$. The association between $ME_{total} = ME_R + ME_E$, its resistive (ME_R), elastic (ME_E) and static component (ME_{stat}) were assessed by Pearson correlation test. The determined component with respect to ΔK_{is} was tested by step-wise linear model reduction according to the minimization of Akaike information criterion (AIC).

Results and Discussion: ME_{total} , ME_R and ME_E were positively associated with ΔK_{is} ($\sigma=0.572$, $P=0.004$, $\sigma=0.568$, $P=0.004$ and $\sigma=0.521$, $P=0.009$, respectively). ME_{PEEP} showed a trend to be weakly negatively associated with ΔK_{is} $\sigma=-0.385$, $P=0.063$, and ME_{stat} had no direct association with ΔK_{is} . The model with the lowest AIC included only the elastic mechanical energy ME_E (AIC=-225).

Conclusion: In this experimental model of acute lung injury, the dynamic elastic and resistive components of ME, but not the static component including PEEP, was associated with VILI.

Acknowledgements: Lorenzo Maiello MD, University of Genoa, Department of Surgical Sciences and Integrated Diagnostics, IRCCS AOU San Martino IST, 16131 Genoa, Italy

7267

The prevalence of psychiatric disorders as part of post-ICU syndrome among ICU-survivors – a retrospective single-center study

Zarour S.¹, Matot I.¹, Dahan E.¹, Cohen B.¹
¹Tel Aviv Sourasky Medical Center - Tel Aviv-Yafo (Israel)

Background: The number of patients that survive hospitalization in intensive care units (ICUs) constantly increases. ICU survivors are at increased risk of long-term physical, cognitive, and psychiatric impairments. These impairments are referred to as Post-ICU Syndrome (PICS). Early diagnosis and intervention through post-ICU clinics seem valuable. We aimed to evaluate the prevalence of psychiatric impairments as part of PICS diagnosis in a post-ICU clinic in a single tertiary center in Israel.

Methods: We conducted a retrospective, single center, cohort study. Data were collected from the medical records of all patients who visited the Tel-Aviv Medical Center post-ICU clinic between 2017 and 2020 and included demographic and medical variables from patients' electronic medical records. Statistical analysis was conducted using Microsoft Excel 2007 for Windows XP.

Results: Thirty-nine patients attended the post-ICU clinic between 2017 and 2020 with an average age (standard deviation, SD) 51 (17) years. Fifteen (38%) were females. Median [interquartile range, IQR] follow-up duration until the first post-ICU clinic visit was 62 [21, 244] days. Of these, 7 were excluded from the study due to missing proper psychiatric analysis. One (3%) patient was diagnosed with new posttraumatic stress disorder (PTSD) and none were diagnosed with new anxiety or depressive disorders. In total, 16 patients (25%) were found to have new mild cognitive impairment using the Montreal Cognitive Assessment (MoCA) tool, and 21 patients (9%) were diagnosed with severe functional impairment using the Barthel Index for Activities of Daily Living (ADL). Fifty-four percent of patients did not return to work.

Conclusion: We found a remarkably lower incidence of PTSD compared to existing literature, which is most probably associated with our relatively small cohort, increasing the risk of both selection and diagnosis bias. Other possible explanations include different diagnosis tools, different baseline and clinical characteristics of our study group, and unique national, cultural, ethnical, or religious perspectives that lead to lower tendency to develop PTSD after a traumatic event. The high prevalence of patients who did not return to work may suggest an impairment in higher functions and/or inability to perform complex activities that are not enrolled in ADL index. Further research is required to establish the prevalence of psychiatric disorders as a part of PICS, among ICU-survivors.

7289

Prevalence and predictive value for poor outcome of body mass index in critically ill COVID-19 patients: a retrospective cohort study

Hendrickx P.¹, De Pauw I.², Pierson M.², Callebaut I.², Dubois J.², Stessel B.²
¹Jessa Ziekenhuis Hasselt - Hasselt (Belgium), ²Jessa Hospital - Hasselt (Belgium)

Background and Goal of Study: Several systematic reviews concluded that obesity is a significant risk factor for ICU admission, invasive mechanical ventilation (IMV) requirement and mortality. Despite the seemingly overwhelming evidence, there are conflicting data regarding the association between obesity and COVID-19 severity. In a large database of 76.819 patients diagnosed with COVID-19 in the United states, there were no statistically significant differences in prevalence of overweight and obesity between hospitalized and non-hospitalized patients (12). Our aim was to evaluate the distribution of Body Mass Index (BMI) categories in a mono-center dataset of COVID-19 patients admitted to the ICU and to assess the association between body weight and poor outcome after COVID-19 infection.

Materials and Methods: All patients admitted to the ICU of JESSA hospital, Hasselt, Belgium with laboratory-confirmed diagnosis of

COVID-19 pneumonia between March 13th and October 17th 2020, were included in the study. We collected data on patient characteristics, comorbidities, and outcomes including the length of ICU and hospital stay, acute kidney injury, venous thrombo-embolism and 1-month mortality.

Results and Discussion: In total, 116 COVID-19 patients were admitted to the ICU from March 13th until October 17th 2020. 13 patients were excluded for various reasons, leaving 103 patients in the analysis. Baseline characteristics are presented in table 1. In total, 33.7% of all patients were overweight and 29.8% obese. An overview of outcome parameters is presented in table 2. A statistical significant association between BMI distribution and disease severity or poor outcome was not detected in our cohort.

Conclusion: Overweight and obese individuals seem over-represented in this cohort of COVID-19 patients admitted to the ICU. However, an association between body weight and poor outcome could not be detected in COVID-19 patients admitted to the ICU in Jessa Hospital.

7306

Clinical course and outcomes of critically ill patients with COVID-19 infection treated in the Intensive Care Unit of University Hospital of Split.

Stojanovic Stipic S.¹, Prizmic G.¹, Peris F.¹, Stipic T.¹

¹Department of Anaesthesiology and Intensive Care, University Hospital Split - Split (Croatia)

Background and Goal of Study: The global numbers of confirmed cases and deceased critically ill patients with COVID-19 are constantly increasing. However, the clinical course and the predictors of mortality in critically ill patients have not been fully elucidated. Since COVID-19 represents a challenge for patient management during ICU stay, data on clinical course and outcomes of intensive care patients are of paramount importance to reduce mortality. The goal of this study was to describe the clinical course and outcomes of ICU patients with laboratory-confirmed COVID-19 and to determine risk factors of 28-day mortality post-ICU admission.

Materials and Methods: The global numbers of confirmed cases and deceased critically ill patients with COVID-19 are constantly increasing. However, the clinical course and the predictors of mortality in critically ill patients have not been fully elucidated. Since COVID-19 represents a challenge for patient management during ICU stay, data on clinical course and outcomes of intensive care patients are of paramount importance to reduce mortality. The goal of this study was to describe the clinical course and outcomes of ICU patients with laboratory-confirmed COVID-19 and to determine risk factors of 28-day mortality post-ICU admission.

Results and Discussion: In this study, 55.56% of patients were men and 44.44% of patients were women. Survival of patients in the group of patients who had 2 comorbidities was 33.33%, while in the group of patients who did not have comorbidities it was 50% ($p=0.497$). Survival was 3.5-fold higher in patients who did not receive vasopressors compared with patients who did not receive them ($p=0.003$). Patients who developed acute renal failure as a complication were 1.1 times more likely to have a fatal outcome than patients who did not develop this complication ($p=0.824$). The mean value of the highest D-dimer was 9.93 mg / L higher in patients who died compared to the mean value in patients who survived ($p=0.234$).

Conclusion: Mortality was higher in patients receiving vasopressors, who had 2 or more comorbidities, who had high D-dimer values, as well as in patients who developed acute renal failure as a complication.

7309

Energy expenditure measured with indirect calorimetry during the post-ICU hospital stay.

Lepore D.¹, Fadeur M.¹, Lucania S.¹, Verbrugge A. M.¹, Misset B.¹, Rousseau A. F.¹

¹University Hospital of Liège - Liège (Belgium)

Background and Goal of Study: Nutritional support is fundamental for recovery after a critical illness. During the post-intensive care unit (ICU) hospital stay, energy targets have been suggested to be higher than during the ICU stay. However, no formal guidelines are available. This study aimed to measure energy expenditure (EE) of ICU survivors using indirect calorimetry (IC), and to compare measured EE (mEE) to predicted EE (pEE) and their energy intakes.

Materials and Methods: Adults who survived an ICU stay ≥ 7 d between 4/2 and 15/5/2021 were included if they were collaborative, weaned from oxygen supply, and not on isolation precautions. In the ward during the 7 days following ICU discharge, EE (considered as total EE) was measured using Q-NRG (Cosmed) in canopy mode. EE was predicted using the modified Penn State (PS) equation for spontaneously breathing patients[1]. Mean energy intakes over the 3 days before IC were quantified using the nursing chart. Data about demographics, ICU stay, and biological status at IC time were recorded. Actual, ideal and adjusted body weight were used in the formulas, according to BMI. Data are expressed as median (Q1-Q3) or percentages. Normally distributed data were compared using paired t-test. Performance of PS was compared to IC using Bland-Altman analysis.

Results: 30 patients (13 (43.3%) females, age 58 (51-65)y, BMI 27.2 (22.4-30.9)kg/m², SAPS II 32.5 (24.2-45.5)) survived an ICU stay of 10.5 (7-16)d with a mechanical ventilation of 8(5.5-13.5)d in 17/30 (56.7%) patients. IC was performed 5 (2-8)d after ICU discharge. At that time, 18/30 (60%), 6/30 (20%), 4/30 (13.3%) and 2 (6.7%) patients were on oral, enteral, combined oral and enteral, and parenteral nutrition, respectively. Mean intakes were 1875 (1488-2300) kcal/d. mEE was 1810 (1442-2126) kcal/d, corresponding to 23.8 (22.2-26.1) kcal/kg/d. No difference was observed between intakes and mEE ($p=0.28$), including in orally fed patients ($p=0.58$). pEE (1517 (1378-1679) kcal/d) was significantly lower than mEE ($p=0.002$), with a bias of -249.2 kcal or -13.2%. C-reactive protein was 34.5 (11.1-64.2)mg/L and prealbumine was 0.2 (0.18-0.27) mg/L, respectively higher than and into the normal.

Conclusion: During the first days of the post-ICU hospital stay, EE could be predicted using a weight-based equation reaching 23-24kcal/kg/d, but not using PS equation. In all patients, including orally fed patients, intakes reached the measured EE.

7311

Acylcarnitines profile in survivors of a prolonged ICU stay.

Schmitz S.¹, Boemer F.¹, Farrauto L.¹, Cavalier E.¹, Misset B.¹, Rousseau A. F.¹

¹University Hospital of Liège - Liège (Belgium)

Background and Goal of Study: A stay in intensive care unit (ICU) exposes patients to a risk of carnitine deficiency that could be supplemented if necessary. Moreover, acylated derivatives of carnitine (acylcarnitines, AC) are biomarkers for metabolic mitochondrial dysfunction, that has been linked to post-ICU disorders. This retrospective study aimed to describe the AC profile of survivors of a prolonged ICU stay.

Materials and Methods: Adults who survived an ICU stay ≥ 7 days between 10th September 2020 and 7th July 2021 were included if they were enrolled in our post- ICU follow-up program. In the ward during the first 7 days following ICU discharge, a visit is scheduled to detect symptoms of the post-intensive care syndrome and a blood analysis is performed focusing on nutritional and metabolic biomarkers. Measurement of AC profile was part of our standard analysis. Serum AC concentrations were determined by liquid chromatography with tandem mass spectrometry, and were compared to the reference values (RV) of 50 Belgian adults aged 18 to 81. Data about demographics and ICU stay were also recorded. Data are expressed as median (Q1-Q3) or percentages.

Results: 162 patients (65.4% males, age 67 (58.7-73)y, SAPS II 50.5 (32-72)) survived an ICU stay of 9.7 (7.1-19.3)d and were evaluated after 5 (3-8)d discharge. Only 1 was HIV positive. During ICU stay, 4 patients received valproate, 113/162 (69.6%) were sedated using propofol, and 23/162 (37.1) were fed by parenteral route during 7 (4-9)d. Compared to RV, AC profile of ICU survivors was significantly different, mostly in terms of short chain AC: the sum of C3, C4 and C5 derivates reached 1.36 (0.98-1.99) and 0.86 (0.66-0.99) $\mu\text{mol/l}$, respectively in survivors and RV ($p < 0.001$). On the contrary, carnitine (C0) concentration was similar to RV: respectively 46.06 (35.04-56.35) vs 43.64 (36.43-52.96) $\mu\text{mol/l}$ ($p = 0.55$). C0 concentration < percentile 2.5 of RV was observed in 6/162 (3.7%) survivors. Their total AC/C0 ratio was 0.33 (0.22-0.42). A ratio >0.4 was observed in 45/162 (27.8%) patients.

Conclusion: In our cohort of survivors of an ICU stay ≥ 7 days, carnitine deficiency was observed in < 5% of the patients. A different AC profile in term of short chain AC could be related to an increased catabolism of branched-chain amino-acids. Interestingly, abnormal AC/C0 ratio was observed in more than 25% of survivors, possibly representing disturbed mitochondrial metabolism.

7314

A case report on bilateral primary psoas abscess in a patient with long standing diabetes mellitus

Munasinghe M.¹, Subramaniam N.¹, Srisothinathan N.¹, Soysa L.¹, Hapuarachchi C.¹

¹DGH Mannar - Mannar (Sri Lanka)

Background: Bilateral psoas abscess due to methicillin resistant *Staphylococcus aureus* (MRSA) is quite rare [1]. Its indeterminate presentation may cause challenges in making early diagnosis. The following is our institutional experience.

Case Report: A 59-year-old male with long-standing poorly controlled diabetes mellitus presented with haemodynamic instability, elevated serum lactate and pain on hip flexion. Expedient assessment for a septic focus was carried out. Blood and urine cultures were negative. Ultrasound scan of the abdomen revealed bilateral psoas abscesses. Secondary psoas abscess was unlikely as he did not have genitourinary, intra-abdominal or adjacent skeletal foci of infection. Pus was aspirated under ultrasound guidance. MRSA was isolated from aspirate, following which the patient was started on intravenous broad-spectrum antibiotics. As pigtail catheters required for a continuous percutaneous drainage were not available, repeated aspiration of residual pus was carried out under ultrasound guidance. The Patient made a steady recovery with antibiotics and follow-up ultrasound scans.

Discussion: Primary psoas abscesses are predominantly seen among males and in patients with history of diabetes and immunosuppression [2]. Antibiotics and drainage of the abscess are the main modalities of treatment. Percutaneous drainage is preferred over surgical drainage, since it is less invasive [3]. The outcome has improved recently, yet depends on early diagnosis and prompt management. In this patient with bilateral primary psoas abscesses, early detection, drainage and antibiotics led to recovery.

References:

- Bakri, F.G., Hadidy, A.M., Hadidi, F. et al. Bilateral primary psoas abscesses due to methicillin-resistant *Staphylococcus aureus* in a neutropenic patient: a case report. *J Med Case Reports* 10, 12 (2016). <https://doi.org/10.1186/s13256-015-0781-7>
 - Mallick IH, Thoufeeq MH, Rajendran TP. Iliopsoas abscesses. *Postgrad Med J*. 2004;80:459–62.
 - Hsieh MS, Huang SC, Loh E-W, Tsai CA, Hung YY, Tsan YT, et al. Features and treatment modality of iliopsoas abscess and its outcome: a 6-year hospital-based study. *BMC Infect Dis*. 2013;13:578.
- Learning points:** Psoas abscess can be life threatening and easily missed. This warrants a higher degree of suspicion in high risk patients. Early identification, prompt evacuation and antibiotics are pillars of effective management.

7317

Accuracy of spot urine protein to creatinine ratio (SPCR) as an early predictor for acute kidney injury in severe preeclampsia

Essafti M.¹, Belmaati R.¹, Elarras S.¹, Rebahi H.¹, Eladib A. R.¹
¹chu Mohammed VI - Marrakech (Morocco)

Background: Preeclampsia is a pregnancy-specific disease that may lead to multiple organ dysfunctions and is a leading cause of maternal and perinatal mortality worldwide. Since most adverse outcomes arise in women with proteinuria, SPCR appears as a diagnostic criterion for severe preeclampsia due to its sensitivity to detect positive 24-hour proteinuria (1). Our aim is to assess the diagnostic accuracy of SPCR as an early predictor of acute kidney injury in severe preeclampsia

Methods: This is a single-center, retrospective, observational study from 01/01/2021 to 30/04/2021 including all patients with severe preeclampsia. Exclusion criteria were the presence of chronic kidney injury, auto-immune disease, pre-gestational diabetes, or chronic hypertension. The urinary sample was taken upon admission with a positivity threshold value of 30 mg/mmol. The primary endpoint was the onset of acute kidney injury defined by an increase in serum creatinine levels of at least twice its initial value in less than 48 hours or a serum creatinine value over 96 $\mu\text{mol} / \text{L}$ according to the ACOG guidelines (1).

Results and discussion: 88 parturients were included, of which 18.2% were complicated by eclampsia. SPCR was found positive in 82.9% of patients with an average value of 211 mg/mmol. The incidence of AKI was 15.9% with a 48 hours recovery in 64.81% of cases. A single case of persistent renal failure requiring the use of intermittent dialysis sessions was reported. SPCR values were higher in patients with AKI but weren't statistically significant ($p = 0.197$). Furthermore, the AUC of a generated receiver-operating characteristic (ROC) curve was mediocre at 0.703 which sets the SPCR of no value at predicting AKI. Screening of risk factors for AKI showed only one significant variable: the intake of diuretics (p -value=0.027, OR=6.34). Diuretics were used at low doses when symptoms of overload were observed, such as pulmonary edema. This result can be explained by the association between the presence of transitory oliguria and a probable deterioration in renal function that is not yet coupled with an increase in creatinine values as defined previously.

Conclusion: The SPCR value does not help predict the onset of AKI. Its contribution is limited to the detection of positive 24-hour proteinuria and as a diagnostic criterion of severe pre-eclampsia. 1)ACOG Practice Bulletin No. 202: Gestational Hypertension and Preeclampsia. *Obstet Gynecol*. Jan 2019

7325

Frequency of lactate monitoring as a prognostic utility in postcardiac ICU patients: a propensity matched analysis

Lokosek V.¹, Pelajic S.¹, Lijovic L.¹, Abgrall G.², Angelucci A.³, Galli A.⁴

¹UHC Sestre milosrdnice - Zagreb (Croatia), ²Hospital center Yves de Foll - Rennes (France), ³Polytechnic University of Milan - Milan (Italy), ⁴Papa Giovanni XXIII Hospital - Bergamo (Italy)

Background and Goal of Study: Serum lactate is a useful biomarker indicating various pathologic conditions like global tissue hypoperfusion, inadequate cell oxygen utilization or inadequate clearance. Reduction of elevated lactate level toward normal can serve as a surrogate for the reversal of underlying condition and response to therapy. While prognostic utility of serial lactate monitoring is well studied in septic patients, its value has not been specifically studied in postoperative cardiac ICU patients. The aims of this study were to compare outcomes of cardiac surgery patients with or without frequent serial lactate monitoring in the first 24 hours after admission to the ICU.

Materials and Methods: Data from AmsterdamUMCdb (N=23106) were used. Inclusion criteria were cardiac surgery patients with ≥ 1 lactate samples and length of stay (LOS) ≥ 24 h. Exclusion criteria were septic patients. Principal exposure was ≥ 4 vs. < 4 lactate measurements within 24 hours of admission. To adjust for disease severity, a propensity score matching with optimal match without replacement and 1:2 nearest neighbour method with logistic regression distance was used on

confounding variables available on the first day. Confounding variables were lactate on admission, mean arterial pressure, GCS, creatinine, thrombocytes, PaO₂, sex, vasopressor use and IV fluids used. The primary outcome was LOS. Secondary outcomes were 28-day mortality and resuscitative measures taken.

Results and Discussion: 1532 patients in database were eligible. After matching, there were 436 patients in <4 lactate samples group and 765 patients in ≥4 lactate samples group. In the matched cohort (covariate std.mean difference <0.1) there was a statistically significant difference in length of stay (mean of 4.15 vs 5.87 days, p=0.002) and dobutamine use (p=0.016) but not in 28-day mortality rate and vasopressor or electrolyte infusion use. In this ICU population, frequency of lactate sampling was linked to a reduced LOS which is in accordance with previous studies on other ICU populations. The other interventional outcomes did not have the same significance. Bias could be present due to confounding variables not taken in account in propensity matching.

Conclusion: In this propensity-matched retrospective cohort study on cardiac surgery patients in freely available AmsterdamUMCdb database LOS was affected by frequency of lactate sampling. Mortality and intervention outcomes were not affected.

7333

Re-expansion Pulmonary Oedema – an under reported and often missed complication. Can it be avoided?

Rosenheim Z.¹, Spiking J.¹

¹Kings College Hospital London - london (United Kingdom)

Background: Re-expansion pulmonary oedema (REPO) is a rare complication following drainage of a pleural effusion or pneumothorax, though it has also been described after removal of a mediastinal tumour and removal of large extrathoracic lesions¹.

Case Report: 76-year-old male presented with increasing dyspnoea one month post CABG. An initial ECG revealed a LBBB. An angiogram showed patent vasculature, however, an echocardiogram revealed a large left sided pleural effusion. A chest radiograph confirmed the effusion. A chest drain was inserted with >3.5L of blood-stained fluid rapidly drained. The patient immediately deteriorated, with worsening dyspnoea, tachycardia and hypotension and an SpO₂ of 85%. He was initiated on high flow oxygen. Diuresis was instigated with boluses of furosemide. Despite treatment, he continued to deteriorate with increasing oxygen requirements and worsening hypotension. He was transferred to ITU for vasopressors, invasive monitoring and HFNC. He responded well to treatment and after 48 hours was discharged to the ward for ongoing management.

Discussion: The reported incidence of symptomatic REPO is around 1 in 100. However, the incidence is likely to be higher. Risk factors include prolonged symptom duration, rapid lung expansion with drainage of large volumes and application of highly negative intrapleural pressures (>-20cmH₂O)². The pathophysiology is complex. Rapid re-expansion of a collapsed lung results in reversal of hypoxic vasoconstriction, initiating a proinflammatory process that leads to an increase in capillary permeability. When large volumes of air or fluid are removed, the intrapleural pressure becomes markedly more negative, reducing the pressure in the pulmonary interstitium. This creates an increased gradient for fluid movement across the alveolar-capillary barrier, resulting in REPO.

References:

1. Havrankova et al. Re-expansion pulmonary oedema – fatal complication of mediastinal tumour removal. *Cor et Vasa*. 2013. 55(6) 533-535.
2. Aujaieb A. Re-expansion pulmonary oedema in pneumothorax. *BMJ Case Reports* 2019
3. British Thoracic Society Pleural Disease Guideline 2010.¹, *Thorax*, 65(Supplement II), pp.61-74

Learning points: REPO is serious but potentially avoidable. This case demonstrates that recognition of the patient at high risk for REPO is key. Guidelines suggest limiting fluid removal to 1.5L³. Research is required into the use of intrapleural manometry to assess if routine use can reduce the rates of REPO.

7343

Demographics, Risk factors and Outcomes of Critically Ill COVID-19 patients requiring Continuous Renal Replacement Therapy: A National Cohort Study from Malta.

Tua C.¹, Vassallo D.¹, Sciberras S.¹, Buttigieg M.¹

¹Mater Dei Hospital Malta - Msida (Malta)

Background: COVID-19 is predominantly a respiratory disorder, however a number of critically ill COVID-19 patients develop Acute Kidney Injury (AKI) requiring Continuous Renal Replacement Therapy (CRRT). The objectives of this study are to describe the demographics, risk factors and outcomes of COVID-19 patients requiring CRRT in the Intensive Care Unit (ICU) at Mater Dei Hospital, Malta.

Methods: This is an observational prospective study of patients admitted to Mater Dei Hospital ICU with COVID-19.

Results: 252 patients were admitted to ICU with COVID-19 from March 2020 to May 2021. 248 patients were included due to incomplete data in 5 patients. Four patients had End Stage Kidney Disease requiring renal replacement therapy (RRT) prior to admission and were omitted from data analysis. 58 patients (24%) required CRRT during their stay in ICU. Compared to patients not requiring CRRT, patients requiring CRRT were significantly more likely to be male (84% vs 70%, p= 0.04), have pre-existing CKD (24% vs 3%, p<0.001), have a higher median creatinine on ICU admission (133µmol/L [94 – 223] vs 75 µmol/L [61 – 93], p<0.001) and have a higher SOFA score (SOFA: 3.5[2-4], vs 2[2 – 3], p<0.001). Patients requiring CRRT were also more likely to be mechanically ventilated during their stay (95% vs 59%, p<0.001). There was no significant association between CRRT and increasing age and the presence of comorbidities such as hypertension, diabetes, ischemic heart disease and immunosuppression. CRRT was started after a median of 4 days and was continued for a median duration of 6 days. CRRT was strongly associated with increased 28-day mortality, (64% vs 25%, p<0.001). The 28-day mortality of patients requiring both CRRT and mechanical ventilation was 67% compared to 36% for patients requiring only mechanical ventilation. 20 patients (34%) of those requiring CRRT were discharged from ICU, 17 of these were discharged from hospital while 3 died during hospital admission. None of the patients discharged from hospital required ongoing renal replacement therapy (RRT).

Conclusion: This observational study represents all COVID-19 ICU admissions that occurred in Malta from March 2020 to May 2021 in the single institution caring for these patients in the country. We demonstrated a 24% incidence in the use of CRRT with an associated 64% 28-day mortality. 34% of patients requiring CRRT were discharged from hospital, with none requiring ongoing RRT.

7411

Feasibility and safety of in-bed cycling in early physiotherapy of severe TBI patients admitted to intensive care unit.

Nardai G.¹, Hováth N.¹, Suba K.¹¹Pétery Hospital and National Trauma Centre - Budapest (Hungary)

Background and Goal of Study: Physiotherapeutic interventions implemented in the early phase of intensive care are capable to decrease number of complications as pressure ulcers, muscle wasting, respiratory and bowel problems. Comatose traumatic brain injury (TBI) patients have an increased risk for these complications however a cautious physiotherapeutic approach is experienced because of the risk of intracranial hypertension provoked by positioning and movement. Aim of our work was to register the applicability and safety of lower limb physiotherapy (in-bed cycling) and changes of intracranial pressure, hemodynamic and oxygenation parameters in severe TBI patients during exercise.

Materials and Methods: In a single centre, prospective, observational pilot study adult, ventilated, comatose (GCS <9), TBI patients with ICP monitoring were enrolled after stabilisation. Demographic and injury parameters were described. Basic parameters as ICP, CPP, MAP, heart rate, SpO₂, pCO₂ were registered before, during and after the interventions. Physiotherapy was performed by a programmable, electronic in-bed cycle (minimum 30 minutes). Adverse events, interruption of the intervention were also detected. Datasets were described as median (min-max), statistical analysis was performed by Mann-Whitney U test (p<0,05).

Results and Discussion: Eight patients with 16 interventions were analysed (6 male, age: 43, GCS at admission: 4). All patients had focal brain injuries (subdural haematoma, intraparenchymal contusions), half of them suffered additional extracranial injuries (not lower limb). Intervention was introduced at day 3 (admission: day 1). Application and exercising with in-bed cycle was feasible in selected patients. Only one treatment was interrupted because of ICP elevation (after interruption ICP normalised spontaneously). In other cases, there were no relevant changes in parameters measured in the peri-interventional period and treatments were safe.

Conclusion: Preliminary results of this pilot study showed that lower limb physiotherapy with electronic in-bed cycle is possible and seems safe in majority of severe TBI patients under extended monitoring in the early phase of intensive care management.

7453

Assessing the accessibility of patient transfer information from an electronic system at a regional burns intensive care unit

Wong G.¹, Holdstock-Brown B.¹, Lloyd J.¹, Neves J.¹, Emamdee R.¹, Van Wyk C.¹¹Mid Essex Hospitals Nhs Trust, Broomfield - Chelmsford (United Kingdom)

Background and Goal of Study: Large burns are managed in tertiary centres due to the need for specialised care. Transfer time exceeding two hours from base hospital to our specialist unit is not uncommon. Anecdotally, patients can arrive under-resuscitated and hypothermic, which impacts on early burn wound management. We use Metavision® electronic recording system for all inpatient multidisciplinary documentation. Metavision® is also a useful audit and data collection tool but is only as good as data input. We surmised that sometimes data were not conveniently accessible due to lack of transcribing of paper data into Metavision. This study investigated the availability on Metavision® of clinically relevant data from pre-admission and admission narrative text.

Materials and Methods: The electronic records of all adult resuscitation burns (>20%) admitted for 12 months from August 2020 were analysed. Paediatric cases & skin loss syndromes were excluded. Data collected included the accessibility of narrative notes on logistic variables (times of burn, referral, departure from base hospital and arrival to our unit) and key physiological variables (pre-transfer and admission temperatures, presence of appropriate lines, fluid resuscitation).

Results and Discussion: A total of 32 patients were included for analysis. Questions with specific prompts (base hospital and arrival time; time and date of burn) were well documented (32 and 31 cases respectively). Factors without specific prompts were less well documented. Only two cases noted a referral time. No patient had departure times & temperatures recorded. Temperature on arrival was stated in 21 cases. Volume of fluid therapy was documented in 31 patients. However, in 13 cases, it was unclear whether the Parkland resuscitation formula was correctly followed. The presence of preadmission arterial and central venous lines was not mentioned in 13 and 10 cases respectively. One case was unclear as to intubation time (pre or post arrival).

Conclusions: This study demonstrates improvement in our electronic documentation (especially of preadmission notes) is necessary. If electronic records are unavailable, then the reliance on paper records is unpredictable, as these may be misplaced or not rapidly accessible. One solution is the inclusion of more specific prompts on Metavision®, with the goals of eliminating causes of transfer delay and optimisation of physiological variables, beginning at the time of referral.

7459

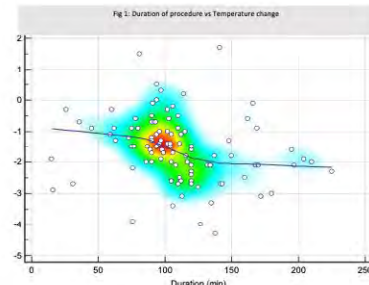
Heat Loss During Sedated Wound Management Procedures in Burn Injuries

Jandu A.¹, Emamdee R.¹, Jayasekera D.¹, Van Wyk C.¹, Oakey S.¹, Arawwawala D.¹¹Mid Essex Hospitals Nhs Trust, Broomfield - Broomfield (United Kingdom)

Background and Goal of Study: Introduction: Significant burn injuries result in an increased risk of hypothermia from evaporation, radiation, convection, and conduction. Ongoing wound care require regular wound toileting and change of dressings (COD) to reduce infections and aid wound healing. Heat loss is inevitable with detrimental impacts on homeostatic functions. Aims: To assess heat loss during wound care procedures (CODs and showers) for critically ill burn patients with >20% total burn surface area.

Materials and Methods: With hospital audit committee approval, data were gathered retrospectively over three months from 1/5/21 from our electronic patient record system. Data included: patient demographics, procedure duration, patient temperature pre- and post-procedure, room temperature and shower water temperature (if applicable.) A negative change in temperature was taken as an indirect measurement of heat loss.

Results and Discussion: Six patients fulfilled inclusion criteria, with a combined total of 101 wound care procedures. Key findings were a mean temperature change of 1.6°C (CI -1.8 to -1.4); a median procedure duration of 105 min (CI 98.17 to 111 min) and a mean room temperature of 25°C. A local regression plot demonstrated a visual temperature drop at circa 100 min. (Fig 1).



Further subgroup analysis (≤ 100 and > 100 min) identified a statistically significant difference in mean temperature change: -1.2°C and -1.9°C respectively; $p = .0008$. Heat loss appears to increase at a clear time point. It is dependent on multiple mechanisms but sound peri-procedural practices can minimise the impact. Initially, sedation with anaesthetic agents leads to heat redistribution. A patient's room warmed to 25°C and low flow environments can reduce convection. Cutaneous warming with forced air warmers, wound dressings and warm water lessen heat loss by conduction and evaporation.

Conclusion: We recommend minimising initial patient heat loss by active patient warming, increasing ambient room temperature and keeping wound procedure duration below 100 min.

7469

Anaesthetic conserving device AnaConDa® used for hypertension control in critical care of burned patient

Silva A.¹, Cunha Y.², Marques M.², Tourais I.²

¹Centro Hospitalar Universitário de São João - Porto (Portugal), ²Centro Hospitalar Universitário de Coimbra - Coimbra (Portugal)

Background:Critically ill patients undergoing mechanical ventilation as a component of their burn management require adequate sedoanalgesia¹. A device, called AnaConDa Anesthetic Conserving Device), allows sedation with sevoflurane in UCI². We report, for the first time, the use of this device as an adjunct to sedation and hypertension control in a burned patient.

Case Report:An 80-year-old man with a history of uncontrolled hypertension was admitted to our Burn Center, after an explosion at home. Altogether 16% TBSA was burned by flame (with 2nd-3rd degree injuries) with airway injury. During hospitalization he underwent several skin graft procedures, and kept ventilated and sedated. Initially, sedoanalgesia was maintained with propofol and fentanyl and changed to midazolam, dexmedetomidine and fentanyl because his hypertension. However, his hemodynamic profile kept strongly hypertensive and labetalol was added. Adjuvant medication included perfusion of isosorbide dinitrate, remifentanyl rather fentanyl and esmolol rather labetalol, were added progressively with relatively low efficacy. For his last skin graft procedure a general balanced anesthesia with sevoflurane was used, instead of TIVA as before. Along this, his hypertension was normalized without adjuvant medication. As result, sedation was maintained by continuous sevoflurane inhalation through the AnaConDa® device in UCI. This approach allowed a good tensional control and suspension of all hypotensive medication after 48h.

Discussion:The volatile anesthetic agent, sevoflurane, is used widely in anesthesia practice[3]. Its blood pressure-lowering effect is well known. Our case report reveals the potential of sevoflurane, through AnaConDa® device, as a sedative and hypotensive drug to treat resistant hypertension

References:

1. JUNG, C., et al. Use of sevoflurane sedation by the AnaConDa® device as an adjunct to extubation in a pediatric burn patient. *Burns*, 2008, 34.1: 136-138
2. MISRA, Satyajeet; KOSHY, Thomas. A review of the practice of sedation with inhalational anaesthetics in the intensive care unit with the AnaConDa® device. *Indian journal of anaesthesia*, 2012, 56.6: 518
3. JERATH, Angela, et al. Volatile anesthetics. Is a new player emerging in critical care sedation?. *American journal of respiratory and critical care medicine*, 2016, 193.11: 1202-1212

Learning points: AnaConDa device as a safety and simple form of inhalation sedation and effect of sevoflurane-induced hypotension.

7485

Diary of COVID-19 patient with Guillain-Barre Syndrome- ICU Christmas miracle

Stojanovic Stipic S.¹, Peris F.¹, Carev M.¹, Frankic M.¹, Stipic T.¹

¹Department of Anaesthesiology and Intensive Care, University Hospital Split - Split (Croatia)

Background:Exponential numbers of GBS cases have been reported during the COVID-19 pandemic suggesting a pathophysiologic link between COVID-19 and GBS.

Case Report:61-year-old male without comorbidities, previously in excellent shape, presented 11 days after overcoming mild case of COVID-19 infection. He was admitted with signs of tetraparesis and tetraplegia, where treatment with plasmapheresis was initiated and then stopped due to increasing inflammatory parameters and the development of pneumonia. During the stay, the patient was dependent on mechanical ventilation, treated several times for bacteremia and sepsis with broad-spectrum antibiotics. He underwent a percutaneous tracheotomy (day 7) and PEG (day 10). From December, 24., the patient was in contact. Communication using facial expressions and bed- side physical therapy were started. On December 31. partly spontaneous respirations were noticed. The patient understood and communicated with his lips (deliberately forming words) with emotionally reacting and fully following the flow of the interlocutor's speech. He frowned and raised the forehead (right side weaker), with significantly less pronounced component of right-sided peripheral facioparesis, compared to before. Tactile sensation was satisfying. The patient began localizing the touch. Limb EMNG showed severe sensorimotor axonal-demyelinating polyneuropathy. On January 31., after numerous attempts, the patient was weaned from the mechanical ventilator. On the same day, the fleximetal cannula with cuff was replaced with a plastic cannula without cuff. After placing the phonation extension on cannula, the patient began to speak. The motor progress of the patient was visible on a daily basis, and he was transferred to the Department of Physical Medicine in order to intensify physical therapy and training after 61 days spent in the ICU. A month after his discharge from the ICU, with help, the patient is walking on his own.

Discussion:GBS is an antibody- mediated disease of the peripheral nerves that can be potentially life- threatening. Ongoing research shows that SARS-COV-2 activates leukocytes releasing a high level of cytokines, further activating the inflammatory cascade and causing extensive tissue damage with multiple organ dysfunction.

Learning points: We hope that highlighting the increasing number of cases of GBS brings attention to this potential complication in the wake of the COVID-19 pandemic.

7496

Use of Sedatives and Neuromuscular-Blocking agents in Mechanically Ventilated patients with COVID-19 ARDS

Ego A.¹, Diosdado A.², Peluso L.³, Taccone F. S.³, Gorham J.³

¹Erasme Hôpital - Brussels (Belgium), ²Hospital del Mar - Barcelona (Spain), ³Erasme Hôpital. - Brussels (Belgium)

Background and Goal of Study:Early use of analgesic drugs and minimal sedation regimens are recommended for the management of patients suffering from acute respiratory distress syndrome (ARDS), which should favor awakening and early rehabilitation and reduce the risk of delirium and prolonged ventilation (1). However, this approach might not be applied to severe ARDS patients, who might show symptoms of discomfort or ventilator asynchrony and therefore received deep sedation and/or paralysis. Patients with COVID-19 ARDS have shown to require high sedation regimens; however, whether COVID-19 ARDS patients receive different sedation strategies than non-COVID ARDS patients remains poorly described. The aim of this study is to compare sedatives and neuromuscular-blocking agents (NMBA) requirements in these two ARDS patients' populations.

Materials and Methods:Retrospective observational cohort study, single-center tertiary Intensive Care Unit. COVID-19 patients with ARDS (March-May 2020) and non-COVID ARDS patients (2017-2020) on

mechanical ventilated and receiving sedation for at least 48 hours.

Results and Discussion: A total of 39 patients met the inclusion criteria in each group, with similar demographics at baseline. COVID-19 patients had a longer duration of MV (median 22 [IQRs 16-29] vs. 9 [6-18] days; $p < 0.01$), of sedatives administration (18 [11-22] vs. 5 [4-9] days; $p < 0.01$) and NMBA therapy (12 [9-16] vs. 3 [2-7] days; $p < 0.01$). During the first 7 days of sedation, compared to non-COVID patients, COVID patients received more frequently multiple combination of sedatives drugs (76.9% vs. 28.2%; $p < 0.01$) and a higher NMBA regimen (cisatracurium: 3.0 [2.1-3.7] vs. 1.3 [0.9-1.9] mg/kg/day; $p < 0.01$). Figure 1

Conclusion(s): The duration and consumption of sedatives and NMBA was significantly increased in patients with COVID-19 related ARDS than in non-COVID ARDS. Different sedation strategies and protocols might be needed in COVID-19 patients with ARDS, with potential implications on long-term complications and drugs availability.

7513

Platelet trends associated with mortality in patients admitted to the Intensive Care Unit with COVID-19: a retrospective single-centre study

Shah R.¹, Mackenzie C.², Varghese T.²

¹Luton and Dunstable University Hospitals NHS Trust - Luton (United Kingdom), ²University College London - London (United Kingdom)

Background and Goal of Study: Platelets have many functions including roles in both haemostasis and immunomodulation, with studies having identified both low and raised platelet counts in patients with severe viral and bacterial infections. Furthermore, platelet counts are readily available and requested frequently for inpatients. We set out to explore the relation between platelet trends and mortality in patients admitted to the intensive care unit (ICU) with Covid-19.

Materials and Methods: We collected data retrospectively from medical records of all patients admitted to ICU with Covid-19 pneumonitis between March 2020 and April 2021 at our local hospital (n = 244). Patients with repeat admissions were excluded. The dataset was sorted into survivors and non-survivors. Platelet trends and length of admission was analysed for both groups. Platelet counts are given in $\times 10^9/L$ units.

Results and Discussion: 148 patients survived to be discharged from ICU, 96 died in ICU. Average age was 59 years and 62.7% were male. During ICU stay, the median change in platelets was 67 for those who survived and -2 in those who did not survive. 74.3% ($p < 0.01$) of survivors had an increase in platelets during ICU admission vs 45.8% in non-survivors. The mean percentage increase in platelets was 40.6% ($p > 0.05$) for survivors and 22.6% ($p > 0.05$) for non-survivors. 90% of survivors vs 83% of non survivors were admitted to ICU in less than 7 days from admission, mean time prior to admission was 1.17 ± 3.05 ($p < 0.05$) vs 1.24 ± 3.23 ($p < 0.05$) days. Mean length of stay in ICU before peak platelet count was similar in both groups. Median platelet count at admission to ICU was lower in non-survivors than survivors (218.5 vs 246) and also at discharge (236 vs 320). These results together indicate an upwards trend in platelets is associated with reduced mortality.

Conclusion: Our sample size was not large enough to be able to produce statistically significant results. Whilst it appears that lower platelet counts and downward trending platelet counts are associated with increased mortality, a larger multi-centre cohort study is required to further investigate this outcome, with selection of patients who are admitted to hospital with Covid-19 pneumonitis as the primary diagnosis.

Acknowledgements: Dr Venkat Prasad

7519

Viral coinfections and viral reactivations in critically ill COVID-19 patients

Maqueda B.¹, Bentoumi K.¹, Cudia A.¹, Foulon P.¹, Kaefer K.¹, De Backer D.¹

¹CHIREC Delta - Auderghem (Belgium)

Background and Goal of Study: COVID-19 has been shown to modulate the immune host response. Viral coinfection or reactivation was reported at variable incidence in a few studies including a limited number of COVID-19 ICU patients (1, 2). We evaluated in a large COVID ICU the incidence of viral co-infections and reactivations in critically ill COVID-19 patients.

Materials and Methods: This retrospective cohort study included all consecutive critically ill patients with COVID-19 admitted between February 2020 and June 2021 in our Intensive Care Department.

Viral infection/reactivation was identified as a positive multiplex PCR on broncho-alveolar lavage (BAL). Blood viral PCR and viral serologies were performed on demand. Patients were separated into early and delayed (<7 or ≥ 7 days of ICU admission, respectively). As non-intubated patients may be less frequently submitted to full viral/aspergillus sampling (BAL was performed once the patient was intubated and repeated every 7-14 days according to clinical evolution), we focused on intubated patients. Data are presented as n (%) and compared with Fischer exact test.

Results and Discussion: 269 patients were included, among these 169 were ventilated. Viral infection/reactivation was observed in 65 patients (38%). Viral reactivation/infection occurred less frequently at early stage (n=13; 8%) than at later stage (n=55; 33%) ($p < 0.05$). Among the virus observed, cytomegalovirus, and herpes virus (HSV 1 and 2 and HHV6) were the commonest both at early and later stages (CMV early n=3 vs CMV late n=25; herpes early n=9 vs herpes late n=48, some patients presenting multiple infections).

Conclusion: Viral infection/reactivation frequently occurs in COVID patients requiring MV. Viral reactivation/infection mostly occurred at a delayed stage (>7 days after ICU admission). Herpes and CMV were the most frequent viruses.

References:

1. Le Balc'h P, Pinceaux K, Pronier C, Seguin P, Tadié JM, Reizine F. Herpes simplex virus and cytomegalovirus reactivations among severe COVID-19 patients. *Crit Care*. 2020;24(1):530.
2. Contou D, Claudinon A, Pajot O, Micaëlo M, Longuet Flandre P, Dubert M, et al. Bacterial and viral co-infections in patients with severe SARS-CoV-2 pneumonia admitted to a French ICU. *Annals of intensive care*. 2020;10(1):119.

7526

Pericardial effusion and Hypoalbuminemia in mechanically ventilated patients: The unbreakable bond

Stojanovic Stipic S.¹, Becic T.², Peris F.¹, Frankic M.¹, Stipic T.¹

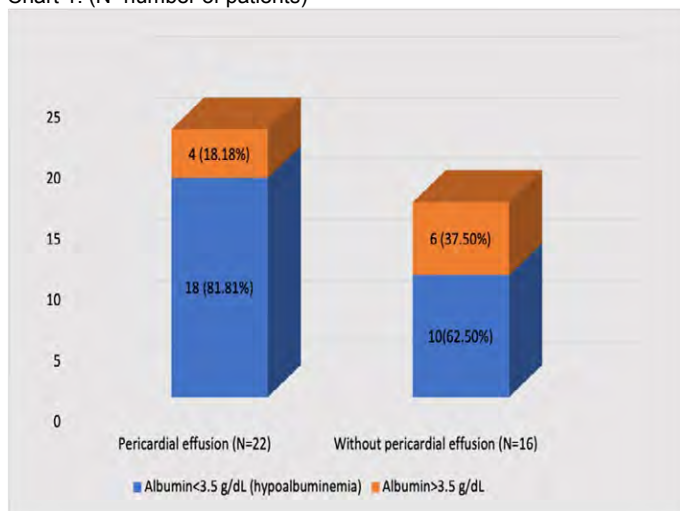
¹Department of Anaesthesiology and Intensive Care, University Hospital Split - Split (Croatia), ²Department of Cardiology, University Hospital Split - Split (Croatia)

Background and Goal of Study: A pericardial effusion refers to the accumulation of excess fluid in the pericardial sac surrounding the heart. Large and rapidly accumulating effusions may result in potentially life-threatening cardiac tamponade. Diagnosing is critical for optimal patient care. The focus was only on cardiac tamponade as a life threatening condition associated with poor prognosis and high mortality. The objectives of the study were to examine connection between the levels of albumins with development of pericardial effusion in patients in ICU.

Materials and Methods: The research was conducted in the Intensive care unit, University Hospital of Split. 38 mechanically ventilated patients of various comorbidities, predominantly in states of sepsis and states following cardiocirculatory procedures, whose blood albumin levels were monitored were included in the study. All patients were evaluated with a heart ultrasound scan in the period between May 15th and June 17th, which correlated the parameters of albumin with the occurrence of pericardial effusion. Hypoalbuminemia was defined as serum albumin concentration <3.5g/dL, based on prior studies.

Results and Discussion: Conducting the research in the mentioned period, the occurrence of a localised pericardial effusion of a diameter up to 15 mm by the right ventricular wall was noticed in 22 patients. The effusion is predominantly fibrinous, stationary, and independent of the underlying condition that led to hospitalisation. A reduced level of albumin was observed in the blood of 18 (81.8%) patients with pericardial effusion. In comparison, reduced levels of albumin was observed in 10 (62.5%) patients without pericardial effusion. Although statistically not significant, patients with hypoalbuminemia were more likely to have pericardial effusion (81.8% vs 62.5%).

Chart 1. (N=number of patients)



Conclusion: Pericardial effusion is present in intensive care units. It most often occurs as a result of reduced albumin levels, and it is generally stationary and of fibrine content. The main causes of keeping the effusion stationary are adequate albumin compensation and regulation of the electrolytic disbalance.

7573

Comparison of norepinephrine and terlipressin versus norepinephrine alone for management of septic shock: a randomised control study

Sahoo P.¹, Kothari N.¹, Goyal S.¹, Sharma A.¹, Bhatia P.¹

¹All India institute of medical sciences, Jodhpur - Jodhpur (India)

Background and Goal of Study: Terlipressin (triacetyl-lysine vasopressin), a long acting synthetic analogue of vasopressin, exerts higher selectivity for V1 receptor and produces potent vasoconstriction of blood vessels without causing damaging adverse effects of vasopressin. There lies potential in starting a low dose continuous infusion of terlipressin early in the management of septic shock along with norepinephrine in order to attain a better organ perfusion and mean arterial pressure without having to significantly increase either of their doses thus avoiding their side effects. Hypothesis: Use of terlipressin reduces the requirement of norepinephrine to achieve target MAP and subsequently improves organ perfusion. Primary objective: To study the dose of Norepinephrine required to achieve target MAP(65-70mm of Hg) after 12 hours of starting the vasopressors.

Materials and Methods: In this prospective, randomised control trial, 50 adult patients with septic shock were randomised into two groups. Group 1 received a combination of injection terlipressin 0.02 mcg/kg/min (fixed dose) infusion and injection noradrenaline 0.01 mcg/kg/min infusion and Group 2 received injection noradrenaline 0.01 mcg/kg/min infusion alone. Both the groups were targeted to achieve a mean arterial pressure of 65-70 mm of Hg. The data collected were the dose of noradrenaline required to achieve the target MAP, urine output, serum lactate, procalcitonin, C-Reactive Protein, SOFA score, total duration of vasopressor support and incidences of adverse effects.

Results and Discussion: The noradrenaline dose in group 1 versus group 2 at 12 hours was found to be 0.141 ± 0.067 vs 0.374 ± 0.096 mcg/kg/min ($p < 0.005$). The serum lactate was lower, and urine output was higher in group 1 than group 2 ($p < 0.05$). The blood lactate concentration was significantly lower in group 1 than group 2 ($p < 0.05$). The urine output of the patients in group 1 was significantly higher than group 2 ($p < 0.05$). Group 1 had a significantly greater reduction in SOFA score in 12 hours than group 2. There was a significant decrease in the duration of vasopressor administration amongst the patients being discharged from the ICU in group 1 versus group 2. However, there was no difference in the mortality between the two groups during their ICU stay.

Conclusion: A low dose continuous infusion of Terlipressin and Norepinephrine could help attain early resuscitation goals for managing patients with septic shock.

7600

Identification of mineralocorticoid and glucocorticoid receptors as potential targets to regulate parasympathetic, sympathetic and sensory neurons within rat intracardiac ganglia

Dehé L.¹, Shaqura M.², Mousa S.², Schäfer M.², Treskatsch S.²
¹Charité - Universitätsmedizin Berlin - Berlin (Germany), ²Charité - Berlin (Germany)

Background and Goal of Study: Recent interest has focused on the steroid-mediated regulation of heart performance; however, specific allocation of glucocorticoid (GR)- and mineralocorticoid receptors (MR) to the parasympathetic, sympathetic and sensory innervations of the heart is scarce. Therefore, the present study aimed to characterize such specific target sites for aldosterone and/or cortisol in intracardiac ganglia which act as a complex network for the integration of the heart's neuronal in- and output.

Materials and Methods: Following IRB approval, tissue samples from Wistar rat heart atria were subjected to real-time polymerase chain reaction (RT-PCR), Western blot, and double immunofluorescence confocal analysis of GR, MR, aldosterone and its processing enzyme CYP11B2 for co-localization with the neuronal markers vesicular acetylcholine transporter (VAcHT), tyrosine hydroxylase (TH), calcitonin gene-related peptide (CGRP) and substance P (SP).

Results and Discussion: Our results demonstrated MR and GR specific mRNA and receptor protein in rat heart atria. Double immunofluorescence confocal microscopy revealed that aldosterone and its processing enzyme CYP11B2 predominantly localized in MR-IR peripheral neurons of cardiac ganglia. Moreover, MR and GR immunoreactivity were colocalized with VAcHT in large diameter parasympathetic principal neurons, with TH-immunoreactive small intensely fluorescent (SIF) cells and on nearby TH-IR varicose terminals. In addition, MR and GR immunoreactivity were scarcely identified on CGRP- and SP-IR sensory neurons throughout intracardiac ganglia and atrial myocardium.

Conclusion: Our findings show that MR and GR are expressed as mRNA and translated into specific receptor proteins in cardiac parasympathetic, sympathetic and sensory neurons as potential binding sites for corticosteroids. Thus, they may well play a role within the complex network for the integration of the heart's neuronal in- and output.

7632

The burden of diabetes in critically ill COVID-19 patients: a national cohort study from Malta.

Vassallo D.¹, Tua C.¹, Sciberras S.¹, Buttigieg M.¹
¹Mater Dei Hospital - Msida (Malta)

Background: Diabetes Mellitus (DM) has emerged as a risk factor for hospitalization, critical illness and mortality in COVID-19 infection. 10% of all 20-79 year olds in Malta suffer from diabetes, this places Malta in the first quartile within the European region. The aim of this study is to describe the incidence, demographics, and outcomes of COVID-19 patients with DM admitted to the intensive care unit (ICU) at Mater Dei Hospital, Malta.

Methods: This is an observational prospective study of patients admitted to the intensive care unit at Mater Dei Hospital, Malta with COVID-19.

Results: 252 patients were admitted to ICU with COVID-19 from March 2020 to May 2021. 248 patients were included due to incomplete data. 93 patients (38%) were known to have a diagnosis of DM, of these 77 (83%) were non-insulin dependent and 16 (17%) were insulin-dependent. There was no significant difference in the distribution of age (68[61-72] vs 67[60-73.5 p=0.96], male gender (76% vs 73% p=0.65) or BMI>35 (17% vs 14% p=0.75) for diabetic and non-diabetic patients groups respectively. However compared to patients that were not diabetic, diabetic patients were significantly more likely to have comorbidities such as chronic kidney disease (16% vs 5% p=0.006), ischemic heart disease (28% vs 21% p=0.007) and hypertension (72% vs 53% p=0.003). While rates of intubation were similar across both groups (57% vs 54% p=0.252) there was a non statistically significant trend towards increased 28-day mortality in the diabetic group (42% vs 30% p=0.054) (fig 1).

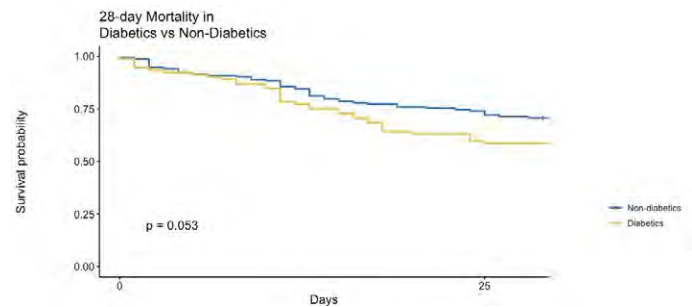


Figure 1. Kaplan Meier curve showing survival probability in diabetic and non-diabetic patients. An HbA1c result in the year preceding admission was available in 80% of diabetic patients, the mean HbA1c was found to be 8.1%. HbA1c levels were not related to 28-day mortality.

Conclusion: This study represents all patients admitted to ICU in Malta from March 2020 to May 2021. We demonstrated that 37% of the COVID-19 ICU population in Malta had a history of DM and that diabetic patients tended to have more comorbidities and a non statistically significant trend towards increased 28-day mortality.

7659

Pancycle aortic incompetence and total pulsus alternans – a dreaded clinico-echocardiographic duet

Devarakonda B.¹, Gopalakrishnan A.², Dharan B. S.², Subramanian S.²
¹Armed Forces Medical College - Pune (India), ²Sree Chitra Tirunal Institute for Medical Sciences & Technology - Trivandrum (India)

Background: Pulsus alternans is a bedside clinical sign of alternating pulse volume with each heartbeat. We describe an interesting case where this clinical sign was demonstrated in postoperative setting after cardiac surgery.

Case Report: A 12-year-old boy presented with bicuspid aortic valve, severe AR and dilated dysfunctional left ventricle. He underwent aortic valve replacement with a mechanical heart valve prosthesis (tilting disc). He was gradually weaned off Milrinone and Noradrenaline in the intensive care over 48 hours. While the blood pressures seemed to remain stable, an alert of bradycardia was started on the pulse while the monitor recorded a heart rate of 100/min. The radial pulse rate was 50/min, regular with normal volume, consistent with peripheral plethysmography. The patient remained in normal atrioventricular conduction. Echocardiography showed severe LV dysfunction with an EF 24% with normal aortic prosthetic valve function with mild intravalvar regurgitation. Abdominal aortic Doppler suggested total alternans with forward flow only in every alternate beat. Doppler interrogation of the aortic valve confirmed total alternans. In the absence of forward flow in every second beat, pancycle aortic incompetence was documented. With Levosimendan and Digoxin, the missing beats reappeared over 24 hours with classical pulsus alternans. He was later instituted on Enalapril, Spironolactone and Metoprolol and is doing well at 12 months' follow up with an EF 48%.

Discussion: Left ventricular dysfunction, large pericardial effusion and severe asthma constitute aetiology of pulsus alternans. This clinical sign was initially described as a clinically demonstrable alternating pulse volume. However, in today's era of pervasive monitoring, this sign has been demonstrated in invasive arterial pressure tracing plethysmography tracing and alternating velocity time integral of pulse wave doppler evaluation of left ventricular outflow tract by echocardiography.

References:

1. Nair KKM, Gopalakrishnan A, Inamdar SA, Ganapathi S, Sivadasanpillai H, Sivasubramanian S, et al. Image of the month: Alternating bifid pulse – a novel manifestation of low cardiac output states. *Clinical Medicine*. 2016 Jun 1;16(3):297–8

2. Saura D, González J, de la Morena G, Valdés-Chávarri M. Systolic aortic regurgitation. *Eur J Echocardiogr*. 2008 Mar 1;9(2):284–5

Learning points: Pulsus alternans can be utilised to gauge the response to Heart failure therapy at bedside.

7667

A case report: Acute Renal Failure in patient undergoing off-pump coronary artery bypass grafting, secondary to *Cryptococcal laurentii* infection

Sachde D. J.¹ adult Cab¹I.N.Mehta Institute of Cardiology and Research Centre - Ahmedabad (India)

Background: fungal infection is 2nd common cause of infection in developing country like India. It's not only develop in immunocompromized patients, but also occur in immunocompetent patients. Usually it involves blood, respiratory or urinary tract infection. sometime, symptoms due to other sites of extra pulmonary involvement (particularly in immunocompromised)-eg, meningoencephalitis/brain abscess, skin lesions, kidneys, liver, muscles etc.- systemic sepsis affecting blood and bone marrow.

Case Report: A case of 58 year old male pt., known case of diabetes since last 5 years, post beating coronary artery bypass grafting. His intra operative course was uneventful and was shifted to postoperative ICU with stable hemodynamics without any ionotrope. Patient was extubated within 6 hours of surgery. Patient was then shifted to SICU on 2nd post op day. On 3rd POD, patient developed oliguria and a rise in renal markers. He rapidly progressed to anuria on 4th POD, which was associated with rise in serum potassium levels with metabolic acidosis and further deterioration of renal function, for which he eventually required Hemodialysis. All cultures were sent, which after 2 days grows heavy growth of candida other than albicans-cryptococcal laurentii in bronchoscopic lavage sample. Chest X-ray showed mild to moderate effusion with collapse/consolidation of basal parts. For that antifungal drug started as per sensitivity. Patient's condition improved within next 5 days and discharged after 23 days.

Discussion: In patient with fungal pulmonary infection, hematogenous dissemination of fungal infection leading to systemic mycosis tends to occur chiefly in immunocompromised patients. Symptoms due to other sites of extra pulmonary involvement (particularly in immunocompromised)-eg, meningoencephalitis/brain abscess, skin lesions, kidneys, liver, muscles etc.- systemic sepsis affecting blood and bone marrow. (Roger Henderson: 2016).

Critical Emergency Medicine Trauma and Resuscitation

6467

Relative risks of death associated with fluid resuscitation regime in the first 24 hours after burn

Belba M.¹, Naco M.¹, Aleksi A.¹, Nezha I.¹, Belba G.¹¹University Hospital Center "Mother Teresa" Tirana Albania - Tirana (Albania)

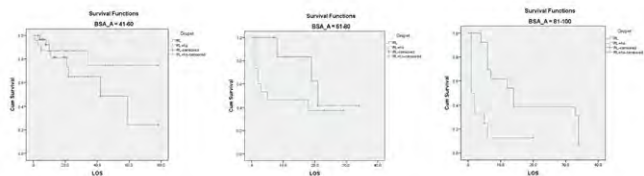
Background and Goal of Study: There are different opinions of burn experts regarding mortality after the use of colloids in the first 24 hours after-burn. According to the most recent recommendations of the American Burn Association, one option is to administer colloid-containing fluids between 12 and 24 hours post-injury to decrease overall fluid requirements during acute burn shock resuscitation. This study aims to analyze the relative risk for mortality comparing resuscitation in the first 24 hours with Parkland and resuscitation with the use of Albumin in patients with severe burns

Materials and Methods: The study includes adult patients with critical burns > 40% TBSA, hospitalized in the Intensive Care Unit of the service during the period 2014 to 2019. Resuscitation in the first 24 hours is done with Ringer Lactate according to Parkland and with Ringer Lactate with the addition of Albumin after 12 hours.

Results and Discussion: The data for organ dysfunction and organ insufficiency were the same in the two groups without statistical significance. Mortality in the RL group was 48% while in the RL + Colloid rehydrated group was 46%. Patients which have 40-60% burns and are rehydrated with RL + Colloids have a risk of death 0.4 times less than those rehydrated with RL (table 1, figure 1).

Table 1- Relative risk for mortality in patients with burns >40% TBSA (n=100)

	RL Group (n=50)	RL+Colloids Group (n=50)	RR (Relative Risk) (95% CI)	OR (Odds Ratio)	NNT (Numbers need Treat)	P
Survivors- no/ total	26/50	27/50	1.04(0.70;1.54)	0.92	50	0.841
Deaths- no/ total	24/50	23/50	0.96(0.63;1.45)	0.92	50	0.841
Mortality,% (n)	48(24)	46(23)				
Time of deaths,% (n)						
The first two days	62(15)	52(12)	0.8(0.41;1.53)	0.74	50	0.5
First week	17(4)	38(9)	2.25(0.74;6.83)	2.52	10	0.15
Second week	13(3)	0(0)				nan
Third week	4(1)	5(1)				1
More than a month	4(1)	5(1)				1
Deaths in TBSA % Groups,%(n)						
40-60%	30(9)	17.3(4)	0.44(0.14;1.34)	0.4	10	0.15
61-80%	50(4)	60(9)	2.25(0.74;6.83)	2.52	10	0.15
81-100%	91.6(11)	83.3(10)	0.91(0.42;1.94)	0.89	50	0.8



Conclusion: Resuscitation with Ringer lactate and Albumin in the first 24 hours of thermal damage is a rehydration alternative for the treatment of burn shock. This therapy especially helps patients with major burns 40-60% TBSA which had improvement in mortality from survival analysis and benefit or Number to Treat (NNT benefit) is 10 so 1 in 10 can benefit with RL + Albumin in the first 24 hours of burn shock.

6791

Pediatric polytrauma with massive transfusion and secondary extremity compartment syndrome

Vucemilovic H.¹, Pavičić Perković S.¹, Vlastelica Munivrana I.², Ančić Bočina N.¹, Stojanović Stipić S.¹, Mrčela D.³

¹KBC Split - Split (Croatia), ²OB Šibenik - Split (Croatia), ³University of Split, School of Medicine - Split (Croatia)

Background: Pediatric trauma is the leading cause of death in children under age of 14, with blunt thoracoabdominal injury being uncommon (<10%). Traffic accidents are among leading causes of pediatric trauma.

Case Report: 2-year old girl was crushed under compact car after car accident. Upon arrival to the emergency department she was unresponsive, breathing insufficiently and without measurable blood pressure. She was immediately intubated and mechanically ventilated. We heard no breathing to the right side. First blood pressure after 250 mls of crystalloid bolus was 60/30 mmHg. Computed tomography was indicated and showed large right-sided hemothorax. Surgeon placed right-sided thoracic drain, and evacuated 500 mls of blood (52% of patient's circulatory blood volume). Anesthesia was maintained with S-ketamine, midazolam, sufentanil, rocuronium and 0.5 MACs of sevoflurane. Patient received 510 mls of PRBCs, 260 mls of FFP, 600 ml of balanced crystalloid and 400 mg of fibrinogen during the procedure. Patient was then moved to pediatric ICU with stable vital signs. During next 3 hours, thoracic bleeding continued rapidly. Another operation was indicated by pediatric surgeon. Upon thoracotomy, right side of liver was severely damaged and protruded through lacerated diaphragm into right hemithorax. Five member surgical team repaired the injuries over the next 5 hours. Patient received 1320 mls of PRBs, 740 mls of FFP, 200 mls of platelets and 2000 mls of crystalloids (4500 mls of volume). Total resuscitation volume was over 6000 mls. We also experienced Penduluft effect due to ventilation of both lungs with single lumen tube. After completion of procedure, patient was moved to pediatric ICU. Her vital signs: BP 105/58 mmHg, p 125/min, SpO2 100%. The next day her arms and legs began to swell, although she wasn't fluid overloaded. Secondary extremity compartment syndrome was the most likely diagnosis. Patient left hospital 5 weeks later, fully recovered and neurologically intact.

Discussion: Pediatric blunt trauma can be very challenging to manage. Combined with 6 circulatory blood volumes of resuscitation it can easily be accompanied with TRALI, TIC, AKI, sepsis and SECS. Fortunately, most of them were avoided, and she successfully recovered.

Learning points: Early hemostatic resuscitation with blood products is crucial in order to preserve hemodynamic stability and to prevent trauma induced coagulopathy.

Care Unit, the neurological examination on discharge showed no sensory or motor deficits, but an acute decompensation of his psychiatric pathology was present.

Discussion: The active-passive rewarming method chosen in this case in front of extracorporeal devices (ECD) was considered better because the expected time to be rewarmed would be less than 6 hours. The patient recovered over 30°C at 140 minutes, similar to the 141±/50 minutes it takes in most studies to initiate an ECD to be started. This resulted in an increase of 1.7°C/h, in agreement with published studies². As we know this case is the longest ALS duration of an out-of-hospital CA due to an accidental hypothermia published in Spain, without aggressive rewarming methods and complete neurological recovery.

References:

- Zafren K. Et al. 2019. Accidental hypothermia in adults. UptoDate
- Kot P. Et al. 2010. Parada cardíaca por hipotermia accidental y resucitación cardiopulmonar prolongada. Med Intensiva, 34 (8): 567-570

Learning points: In our experience, it is not mandatory to use invasive rewarming methods in order to obtain good results without neurological damages. This article is of interest for primary hospitals without the option of ECD.

7163

Changes in the functional state of platelets in patients with polytrauma: prospective cohort observational study

Filyk O.¹, Vyshynska M.¹

¹Department of Anesthesiology and Intensive Care - Lviv (Ukraine)

Background and Goal of Study: Polytrauma remains the leading cause of global morbidity and mortality. The aim of this study was to find out the peculiarity of platelet functions in patients with polytrauma, made the analysis of intravascular platelet activation changes in patients with polytrauma.

Materials and Methods: We examined data of 17 patients at the age 18-40 years with who was admitted to Lviv Municipal Hospital №8 with polytrauma. 15 patients were included in the study results analysis. The level of intact platelets, discocytes, decreases, the number of active forms of thrombocytes, discoechinocytes and spherocochinocytes were obtained on 1st, 3rd, 5th and then every five days during treatment. Statistical Package for the Social Sciences was used and the results were presented using median [IQR].

Results and Discussion: Normal blood clotting requires different components. Determination of components such as indicators of intravascular platelet activation can be an important step in assessing disorders of platelet hemostasis in patients with polytrauma. Vascular platelet hemostasis begins with primary reflex spasm of arterioles, followed by secondary spasm of arterioles, then primary platelet plug is formed (adhesion and aggregation), and, accordingly, the consolidation of the thrombus, resulting in the formation of thrombus. Even before contact of platelets with collagen, the primary activation of platelets occurs. Initially, the shape of intact platelets changes from discoid form to activated cells of discoechinocytes, spherocytes and, or, spherocochinocytes. We found that on day 3 after injury, with a normal number of platelets in the venous blood, the level of intact platelets, discocytes, decreases, the number of active forms of thrombocytes, discoechinocytes and spherocochinocytes, increases, and, accordingly, the total amount of active forms of thrombocytes increases. Normal platelet counts in patients with polytrauma may mask the severity of coagulopathy, and studies of intravascular platelet activation may be a diagnostic component of the vascular platelet hemostasis in patients with polytrauma.

Conclusion: Patients with coagulopathy due to polytrauma have the maximal changes of intravascular platelet activation and platelet aggregation on day 3, its might impact clinical outcome due to increasing the risk of acute haemorrhage.

6836

Out-of-hospital cardiac arrest (CA) due to accidental hypothermia. Case report

Garcia Ballester S.¹, Sanz Iturbe M.¹, Alegret Antonijuan M.¹, Vieito Baqueiro C.¹, Ruiz Buera L.¹, Mora Azabal E.¹

¹Hospital Universitario de Bellvitge - L'Hospitalet de Llobregat (Spain)

Background: Accidental hypothermia is defined as an unintentional drop in core body temperature to below 35 °C. If it progresses, it can lead to CA where resuscitation should be prolonged until the victim is rewarmed, given the good neurological prognosis compared to normothermia¹. The different ways of rewarming have been compared and studied but none have been shown to increase survival over any of the others. A case of successful resuscitation by non aggressive rewarming is presented.

Case Report: We report a case of a 55-year-old man who was found in winter time, with a low level of consciousness and showing signs of severe hypothermia. He was intubated by the prehospital rescue team and subsequently had a CA (with first ventricular fibrillation rhythm). Advanced life support (ALS) manoeuvres were started with a cardiocompressor device for 40 minutes until arrival to the third-level hospital. The initial core temperature in the emergency department was 27 °C. Rewarming measures were adopted with thermal blankets, intravenous fluids, and warm instillation of fluids by nasogastric and vesical catheter. After two hours and twenty minutes with continuous ALS maneuvers, he recovered his heart rate at a temperature of 30.6 °C. After 22 days in the Intensive

7204

Altered ionized calcium levels on admission are associated with increased mortality and coagulopathy after major trauma. A retrospective analysis from the TraumaRegister DGU®.

Helsloot D.¹, Verelst S.², Fitzgerald M.³, Lefering R.⁴, Missant C.⁵
¹AZ Groeninge - Kortrijk (Belgium), ²UZ Leuven - Leuven (Belgium),
³Alfred Health - Melbourne (Australia), ⁴Institute for Research in Operative Medicine & Traumaregister DGU - Cologne (Germany), ⁵KU Leuven campus Kulak - Kortrijk (Belgium)

Background and Goal of Study: Ionized (free) calcium has an essential role in the coagulation and neuromuscular pathways, both of which can be disturbed after major trauma. Various smaller studies have evaluated the association between hypocalcemia and adverse outcome after trauma. The goal of our study was to evaluate in a large sample size if there is indeed an association between altered ionized calcium levels and (1) mortality, (2) coagulopathy.

Materials and Methods: We performed a retrospective observational analysis, using data from the TraumaRegister DGU® from 2015 until 2019 ('overall' group). We selected adult patients (≥16yo) with major trauma (AIS ≥3) and primary admission in a European traumacenter, with complete documentation in the TraumaRegister. Three different subgroups of documented ionized calcium level at time of first blood collection in the emergency room were defined: 'normocalcemia' (iCa 1,11-1,30 mmol/L), 'hypocalcemia' (iCa ≤ 1,10 mmol/L) and 'hypercalcemia' (iCa >1,30 mmol/L). Mortality was compared to expected mortality (RISC-II). Relevant categorical variables were defined for both mortality and coagulopathy as primary endpoints. Based on the regression coefficient the Odds were calculated to evaluate an association with these endpoints.

Results and Discussion: After applying the exclusion criteria 30 183 patients were included from the 'overall' group (n= 175 729). The results for the different subgroups are listed in the table below.

	HYPER-Ca ²⁺ (>1,30)	NORMO-Ca ²⁺	HYPO-Ca ²⁺ (≤1,10)	TOTAL
SURVIVOR				
number	541	21198	3944	25683
% (survivors within Ca ²⁺ subgroup)	75,1%	86,5%	79,4%	85,1%
% (Ca ²⁺ subgroup within survivor group)	2,1%	82,5%	15,4%	100,0%
NON-SURVIVOR				
number	179	3296	1025	4500
% (non-survivors within Ca ²⁺ subgroup)	24,9%	13,5%	20,6%	14,9%
% (Ca ²⁺ subgroup within non-survivor group)	15,4%	73,2%	22,8%	100,0%
RISC 2 (expected mortality)				
average	24,2	13,0	18,2	14,1
TOTAL				
number	720	24494	4969	30183
%	2,4%	81,2%	16,5%	100%
	100%	100%	100%	
VARIABLES				
for mortality: odds ratio	0,990 (0,760-1,289)	1,0 (reference group)	1,247 (1,115-1,394)	
for coagulopathy: odds ratio	2,845 (2,314-3,498)	1,0 (reference group)	3,508 (1,457-7,775)	

Conclusion: Hypocalcemia on arrival in the emergency department after major trauma, has a significant association with coagulopathy and mortality. Hypercalcemia has a significant association with coagulopathy, but not with mortality. Further research should evaluate the causation versus correlation of these findings, which can guide intervention studies on early management of ionized calcium levels.

7264

Does the use of a mere audio-based application for smartphones improve bystanders' resuscitation performance and decrease the barriers to start Basic Life Support – A randomized controlled simulation study

Stech S.¹, Scharf S.², Schneider G.³, Haseneder R.³, Hinzmann D.³
¹Technical University Munich, Klinikum rechts der Isar - Munich (Germany), ²- Fürstfeldbruck (Germany), ³Technical University Munich, Klinikum rechts der Isar - München (Germany)

Background and Goal of Study: Smartphone applications (apps) are suggested for several years now to improve bystanders' basic life support (BLS) performance. However, the body of evidence, whether such apps improve BLS quality, is still limited [1]. In particular, the use of smartphone apps seems to delay the start of BLS [2; 3]. This could be due to the users' distraction while handling the app [2]. We therefore developed a simple audio-based, and easy-to-use smartphone app. We then investigated whether it improved the quality of bystander BLS and lowered barriers to start BLS.

Methods: In this randomized controlled trial, 86 laymen were selected at random to run through a simulated manikin cardiac arrest scenario with (intervention group, n=43) or without (control group, n=43) the help of an audio-based smartphone app. The app solely uses audible instructions leading through the BLS steps. Additionally, the user can call for help by touching a button. To assess resuscitation performance, effective compression ratio (ECR) was calculated from the manikin data. Crucial time points of the scenario (e.g. time to start of chest compression) were also recorded. To assess barriers to start BLS, a 13-item Likert Scale questionnaire was completed by the participants before and after the scenario.

Results: The use of the app did not delay initiation of BLS (P=0.422). Participants in the intervention group called earlier for help (P= 0.017), and showed a more accurate chest compression rate supported by the implemented metronome. The necessary compression depth of 50mm was not reached by the majority of the participants in both groups (45.1mm versus 43.5mm), resulting in a low ECR in both groups (0,09 versus 0,06). Barriers to start BLS were significantly decreased as reported by the participants in the intervention group (P<0.0001) but not in the control group (P=0.108).

Conclusion: The use of our app did not delay start of BLS and improved some parameters of BLS such as the compression rate. However, compression depth remained lower than recommended by resuscitation guidelines. The extent of which this makes the resuscitation efforts insufficient is to be discussed. The barriers to start BLS were reduced, which might lead to an increased rate of survival.

References:

- Olasveengen et al., Resusc. 2021 Apr;161:98-114.
- Paal et al., J Emerg Med. 2012 Sep;43(3):472-7.
- Metelmann et al., Scand J Trauma Resusc Emerg Med. 2021 Feb 1;29(1):29.

7361 Out-of-hospital cardiac arrest: does the location matter?

Goudekamp D.¹, Borgstedt L.², Fuest K.², Ulm B.², Blobner M.², Schaller S. J.³

¹München Klinik Neuperlach, Department of Internal Medicine - München (Germany), ²Technical University of Munich, School of Medicine, Department of Anesthesiology and Intensive Care - München (Germany), ³Charité - Universitätsmedizin Berlin, Department of Anesthesiology and Operative Intensive Care Medicine - Berlin (Germany)

Background and Goal of Study: Cardio-pulmonary resuscitation (CPR) in prehospital settings is a major reason for emergency medical service (EMS) dispatches. The outcome of CPR depends on various factors, such as bystander CPR and initial heart rhythm [1]. Our aim was to investigate whether short-term-outcome or performance of CPR differ depending on the location of out-of-hospital cardiac arrest.

Materials and Methods: After ethical approval of the ethics committee of the TUM School of Medicine (508/16), protocols of a prehospital physician staffed EMS located in Munich-Riem from 2014-2017 were retrospectively evaluated using Mann-Whitney-U test, chi square test, and a multifactor logistic regression model.

Results and Discussion: Of 12,073 cases, 740 EMS responses with out-of-hospital cardiac arrest were analysed. In 402 of these cases CPR was performed. The main reasons for not initiating CPR were obvious signs of death (81.7%) and a patient's provision against CPR (10.9%). Patient characteristics differed significantly between different locations (table 1). Bystander CPR was most likely in public places (42.6%) followed by nursing homes (33.6%) and residential sites (26.0%) but did not differ statistically significant (p = 0.102). In care facilities use of an AED was not documented. Assumed delay was most likely in residential homes with 58.6% compared to 37.9% in nursing homes and 35.6% in public places (p<0.008). The frequency of defibrillation showed a significant difference (p<0.001) between public places (66.0%), residential (36.6%) and nursing homes (26.3%). Regarding ROSC, there was no significant difference (p=0.543).

Conclusion: Bystander CPR and use of AEDs was still low, worrisome low for nursing homes. Percentage of cases with ROSC did not differ between locations i.e., initiation of high-quality basic CPR is essential in all cases without patient's provision against CPR.

References:

1. Czaplá, M.; Zielińska, M.; Kubica-Cielińska, A., et al. Factors associated with return of spontaneous circulation after out-of-hospital cardiac arrest in Poland: A one-year retrospective study. BMC Cardiovasc. Disord. 2020, 20, 288

Table 1. Patient's characteristics stratified by location

	Patients, No. (%)				P-Value
	Residential n = 7160	Public n = 1855	Nursing Home n = 778	Other n = 2280	
Men	3404 (48.2)	1093 (62.6)	260 (34.1)	1111 (58.2)	<0.001 \$
Age (mean (SD))	61.6 (24.2)	42.9 (21.2)	82.4 (11.4)	51.4 (24.1)	<0.001 \$
Age not documented	125 (1.7)	140 (7.5)	20 (2.6)	370 (16.2)	<0.001 \$
Disease category					<0.001 \$
Visceral	577 (8.4)	59 (3.4)	48 (6.5)	113 (6.0)	
Respiratory	632 (9.2)	54 (3.2)	114 (15.3)	123 (6.5)	
Cardiovascular	2536 (36.8)	370 (21.6)	260 (35.0)	654 (34.8)	
Metabolic	290 (4.2)	28 (1.6)	59 (7.9)	31 (1.6)	
Gynaecological	50 (0.7)	8 (0.5)	1 (0.1)	13 (0.7)	
Paediatric	196 (2.8)	11 (0.6)	1 (0.1)	29 (1.5)	
Neurological	3 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Central nervous System	835 (12.1)	244 (14.2)	113 (15.2)	275 (14.6)	
Psychiatric	433 (6.3)	162 (10.6)	11 (1.5)	152 (8.1)	
other	599 (8.7)	99 (5.8)	66 (8.9)	159 (8.5)	
not documented	739 (10.7)	658 (38.4)	70 (9.4)	332 (17.7)	

Abbreviations: SD, standard deviation. \$all post-hoc tests <0.05. †all post-hoc test <0.05, except residential vs. nursing home

7388 Long-term survival after out-of-hospital cardiac arrest: A systematic review and individual patient data meta-analysis

Amacher S. A.¹, Bohren C.², Becker C.³, Beck K.², Appenzeller-Herzog C.⁴, Hunziker S.²

¹Intensive Care and Medical Communication, University Hospital Basel - Basel (Switzerland), ²Medical Communication and Psychosomatic Medicine, University Hospital Basel - Basel (Switzerland), ³Department of Emergency Medicine, University Hospital Basel - Basel (Switzerland), ⁴University Medical Library, University of Basel - Basel (Switzerland)

Background and Goal of Study: Data on long-term survival beyond 12 months after out-of-hospital cardiac arrest (OHCA) is scarce. Herein, we assessed long-term survival of patients after OHCA within a systematic review and meta-analysis of individual patient data.

Materials and Methods: A systematic search of the databases EMBASE and MEDLINE was performed from inception to 25th of April 2021. Clinical studies reporting long-term survival after adult OHCA were selected based on pre-defined in-/exclusion criteria according to a preregistered study protocol on PROSPERO. Literature screening, data collection, and reporting followed the PRISMA and MOOSE guidelines. Individual patient data was reconstructed from Kaplan Meier curves using an iterative algorithm and then pooled to generate survival curves for meta-analysis.

Results and Discussion: The search identified 15'347 reports, of which 21 studies with a total number of 11'800 patients were included. For patients surviving to hospital discharge the median survival time post-discharge was 5.0 years (IQR 2.3 – 7.9) with 77.1% (95%CI 76.1 – 78.1), 64% (95%CI 62.6 – 65.7) and 57.8% (95%CI 55.1 – 60.3) surviving to 5-year, 10-year, or 15-years, respectively. Patients initially presenting with a shockable cardiac arrest rhythm had a significantly higher chance of long-term survival [HR 0.32 (95%CI 0.25 – 0.42); logrank, p<0.0001] compared to patients with non-shockable initial rhythms (Figure 1). Similarly, patients with evidence of myocardial infarction (MI) as cardiac arrest etiology had better long-term survival than patients with other etiologies or unknown MI status.

Conclusion: For OHCA patients surviving beyond hospital discharge, this study reports a median long-term survival of five years, indicating a beneficial long-term survival in case patients survive the acute critical illness, which is comparable to other entities of critical illness like MI or respiratory failure. Initial shockable rhythm and MI as etiology might be important prognostic factors in long-term OHCA survivors. Future research should evaluate further potentially modifiable factors of long-term survival in OHCA patients.

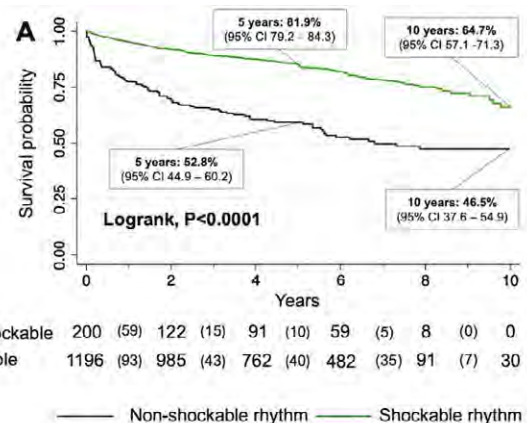


Figure 1. Kaplan Meier survival curve for patients surviving to hospital discharge stratified by initial cardiac arrest rhythm. Below x-axis, number at risk for the individual time points with number of deaths (in brackets) are reported.

7399

A struggle for breath: management of acute Thoracic Compartment Syndrome in a burnt patient - case report

Complications, compartment syndrome, Complications, burns, Airway, pressure

Santos A.¹, Sousa Dias C.¹, Valente F.¹, Carrilho A.¹

¹Centro Hospitalar Lisboa Central - Lisbon (Portugal)

Background and Goal of Study: Compartment syndrome is a frequent complication in the burnt patient.¹ Thoracic compartment syndrome (TCS) is a rare, life-threatening form of compartment syndrome. It develops secondarily to elevated intra-thoracic pressure and manifests itself clinically as elevated airway pressures, inability to provide adequate ventilation and hemodynamic instability.¹ Surgical decompression is often the only effective treatment.

Materials and Methods: A middle-aged woman was admitted to the emergency room following self-immolation with extensive upper-body third degree burns (total body surface area of 50%), including all-around thoracic burns. Tracheal intubation had already been performed at the scene. As she presented severely hypotensive on arrival, a right femoral arterial and central venous line were placed, and noradrenergic support was initiated with good hemodynamic response. Fluid therapy replacement and sedation were adjusted. The patient was then transferred to the Burn Unit. On admission the patient developed hypoxemia, chest expansion restriction and increased airway pressure. The endotracheal tube was repositioned, ventilatory parameters and sedation were optimised, followed by ketamine and neuromuscular relaxant administration. However, no ventilatory improvement was attained. At this time, acute TCS was suspected, and a plastic surgeon was called to perform emergency thoracic escharotomy. Immediate ventilatory recovery, with increased chest expansion and normalization of peak airway pressure confirmed the diagnosis. Blood gas analysis showed progressive reversal of hypoxemia and hypercapnia as clinical stability was achieved.

Conclusion: Despite early diagnosis and effective surgical treatment of TCS, the severity of the burns eventually proved fatal for the patient. This case reports highlights the crucial role the anaesthesiology plays in early recognition of potential severe complications when dealing with burnt patients.

References:

1. Wandling, M.W., An, G.C. A case report of thoracic compartment syndrome in the setting of penetrating chest trauma and review of the literature. *World J Emerg Surg* 5, 22 (2010)

When all else is ruled out, rare exclusion diagnosis must always be considered.



7424

A successful case of an acquired methemoglobinemia treated with methylene blue

Almeida D.¹, Remelhe M.¹, Castro H.¹, Machado H.¹

¹Centro Hospitalar do Porto - Porto (Portugal)

Background: Methylene blue has been advocated for multiple indications, but data reporting its use on intoxication is rare. This case report describes a 45-year-old man with acute methemoglobinemia due to n-propyl nitrate intoxication solved with methylene blue.

Case Report: Caucasian, 45-year-old man, with a history of dizziness, blurred vision and mild respiratory distress lasting 2 hours, after involuntary exposure to n-propyl nitrate through manipulation of a cleaning product without personal protective equipment. The patient came into the emergency department conscious, symptomatic, with profound peripheral and central cyanosis, respiratory rate of 24 cycles per minute and oxygen saturation of 88% on air, with no response to oxygen supplementation with a non-re-breathing face mask. Arterial blood gas showed pH 7.55, PO₂ 275mmHg, SaO₂ 97%, PCO₂ 26mmHg and methemoglobin 22.9%. He was hemodynamically stable. Full blood count and serum biochemical profile were normal. Methylene blue (1mg/kg) was administered intravenously and symptoms improved dramatically. Control arterial blood gas showed 2.6% of methemoglobin. Twelve hours later, the patient remained asymptomatic, with blood methemoglobin 1.3% and 93.1mmHg of PO₂ on air. He was later discharged asymptomatic and in a stable condition.

Discussion: Methemoglobinemia is a rare cause of cyanosis, resulting from oxidation of ferrous iron to ferric iron, yielding hemoglobin unavailability for oxygen transport with potential life-threatening hypoxia. Acquired methemoglobinemia can be caused by a wide variety of chemicals and toxins. Symptoms are nonspecific but typically related to blood methemoglobin levels. On severe cases, with high methemoglobin levels (>20%), methylene blue is the first line treatment as it accelerates the enzymatic reduction of methemoglobin by NADPH-methemoglobin reductase. Despite the rarity of occurrences in occupational set, a high degree of clinical suspicion and prompt diagnosis is crucial in treating this emergency situation. The main reason for reporting this case is the scarce data concerning the use of methylene blue on toxic situations.

References:

1. Wright RO, et al. Methemoglobinemia: etiology, pharmacology, and clinical management. *Ann Emerg Med.* 1999;34:646–56

Learning points: Methemoglobinemia is an hypoxic life-threatening emergency. Pulse oximetry is inaccurate and unreliable in methemoglobinemia. On severe cases methylene blue is the first line treatment.

7438
Clinical characteristics and survival of in-hospital cardiorespiratory arrest (IHCA) in a level one hospital. Observational retrospective analysis.

Sanz Iturbe M.¹, Mora Azabal E.¹, Galego Ferreiro A.¹, Alvarez Villegas D.¹, Bellafont Peralta F. J.¹, Belmonte Cuenca C.¹
¹Hospital Universitario de Bellvitge - L'Hospitalet de Llobregat (Spain)

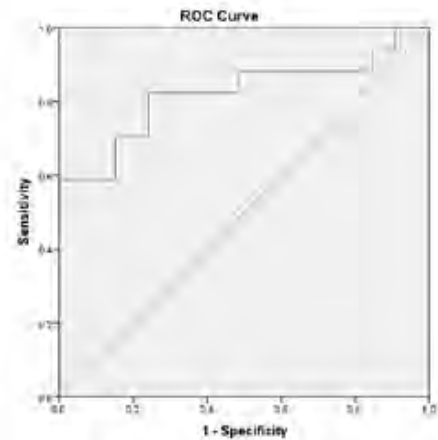
Background and Goal of Study: Patients who undergo IHCA have a high mortality, so identifying the parameters that may influence survival is essential. The objective of the study is to analyze the incidence, the characteristics of IHCA and its association with mortality.

Materials and Methods: A retrospective-observational study of an Utstein-type register of the IHCA attended by the rapid response team (RRT) between 1/1/2018 to 31/12 /2019 was performed. The SPSS program was used to analyze the association (Chi² and Mann-Whitney tests), using a p-value <0.05 as statistically significant.

Results and Discussion: There were 262 cases of IHCA with 150 cases excluded due to non IHCA situations. The incidence of IHCA was 1.05 / 1000 admissions. The median age was 70 (50-85) years and 71% (72%) were men. 57 (52%) of IHCA occurred during the first week of admission and 50 (45%) occurred during the nursing night shift. The most frequent cause of IHCA was respiratory failure (65%). Recovery of spontaneous circulation occurred in 50 patients (45%) and 11 (9.8%) of IHCA were discharged from hospital. Survivors at 12 months were 9 patients (8%). Factors associated with mortality were witnessed IHCA (W-IHCA), previous monitoring (PM) and cardiopulmonary resuscitation duration (CRD). There were 59 patients (85%) that suffered W-IHCA that died, in comparison to 42 (97%) of patients with no W-IHCA (p =0.031); 41 patients (83%) with PM at the moment of IHCA died, in comparison to 52 (96%) of those without PM (p = 0.032). The CRD had a median of 20 minutes in the subgroup who died, while in the survivors, the median duration was 8 minutes, (p= 0.014). The type of rhythm was not significantly related to mortality, with 7 patients (6%) having initial shockable rhythm.

Conclusion: The incidence of IHCA in Europe, survival to discharge and at 12 months, are similar to other studies at the European level. The data suggest some factors associated with better survival, as prior monitoring and witnessed IHCA, similarly as described in the bibliography. The study confirms the importance of early recognition of the alarm parameters for improving outcomes in hospitalized patients. Due to the limitation of the sample of survivors we were not able to prove the association of some other characteristics as first rhythm to mortality.

and 15 children), or 66% of the total received 0.5-0.6 mmol/kg/%, while only 17 patients (4 adults and 13 children) or 34% received more than 0.6 mmol/kg/%. The ROC curve suggested that the cut-off was 3.7 ml/kg/% and the values greater than this cut-off illustrated sodium load more than 0.5-0.6 mmol/kg/% (AUC = 0.822, 95% CI 0.678; 0.966, p<0.000)(Figure



Area Under the Curve

Test Result Variable(s) water load (ml/kg/%)24h

Area	Std. Error	Asymptotic Sig. ^a	Asymptotic 95% Confidence Interval	
			Lower Bound	Upper Bound
.822	.073	.000	.678	.966

- a. Under the nonparametric assumption
- b. Null hypothesis: true area = 0.5

Case Processing Summary

sodium received classification	Valid N (listwise)
Positive	17
Negative	33

Larger values of the test result variable(s) indicate stronger evidence for a positive actual state.
 a. The positive actual state is 0.

Figure 1 - Area under the ROC curve of testing the threshold of fluid administration (cut-off=3.7 ml/kg/%) for giving adequate sodium load (0.5-0.6 mEq/kg/%)

7456
Relationship of fluid load and sodium needs during resuscitation of burn patients

Belba M.¹, Belba A.²
¹University Hospital Center "Mother Teresa" Tirana Albania - Tirana (Albania), ²KULeuven - Leuven (Belgium)

Background and Goal of Study: The different formulae for calculation of resuscitation therapy after thermal damage recommend 0.5-0.6 mmol sodium for each % of Total Body Surface Area (TBSA) burned, suggesting fluid requirements between two to four ml/kg/% burn because of sodium loss in the burned and unburned tissues. This study aims to analyze the relationship between the amount of crystalloid fluids given during resuscitation and meeting sodium needs for successful resuscitation.

Materials and Methods: An observational study was conducted on 150 patients hospitalized in the ICU of the Service of Burns at the University Hospital Center "Mother Teresa" in Tirana, Albania, during 2016. The study included patients with burns of more than 20% of TBSA, patients with less than 20% TBSA but who require resuscitation in the shock period, and children as well as adults and elderly. Avoidance criteria were: the presence of inhalation burn, pregnancy, discharge from ICU in the first 48 h, and death within this period. The area under the ROC curve was used to compare the diagnostic performance of the best cut-off of fluid load to give the recommended amount of sodium load.

Results and Discussion: The mean sodium received for all patients in the first 24 h was 0.51±0.17 mmol/kg/%. Thirty-three patients (18 adults

Conclusion: During resuscitation, the values of the fluid load should not overcome the value of 3.7 ml/kg/% TBSA in order to only gain the positive aspects of the treatment (giving the right amount of sodium load without high fluid load). If we give more than these amounts of fluids during resuscitation, we will introduce a higher sodium load above the normal values, which would lead to increased urinary output and elevated sodium excretion.

7463

Correlation between meteorological factors, air pollution and the number of emergency medical service dispatches with respect to acute coronary syndrome in Munich 2014-2017

Weingast S.¹, Borgstedt L.², Fuest K.², Ulm B.², Blobner M.², Schaller S. J.³

¹RoMed Klinik Bad Aibling - Bad Aibling (Germany), ²Technical University of Munich, School of Medicine, Department of Anesthesiology and Intensive Care - Munich (Germany), ³Charité - Universitätsmedizin Berlin, Department of Anesthesiology and Operative Intensive Care Medicine - Berlin (Germany)

Background and Goal of Study: Acute coronary syndrome (ACS) is one of the most common causes for death in Germany and for emergency medical service (EMS) dispatches. The effects of changing weather conditions due to climate change and air pollution on mortality have been well described [1]. This study wanted to investigate correlations between meteorological data, air pollution and EMS dispatches.

Material and Methods: After ethical approval of the ethics committee of TUM Medical School (508/16) protocols of the physician staffed EMS in Munich-Riem from 2014-2017 were retrospectively evaluated. Meteorological and air pollution data were obtained from the Munich German weather service. Spearman's rank correlation coefficient was used for univariate analyses, Poisson regression for multivariate analyses. To reduce multicollinearity variables with a variance variability factor > 4 were excluded.

Results and Discussion: 12,073 cases were assessed. In 3,818 (34.0%), the main diagnosis was ACS. Increase of air pollution e.g., carbon monoxide ($p < 0.001$), nitrogen monoxide ($p < 0.001$) and nitrogen dioxide ($p < 0.001$) were associated with an increased incidence of ACS. Temperature ($p < 0.001$), decrease of ozone ($p < 0.001$) and vapor pressure ($p < 0.001$) correlated with a decreased incidence of ACS. Other meteorological factors like sun duration or fine dust pollution did not correlate with ACS (table 1).

Conclusion: We found significant correlations between meteorological parameters, air pollution and EMS dispatches due to ACS. In accordance with current literature, these findings show that weather and air pollution influence people's health, medical resources and healthcare costs [2].

References:

1. Gasparrini A, Guo Y, Hashizume M, Lavigne E, Schwartz J, et al. Mortality risk attributable to high and low ambient temperature: a multicountry observational study. *Lancet*. 2015;386(9991):369-75. Epub 2015/05/25.
2. Ghada W, Estrella N, Pfoerringer D, Kanz KG, Bogner-Flatz V, Ankerst DP, et al. Effects of weather, air pollution and Oktoberfest on ambulance-transported emergency department admissions in Munich, Germany. *Sci. Total Environ*. 2021;755(Pt 2):143772. Epub 2020/11/25.

Table 1.

	Correlation coefficient (p-value)
	ACS
Temperature mean (°C)	-0.106 (<0.001)*
Temperature max (°C)	-0.094 (<0.001)*
Temperature min (°C)	-0.115 (<0.001)*
Wind speed	-0.045 (0.093)
Sunshine duration (h)	-0.07 (0.007)*
Cloud coverage (okta)	0.019 (0.462)
Vapor pressure (hPa)	-0.106 (<0.001)*
Air pressure (hPa)	-0.033 (0.209)
Relative humidity (%)	0.032 (0.222)
Ozone (µg/m ³)	-0.085 (0.001)*
Carbon monoxide (µg/m ³)	0.106 (<0.001)*
Nitrogen monoxide (µg/m ³)	0.056 (0.032)*
Nitrogen dioxide (µg/m ³)	0.104 (<0.001)*
Particulate matter (particle size 2,5 in µg/m ³)	0.024 (0.351)
Particulate matter (particle size 10 in µg/m ³)	0.022 (0.406)

Correlation of meteorological data and air pollution parameters to ACS in EMS dispatches in Munich-Riem between 2014 and 2017.

7541

Is it possible to predict first failed intubation attempt? A prospective cohort

Pinto G.¹, Carvalho C.¹, Agra I.¹, Costa Y.¹, Ramos I.¹

¹Universidade Federal de Campina Grande - Campina Grande (Brazil)

Background and Goal of Study: Predicting difficult intubation (DI) remains challenging, much due to the low frequency of this event.¹ On the other hand, much effort has been targeting the success in the first intubation attempt to avoid complications. We conducted this study to assess mainly if some regularly used bedside tests can accurately predict fail to intubate adult patients in the first attempt with Macintosh laryngoscope.

Material and Methods: We prospectively enrolled 211 patients scheduled for elective surgical procedures under general anaesthesia. We collected data on sex, age, weight, height, ASA, BMI, mouth opening, thyromental distance, upper lip bite test, Mallampati, and number of intubation attempts. Our main outcome was failed first intubation attempt (FFIA). We alternatively evaluated difficult laryngoscopy (Cormack and Lahane 3 or 4). Univariate analyses were performed to assess association between individual variables and the outcomes. Predictors associated with FFIA would be included in a multivariable model to evaluate their predictive performance.

Results and Discussion: FFIA was present in 15 (7.1%) manipulations, while difficult laryngoscopy in 12 (5.7%). No single variable was significantly associated with FFIA. Only Mallampati was associated with difficult laryngoscopy ($p = 0.001$).

Conclusion: The investigated bedside tests did not show significant association with the occurrence of FFIA. We could not consequently use them with this aim based on the present data. Larger studies, however, would be necessary to improve tests' power and have a more definitive response about the addressed question.

7542 Comparison between videolaryngoscopes and Macintosh laryngoscope for failed first intubation attempt: a systematic review with trial sequential analysis.

Ramos I.¹, Carvalho C.¹, Agra I.¹, Pinto G.¹, Costa Y.¹
¹Universidade Federal de Campina Grande - Campina Grande (Brazil)

Background and Goal of Study: Videolaryngoscopes (VLs) are deemed to improve glottic visualization, but we currently don't know whether they also enhance chances of intubation at first attempt.¹ We conducted a systematic review with trial sequential analysis (TSA) to evaluate the available evidence comparing both devices for failed first intubation attempt (FFIA).

Material and Methods: We conducted searches through PubMed and further five databases on 11/01/2021. We included randomized clinical trials with patients aged ≥ 16 years, comparing VLs with ML for FFIA. We used ROB 2 tool to assess the risk of bias within individual studies. We carried a random-effects pairwise meta-analysis with trial sequential analysis to summarize available data. The GRADE approach was used to assess the quality of the evidence.

Results and Discussion: We included 125 comparisons from 102 studies (11,273 participants), with 11 comparisons not being considered in the meta-analysis because they presented zero events for both groups. VLs reduced the risk of FFIA as compared to Macintosh laryngoscope (RR = 0.61, 95% CI: 0.50 to 0.75, p < 0.0001, 114 comparisons, 10,266 participants; heterogeneity: I² = 53.6%, Chi2-p < 0.0001). The pooled frequency of FFIA for Macintosh was 11.0% (95% CI: 8.8 to 13.7%). Subgroup analysis by type of blade showed the hyperangulated blades to have the lowest pooled risk ratio, although this difference has not reached statistical significance (Table 1). The results from TSA are presented in Figure 1 and confirm VLs superiority. The evidence was judged to be of low quality (high risk of bias and relevant inconsistency).

Conclusion: Low quality evidence shows significantly reduced risk of FFIA for VLs compared to ML in adult patients. Further studies are still necessary to better assess the role of blade types over first intubation success.

Table 1. Subgroup analysis by type of videolaryngoscope (VL) blade from the comparison between VLs and Macintosh laryngoscope for failed first intubation attempt.

Type of blade	Number of comparisons	Risk Ratio	95% CI	I ²	p _{subgroup}
Mac channelled	33	0.57	0.36-0.90	64.1%	0.595
Mac non-channelled	72	0.65	0.51-0.82	50.1%	
Hyperangulated	9	0.42	0.16-1.11	16.0%	

Mac = Macintosh-like blade



Figure 1. Trial Sequential Analysis for the comparison between videolaryngoscopes and Macintosh laryngoscope for Failed First Intubation attempts. X-axis represents the accumulating number of participants, while y-axis shows the Z scores and represents the statistical summary of the accrued data. We can see that the reached Z score from available data crosses the top trial sequential boundary (curved red line at top left-hand corner) and confirms sequential analysis statistical significance.

7543 Comparison between videolaryngoscopes with Macintosh and hyperangulated blades for failed first intubation attempt: a systematic review with trial sequential analysis.

Agra I.¹, Carvalho C.¹, Pinto G.¹, Ramos I.¹, Costa Y.¹
¹Universidade Federal de Campina Grande - Campina Grande (Brazil)

Background and Goal of Study: videolaryngoscopes have differential performance, but we currently don't know whether hyperangulated blades would help achieving intubation first pass success. We conducted a systematic review with trial sequential analysis (TSA) to summarize data from clinical trials comparing VLs with hyperangulated blades to VLs with Macintosh blade for failed first intubation attempt (FFIA).

Material and Methods: We conducted searches through PubMed and further five databases on 11/01/2021. We included randomized clinical trials with patients aged ≥ 16 years, comparing hyperangulated VLs with Macintosh VLs for FFIA. We used ROB 2 tool to assess the risk of bias within individual studies. We carried a random-effects pairwise meta-analysis with TSA to summarize available data. The GRADE approach was used to assess the quality of the evidence.

Results and Discussion: We included 24 comparisons from 21 studies (3,345 participants). No significant difference was found between hyperangulated and Macintosh blades (RR = 0.97, 95% CI: 0.62 to 1.54, p = 0.907; heterogeneity: I² = 71.6%, Chi2-p < 0.0001). The pooled frequency of FFIA for Macintosh VLs was 11.5% (95% CI: 8.2 to 15.8%). Subgroup analysis by operator experience showed significant difference between the subgroups – experienced vs non-experienced (Table 1). The results from TSA are presented in Figure 1 and point to need for further studies. The evidence was judged to be of low quality.

Conclusion: Current available evidence is not enough to accept any difference between hyperangulated and Macintosh videolaryngoscopes for risk of FFIA in adult patients. From the data, non-experienced operators seem to benefit more from the use of hyperangulated blades, although little evidence is available so far and such hypothesis might be regarded as of low pre-test probability.

Table 1. Subgroup analysis by operator experience from the comparison between hyperangulated and Macintosh (reference) videolaryngoscopes for failed first intubation attempt.

Operator experience	Number of comparisons	Risk Ratio	95% CI	I ²	p _{subgroup}
Experienced	18	1.23	0.68-2.23	70.1%	0.034
Non-experienced	6	0.62	0.41-0.93	0.0%	

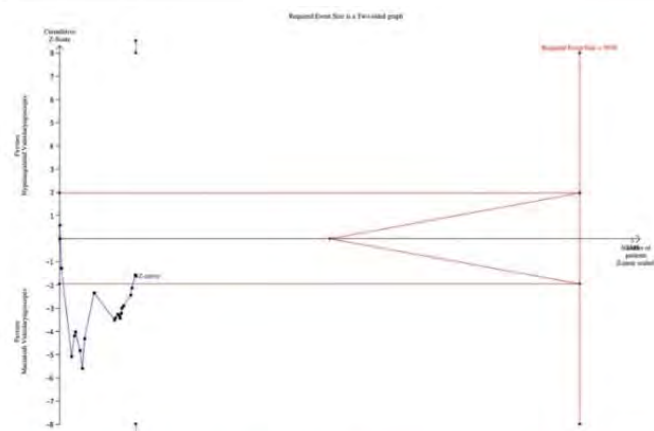


Figure 1. Trial Sequential Analysis for the comparison between hyperangulated and Macintosh videolaryngoscopes for failed first intubation attempts. X-axis represents the accumulating number of participants, while y-axis shows the Z scores and represents the statistical summary of the accrued data. We can see that the reached Z score from available data is not enough to consider either difference or equivalence between the interventions as it did not cross either the trial sequential or the futility boundaries.

7590

Anesthetic management of an acquired tracheal fistula - fibroscopy throughout the process: a case report

Pedrosa E.¹, Ramos Afonso Guimarães Teles D.¹, Teles A. R.¹, Oliveira M.¹

¹Hospital de Sao Joao - Porto (Portugal)

Background: Tracheoesophageal fistula may be a sequela of surgical procedures and it represents a life-threatening condition. Its presence and treatment can be a real challenge, regarding airway and ventilation management.

Case Report: A 72-year-old patient, ASA III, was submitted to a total thyroidectomy with left modified lymphadenectomy and partial resection of the cervical esophagus due to metastatic medullary thyroid carcinoma. In the postoperative period, patient developed stridor and severe respiratory failure requiring endotracheal intubation and intensive care unit (ICU) admission. During this period, it was diagnosed a cervical abscess and tracheoesophageal fistula (TF) requiring surgical treatment. After the procedure, a continuous air leak persisted hindering mechanical ventilation and impaired gas exchange despite a correctly inflated ET cuff. Flexible fiberoptic bronchoscopy (FFB) through the ET was performed and confirmed the persistence of the tracheal fistula, a 5 mm laceration in the left posterolateral wall of the trachea – 7 cm above the carina. The fistula was repaired, and a surgical tracheostomy was performed below the air leak with FFB guidance. After this, there was no more evidence of air leakage or other complications.

Discussion: This case highlights the importance of identifying problems with the airway that require a multidisciplinary approach, such as the presence of tracheal fistulas and its subsequent treatment. Fiberoptic bronchoscopy helped in the diagnosis through direct visualization of the fistula site, it allowed optimization of mechanical ventilation through the correct positioning of the ET obliterating the fistula site, improving patient's respiratory distress and at a later stage, helped in performing the surgical tracheostomy.

References:

1. Diddie R, Shaw IH, Acquired tracheo-oesophageal fistula in adults, Continuing Education in Anaesthesia, Critical Care & Pain (2006), 6: 3
2. Tollinche LE, Chawla M, Lee EW, Peralta R, Collaborating with interventional pulmonology in managing a massive tracheoesophageal fistula that extends from cricoid to carina: a case report, JA Clinical Reports (2017) 3:62

Learning points: FFB, as a portable, lightweight, reliable and easy-to-use device, is of great importance during TF management. It provides safety and greater precision improving outcome, being important that the anesthesiologist becomes familiar with its use in different clinical situations.

Respiration and Airway Management

6463

Safety of high-flow nasal cannula in gastrointestinal endoscopy sedation

Danny I.¹, Lee W. S.¹, Jamel A.¹, Desmond F.¹

¹Department of Anaesthesia, Austin Hospital - Heidelberg (Australia)

Background: Gastrointestinal(GI)endoscopy is a common procedure done under sedation. Select patients receive respiratory support with high-flow nasal cannula (HFNC) during the procedure. Existing literature supports the efficacy of HFNC on treating and preventing hypoxia in GI endoscopy(1). The literature surrounding complications of HFNC in GI endoscopy is limited(2). Our retrospective audit aimed to assess the incidence of complications of HFNC use in GI endoscopy in our institution, a tertiary referral centre in Melbourne.

Method: After obtaining ethics approval, we examined patients who underwent GI endoscopy over a 4-week period at our institution. The data was retrospective, patients that received HFNC during endoscopy were consented via telephone and asked a set of standardized questions to assess for HFNC complications such as epistaxis, dry nose and nasal pain(2). Data was stored in a secure institutional computer and analysed with SPSS.

Results: 42 out of 61 patients were included in our study, 19 patients were excluded due to consent issues. The average age was 61.4 years, with a mean BMI of 30. 66.5% of the cases were ASA 3. 89% of endoscopies were done electively. 35.7% of patients experienced minor complications. 16.6% of patients experienced mild epistaxis, 14.2% of patients experienced dry nose and 1 patient had to be treated with antibiotics for a nasal infection. The incidence of adverse events in our study is higher than in comparable studies(1). Recall bias is a potential confounder given the retrospective nature of the study, this is also the first time that HFNC was studied in our institution.

Conclusion: This audit shows that HFNC use in GI endoscopy is associated with a moderate incidence of minor complications. The incidence of HFNC complications in our study was higher than in international studies and an area for improvement in our centre. Our data support the safety of HFNC in GI endoscopy, including its use in multimorbid and obese patients, although further work is needed.

References:

1. Lin Y, Zhang X, Li L, Wei M, Zhao B, Wang X, et al. High-flow nasal cannula oxygen therapy and hypoxia during gastroscopy with propofol sedation: a randomized multicenter clinical trial. *Gastrointestinal endoscopy*. 2019;90(4):591-601.
2. Leslie K, Allen ML, Hessian EC, Peyton PJ, Kasza J, Courtney A, et al. Safety of sedation for gastrointestinal endoscopy in a group of university-affiliated hospitals: a prospective cohort study. *Br J Anaesth*. 2017;118(1):90-9.

6485

When laryngeal mask saves a newborn's life - Case Report

Felgueiras Lopes L. B.¹, Lemos L.², Barata M.³, Dourado C.³, Gouveia F.³

¹Centro Hospitalar Tâmega e Sousa - Penafiel (Portugal), ²Centro Hospitalar Universitário do Porto - Porto (Portugal), ³Centro Hospitalar Vila Nova de Gaia/Espinho - Gaia (Portugal)

Background: Pierre Robin sequence (PRS) is a rare congenital birth defect defined by a triad of micrognathia, glossoptosis and airway obstruction.⁽¹⁾

Case Report: We report a case of a newborn male, uncomplicated eutocic delivery, diagnosed with PRS associated with cleft palate (figures 1 and 2), conditioning feeding difficulties and respiratory distress, that was scheduled for mandibular distraction osteogenesis, at 27 days of life. A multidisciplinary perioperative plan was carried out considering different strategies of airway management. After adequate monitoring, inhalatory anesthesia was induced and maintained with sevoflurane and orotracheal fibre-optic intubation was performed, under spontaneous ventilation, with a 3,5mm orotracheal tube (OTT). Adequate OTT placement was confirmed through direct visualization and capnography curve. Halfway through the procedure, a progressive elevation of CO₂ end tidal was noted, accompanied by a prolonged expiration phase on capnography waveform. Wheezing on auscultation and oxygen desaturation were also noticed. Due to suspicion of bronchospasm, the inspired oxygen fraction and sevoflurane were increased and endovenous succinylcholine, ketamine and inhaled salbutamol was administered with no improvement. Due to hemodynamic deterioration, advanced life support was initiated. During the third cycle of CPR, sudden loss of capnography accompanied by absence of chest rise and no breath sounds on auscultation led to suspicion of OTT dislodgement. It was replaced for an AuraGain™ size-1 laryngeal mask airway (LMA) with return to spontaneous circulation on the next cycle of CPR. A tracheostomy was then performed to secure the airway and facilitate ventilatory weaning. The remaining surgery was uneventful. After, the patient was transferred to the neonatal intensive care unit.

Discussion: Managing a neonatal difficult airway can be a real anesthetic challenge, especially in patients with PRS. Despite having a successful first airway approach, complications can occur and should be anticipated.

References:

1. Cladis, F, Kumar A, Grunwaldt L, Otteson T, Ford M, Losee J. Pierre Robin Sequence: a perioperative review. *Anesth Analg.* 2014 Aug;119(2):400-12

Learning points: LMA can be helpful as a rescue airway on CPR until a definitive airway is obtained, particularly in a difficult airway management.

6544

Awake fiberoptic intubation in a difficult airway with tracheal stenosis – is “Ketodex” a player?

Silva A.¹, Martins T.¹, Martins A.², Rodrigues A.³

¹Hospital Garcia de Orta - Almada (Portugal), ²Centro Hospitalar Barreiro Montijo - Barreiro (Portugal), ³Hospital Garcia de Orta - Almada (Portugal)

Background: Sedation for awake fiberoptic intubation (AFOI) aims to provide patient comfort, cooperation, maintenance of spontaneous ventilation and airway patency while blunting airway reflexes with minimal haemodynamic variation. Many sedation regimens for AFOI including combination of dexmedetomidine and ketamine infusions (“Ketodex”) have been published. Our unique case reports a successful AFOI in a patient with difficult airway predictors under topical anaesthesia and Ketodex infusion, pointing out this strategy as an attractive option in similar scenarios.

Case Report: 42y male admitted for total thyroidectomy with large multinodular goiter leading to 9mm tracheal stenosis, BMI 46kg/m² and Mallampati 4. Minimal orthopnoea was reported. On OR arrival a 10min loading infusion of dexmedetomidine 0,6ug/kg and ketamine 0,5mg/kg, followed by maintenance infusions of 0,3ug/kg/h and 0,2mg/kg/h respectively were administrated. Upper airway topicalization was

achieved with 2% lidocaine. 15min throughout sedation, patient was sleepy but easily arousable with purpose response. An ETT 6.5mm was advanced through the nostril to the nasopharynx with brief discomfort reported. A flexible fiberscope was then advanced through the ETT into the trachea using a spray as you go technique triggering a short episode of cough. After ETT insertion in the trachea, patient opened his eyes and responded accordingly before induction of anaesthesia. No apnoea/desaturation, hypo/hypertension or bradi/tachycardia episodes were recorded. After an uneventful extubation patient reported comfort during AFOI procedure.

Discussion: To our knowledge this is the first report of Ketodex use for AFOI in a patient with the above mentioned characteristics. It provided excellent conditions with no secretions, fall in SPO₂, blood pressure or heart rate variations being identified while providing patient comfort. This strategy was capable of providing sedation with maintenance of airway patency and spontaneous ventilation. We hypothesize that individual drug dosage reduction combined with the complementary pharmacologic properties resulted in a favourable safety profile while providing excellent AFOI conditions.

Learning points: Ketodex plus topical anaesthesia provided good conditions for AFOI with minimal side effects making it a safe and effective strategy in patients with difficult airway predictors. Further studies are needed to support this hypothesis and identify the best dosage regimen.

6612

Awake fiberoptic intubation in Morbihan syndrome: a case report

Tümer M.¹, Anay Yılbaş A.¹, Uzun Ş.¹

¹Hacettepe University School of Medicine - Ankara (Turkey)

Baseline: Morbihan syndrome (MS) is a rare disease characterized by chronic erythematous edema of the facial structures, which may be threatening airway patency. We share our awake fiberoptic intubation (AFOI) experience in a patient with MS who underwent emergency tracheotomy surgery.

Case report: A 29-year-old female patient with MS, was admitted with an emergency tracheotomy plan under general anesthesia due to respiratory distress. The patient had severe edematous lesions on the face with <2 cm mouth opening (Fig 1-2). Her vocal cords were severely edematous. SpO₂ was 85% under 7 L/min nasal oxygen. We preferred oral AFOI technique due to expected difficult mask ventilation and intubation. The procedure was performed without sedation because she was already drowsy and confused. Following adequate Covid-19 precautions and standard monitoring, topical anesthesia with 10% lidocaine was performed for upper airway and combined with spray-as-you-go technique for vocal cords. Tracheal intubation was confirmed both by viewing the endotracheal tube and monitoring end-tidal CO₂. After tracheotomy was performed, the patient emerged from anesthesia uneventfully.

Discussion: MS is a rare clinical condition that can cause fatal acute airway obstruction. Our literature review revealed only one case with MS in which FOI was performed over the intubating laryngeal mask in a spontaneously breathing patient (1). Our case is the first one including management with awake tracheal intubation (ATI). Performing ATI during Covid-19 is controversial, and the data is limited, however it can be applied where essential for the safety of the patient with full personal protective equipment and adequate precautions. Alternative plans for failure of ATI should be discussed with the whole team before starting (2). MS patients with expected difficult airway can be a striking example of inevitable ATI requirement during covid-19.

References:

1. Adabala, V., Govil, N., Barik, A. K., & Goyal, N. (2020). Corrigendum to “Airway management in a case of Morbihan syndrome; A rare clinical entity” [J. Clin. Anesth. 2019 volume 54, pages 72-73]. *Journal of clinical anesthesia*, 63, 109774.

2. Ahmad, I., Wade, S., Langdon, A., Chamarette, H., Walsh, M., & Surda, P. (2020). Awake tracheal intubation in a suspected COVID 19 patient with critical airway obstruction. *Anaesthesia Reports*, 8(1), 28-31.

6625

Video-laryngoscope versus macintosh laryngoscope in nasotracheal intubation

Hend K.¹, Imen Z.¹, Oumaima G.¹, Salma K.¹, Abdelhamid K.¹
¹Hopital Habib Bourguiba - sfax (Tunisia)

Background and Goal of Study: Endotracheal intubation can be done either through the orotracheal route or through the nasotracheal route. The video laryngoscope has been shown to improve visualization of the upper airways and allow better conditions in orotracheal intubation. However, its benefit in nasotracheal intubation has not been well studied and informations regarding its usefulness is still limited.

The aim of our study is to evaluate the effectiveness of the video laryngoscope compared to the macintosh laryngoscope in nasotracheal intubation.

Materials and Methods: This is a randomized 1:1, double-blind clinical trial. We divided the patients as follows: Group 1: Patients who have undergone nasotracheal intubation by direct laryngoscopy using a macintosh laryngoscope. Group 2: Patients who have undergone nasotracheal intubation by video laryngoscopy. We used the modified nasotracheal intubation difficulty scale (NIDS = modified nasal intubation difficulty scale), the evaluation of the three steps of nasotracheal intubation, the Cormack and Lehane score and the glottic opening percentage scale (POGO).

Results and Discussion: We included 50 patients who underwent maxillofacial surgery. 25 patients in each group. We found a significant difference between the 2 groups concerning: the score of intubation difficulty ($p=0.035$, higher score in group 1), the percentage of glottic opening (POGO) with ($p=0.01$, lower in group 1), the Cormack and Lehane score ($p=0.04$, higher in group 2), and concerning the use of Magill's forceps ($p=0.031$, lower in group 2). We also found a significant difference between the 2 groups concerning the oropharynx-glottis time and the glottis-trachea time in favor of group 2 (respectively $p=0.008$ and $p=0.018$) as well as for the total duration of the intubation ($p=0.005$) with a lower median for group 2. On the other side, the two groups are comparable concerning the nose-oropharynx time ($p=0.068$). No significant difference between the 2 groups concerning epistaxis and hoarseness (respectively $p=0.087$ and $p=0.684$).

Conclusion: According to our study, nasotracheal intubation appears to be easier with video laryngoscope. That's why, the generalization of the availability of the video laryngoscope in operating rooms is certainly of great benefit both for orotracheal intubation and for nasotracheal intubation.

6633

CPAP+4 versus ShamCPAP for radiofrequency ablation of primary and metastatic lung cancer under procedural sedation and analgesia. A prospective randomized control trial.

Carrero E.¹, Vollmer I.², Torres M.³, Casanovas G.⁴, Tercero F. J.⁵, Valero R.⁵ Neuroanaesthesia-CDI-Sleep Unit Hospital Clinic Barcelona Group
¹Anesthesiology Department, Hospital Clinic de Barcelona - Barcelona (Spain), ²Department of Radiology, CDI, Hospital Clinic, University of Barcelona - Barcelona (Spain), ³CIBERES - Hospital Clinic University of Barcelona - Barcelona (Spain), ⁴IDIBAPS - Hospital Clinic Barcelona - Barcelona (Spain), ⁵Anesthesiology Department, Hospital Clinic, University of Barcelona - Barcelona (Spain)

Background and Goal of Study: The risk/benefit of applying CPAP in pulmonary radiofrequency ablation (RFA) under procedural sedation and analgesia (PSA) is unknown. Aim: to assess the safety and efficacy of a minimal CPAP (4cmH₂O) compared with ShamCPAP for RFA of malignant lung tumours under PSA. Hypothesis: CPAP+4 is a safe technique and can improve efficacy of pulmonary RFA on patient oxygenation and local radiological efficacy.

Materials and Methods: Single-center, prospective, randomised controlled study with medical device open-label and two parallel groups. November 2014 to February 2018. Patients with primary or metastatic lung cancer undergoing RFA under PSA were randomised to receive CPAP+4 or ShamCPAP (modified mask for placebo CPAP)1. Primary outcome: safety of CPAP+4. Number (%) of subjects reporting at least one adverse event (AE) or serious AE (SAE) was analysed. We assessed CIRSE and Clavien-Dindo classifications for complications, hospital stay and readmissions during 1 month follow-up. Secondary outcome: effect of CPAP+4 on SpO₂, ETCO₂ and local radiological efficacy of RFA (CT measurement of tumour ablation margin, minimum halo thickness, tumour size change). The risk of complication was assessed using a logistic regression model (OR 95%CI). Longitudinal continuous variables were analyzed using mixed-effects model repeated measures (MMRM) approach. Intention-to-treat (ITT) and per protocol (PP) analysis.

Results and Discussion: 46 patients were randomised (ITT CPAP+4=22, ShamCPAP=24), 37 adhered to the protocol (PP n=17 and n=20, respectively). CPAP+4 had more SAE (ITT 22.7% vs 4.2% $p=0.08$; PP 23.5% vs 0%, $p=0.036$). The risk of AE on the ward postRFA was 4-fold in CPAP+4 (ITT 4.250 (1.234-14.637) $p=0.021$; PP 4.457 (1.110-17.899) $p=0.035$) with a higher incidence of pneumothorax (ITT 22.7% vs 0% $p=0.019$; PP 29.4% vs 0% $p=0.014$). Additional therapy after the procedure or prolonged hospital stay (CIRSE 3) was higher in CPAP+4 (ITT 18.2% vs 4.2% $p=0.15$; PP 23.5% vs 0% $p=0.036$). No differences were observed in Clavien-Dindo classification. CPAP+4 had more admission nights (ITT 1.5±1.1 vs 1.0±0, $p=0.022$; PP 1.6±1.2 vs 1.0±0, $p=0.037$). No patient was readmitted. We found no differences in SpO₂, minimum SpO₂, %time SpO₂<90, maximum ETCO₂, %timeETCO₂>40 or local radiological efficacy.

Conclusion: Cpap+4 is not safe for RFA of lung cancer under PSA.

Trial registration: ClinicalTrials.gov: NCT02117908

Reference:

1-The Lancet 1999;353:1154

6668

Novel video Assisted Oro-tracheal Intubation Device “Nour’s Video assisted airway”

Nour S.¹, Chernishof V.¹

¹Children’s Hospital of Los Angeles - Los Angeles (United States)

Background and Goal of Study: Valuable tools have been developed to aid the anesthesia practitioner during management of difficult intubations, such as the flexible fiber optic and video laryngoscope. However, the presence of blind spots in the oropharynx and reliance on a rigid stylet has led to increased cases of airway trauma with video laryngoscope use. Alternatively, the fiberoptic intubation (FOI) technique is considered the “gold standard” in the management of difficult intubations. Limitations with FOI include difficulty keeping the upper airway patent, shortsighted narrow-angle views, and complete obstruction when heavy secretions or blood is present.² In order to overcome these limitations, a new system was designed with the goal of combining the strengths of each system and minimizing their disadvantages.

Materials and Methods: We have designed a device that combines images obtained from both the video-assisted and fiber optic scopes on a single screen. Furthermore, our video-assisted oral airway mouthpiece comes with an adjustable angle that can provide the laryngeal view while simultaneously allowing the endotracheal tube to be loaded on a flexible stylet or optic scope for intubation by a single operator.

Results and Discussion: The initial prototype shows promising preliminary results. The strengths of the device include, but are not limited to, the following: Reduction in the number of operators needed during management of a difficult airway. Reduction in square footage needed to house multiple different devices in one room. Easy-of-use and Improvement in visualizing the laryngeal structures. Allows inexperienced operators to perform difficult intubations. Limits potential for complications associated with use of video laryngoscope or fiberoptic scope. Further improvement in the prototype design and evaluation are still needed.

Conclusion: Airway management devices entered a new era after the development of video laryngoscopes and flexible fiber optic devices. Although innovative, each device comes with its own limitations and challenges. We hope that our device can help eliminate some of the shortcomings of the currently available devices while enhancing the experience of the operator during management of difficult airways.

6669

Objective airway assessment and predictability of difficult intubation: time to be more accurate.

Pandurangan M.¹, Kastsichenka S.¹, Lamperti M.¹, Cartwright A.¹

¹Cleveland Clinic Abu Dhabi - Abu Dhabi (United Arab Emirates)

Background and Goal of Study: In our institute we substituted the traditional airway assessment system (TAAS) with El-Ganzouri Risk Index (EGRI) airway assessment scoring system in March 2019. The goal of the study is to assess change in practice and the validity of EGRI in predicting difficult intubation in our population group.

Materials and Methods: We performed a retrospective cohort study on all adult patients who underwent general anesthesia with endotracheal intubation from April-July 2018 and April-July 2019. All data were collected from our electronic medical record.

Results and Discussion: We collected data from 1881 patients evaluated by TAAS and 2187 patients evaluated by EGRI. Use of indirect laryngoscopy significantly increased from 45.03% to 51.3% following introduction of the EGRI score. For each EGRI score variable, logistic regression was used to assess its strength of predicting Cormach Lehane view 3,4 (CL 3,4) via calculation of the associated AUC. Original EGRI: the associated AUC value was 0.596. Modified EGRI Score 1 (Figure 1): assigning appropriate weightage for the EGRI components, strength of prediction increased resulting in AUC of 0.642. Modified EGRI Score 2 (Figure 1): when biometric parameters were combined with the set of EGRI components, strength of prediction increased further (AUC = 0.698). Thus, we found that the Modified EGRI Score 2 has an increased strength of prediction over the original and Modified 1 EGRI scores. The Modified EGRI Score 2 is calculated as the weighted linear combination

of their component and biometric data, centered so that a score of 0 aligns with the unconditional probability of CL 3,4 in our sample (6.63%). Plotting the range of the Modified EGRI Score 2 against the predicted probability of CL view 3,4 results in an exponential curve demonstrating how increases in the Modified EGRI Score 2 align with increased probability of CL view 3,4. A patient’s Modified 2 Score can be calculated and plotted to determine their likelihood of CL view 3,4. Thus resulting in a decision-making tool with stronger strength of prediction than the original EGRI.

Conclusion: Introduction of EGRI scoring resulted in increased incidence of use of indirect laryngoscopy. Assigning appropriate weightage based on the aggregate population data resulted in a better airway risk index predictor.

References:

<https://doi.org/10.1093/bja/aem297>

Acknowledgements: Mr Terrence Lee St John - Biostatistician

6684

Videolaryngoscopy - every rose has its thorn!

Zuzarte D.¹, Moreira S.¹, Caria T.¹

¹Centro Hospitalar Lisboa Ocidental - Lisboa (Portugal)

Background: Videolaryngoscopy became a very popular and useful technique, particularly in difficult airway scenarios. Despite better anatomical structures visualization compared to direct laryngoscopy, videolaryngoscopy introduces some new risks due to the existence of blind spots during indirect visualization, different blade curvatures and narrower passage of endotracheal tube (ETT).¹

Case Report: 30 years old parturient, 37 weeks gestation, ASA II, presenting with umbilical cord prolapse, requiring emergent caesarean. General anesthesia was performed under rapid sequence induction. Following loss of consciousness and adequate neuromuscular block, orotracheal intubation was attempted using videolaryngoscopy. A resistance to ETT passage was noticed after introduction on oral cavity. ETT was withdrawn, blood was found in the oropharynx and a right tonsillar pillar perforation was identified. After airway aspiration, we proceed with a new attempt of orotracheal intubation, through direct visualization of the ETT entrance until it passed palatopharyngeal fold, and posterior orientation of ETT guided by video. Emergency otolaryngology team was contacted, and, after clinical evaluation, concluded that there was no indication for invasive intervention. At the end of procedure, oropharynx was re-inspected and active bleeding excluded. Extubation went without complications. Patient was admitted in PACU, with continuous monitoring of signs of hemorrhage or edema. The headboard was kept with 30° elevation and external ice application and cold drink intake was encouraged. No complications were observed.

Discussion: During Insertion of ETT into the oral cavity without direct visual control, advancement occurs in a ‘blind spot’ carrying the risk for palatopharyngeal trauma. ETT should be advanced beyond the uvula under direct visualization and without using undue force before directing practitioner’s attention to the video monitor. Systematic inspection of the oropharynx and examination of the palatopharyngeal wall are crucial steps after each intubation and before extubation.

References:

1. Greer, et al. Review of Videolaryngoscopy Pharyngeal Wall Injuries. Laryngoscope, 2016.

Learning points: Reports of palatopharyngeal injuries associated with videolaryngoscopy are increasing in the literature. Although these injuries rarely require long-term care, strategies that increase the safety of the technique should be actively adopted.

6688

How to manage the airway of a patient with severe tracheal stenosis secondary to infiltration by epidermoid carcinoma of the oesophagus?

Francisco Iglesias C.¹, Martínez Salgado A.¹, Regueira Cuiña J.¹, Rodríguez Lago M.¹, Cortiñas Díaz J.¹, Álvarez Escudero J.¹

¹Hospital Clínico Universitario de Santiago de Compostela - Santiago de Compostela (Spain)

Background: The anaesthetic management of severe tracheal stenosis secondary to neoplasia is insufficiently described in the literature, so there is little evidence to recommend a specific anaesthetic technique. Sharing the airway with the surgeon is an added difficulty in these procedures.

Case report: A 48-year-old male, ex-smoker, was brought urgently to the operating theatre with a diagnosis of almost complete tracheal obstruction due to infiltrative oesophageal neoplasia, which severely impeded his breathing. An intraluminal approach with a rigid bronchoscope was performed and ventilation was maintained with a manual jet system (Manujet III; VBM Medizintechnik GmbH). A right-angled steel cannula was used as an injector, introduced from the proximal orifice during surgical maneuvers and laser treatment of the lesion. General anesthesia was maintained by TIVA and neuromuscular blockade. Significant enlargement of the tracheal lumen was achieved. Intermittent manual jet ventilation lasted approximately 2.5 hours, maintaining constant SpO₂>95%. At the end of the surgical procedure, orotracheal intubation with an exchange guide through the bronchoscope was performed for transfer to the Intensive Care Unit (ICU). On arrival at the ICU, arterial blood gases showed pH 7.25, pO₂ 250 mmHg, and pCO₂ 110 mmHg. The control X-ray ruled out complications. He was extubated in optimal conditions 6 hours later.

Discussion: Manual jet treatment during rigid bronchoscopy for the described type of lesion is safe but not generally known or mastered. It is not a risk-free technique; it is essential to avoid serious complications by monitoring for sustained or increasing chest expansion, observing respiratory movement in and out of the chest. Transcutaneous CO₂ monitoring was not available but would have been useful as long periods of apnoea were required.

References:

1. McRae K. Tracheal Resection and Reconstruction. In: Slinger P et al, et al, editors. Principles and Practice of Anesthesia for Thoracic Surgery. 2nd ed. Toronto. Springer, 2019. P 231-48.

Learning points: Manual jet ventilation allows optimal respiratory control during rigid bronchoscope treatment of obstructive tracheobronchial lesions.

6726

Airway management in a patient with aberrant right subclavian artery aneurysm

Barrera Bohórquez L. C.¹, Monsalve X.², González-Suárez S.²

¹Hospital Universitario Vall d'Hebrón - Barcelona (Spain), ²Hospital Universitario Vall d'Hebrón - Barcelona (Spain)

Background: The aberrant right subclavian artery aneurysm (ARSAA) is an anomaly of the aortic arch (1%)¹. Usually, patients are asymptomatic, and the finding is casual. There are no studies published of acute respiratory failure with difficulty in tracheal intubation and mechanical ventilation in these patients.

Case Report: A 36-year-old woman presented acute and severe respiratory failure, requiring mechanical ventilation. The orotracheal intubation was difficult due to anterior, compressed and shifted glottis to the right, and the tracheal tube did not progress beyond 17 cm from the mouth commissure. A thoracoabdominal computed tomography showed an aneurysm of the aortic root of 59 mm in transverse diameter, and an ARSAA of 86x51 mm that displaced and compressed the trachea and esophagus to the right in the anterolateral direction. The trachea presented an image of extrinsic compression with stenosis from the tip of the tracheal tube to the carina. Given these findings, a thoracic aortic endoprosthesis was placed covering the origin of the aberrant right subclavian artery. Subsequently, a carotid-subclavian bypass with saphenous vein was performed by supraclavicular incision. During

surgery, the patient's mechanical ventilation worsened due to the tracheal compression by the ARSAA, and several measures were necessary to reduce airway pressures such as maintaining the arterial systolic blood pressure below 110 mmHg, and cervical lateralization maneuvers to the left. Since respiratory problems persisted in the postoperative period, a fibrobronchoscope was performed and a 90% tracheal stenosis was seen and treated with dilatation with a high-pressure balloon and placement of a tracheal prosthesis.

Discussion: Nishiyama et al² described a patient with ARSAA who presented difficulty for bronchial intubation with the Univent tube blocker, but not for tracheal intubation and mechanical ventilation. In this case report, the maintenance of low blood pressures, as well as the cervical lateralization to the left, allowed to improve the mechanical ventilation.

References:

1. Bisognano JD et al. Chest. 1997; 112 (6):1693-7.

2. Nishiyama J et al. J Exp Clin Med. 2002; 27 (1): 21-6.

Learning points: In these patients we should avoid high blood pressure and perform postural maneuvers to decrease aneurysm tension, and subsequently improve mechanical ventilation. Also, the placement of a tracheal prosthesis should be considered, to ensure correct pulmonary ventilation.

6736

Acute malnutrition as a marker of difficult weaning from mechanical ventilation and worse outcome in children: a cohort prospective observational study

Filyk O.¹

¹Department of Anesthesiology and Intensive Care - Lviv (Ukraine)

Background and Goal of Study: Serum proteins level disturbances might impact respiratory muscles functions and affect weaning from mechanical ventilation (MV). Transthyretin is a good marker for making the diagnosis of acute nutritional disorders with taking into account level of inflammation due to the fact that its metabolism going rapidly. The aim of this study was to find out whether low level of transthyretin lead to prolonged ventilation. The study hypothesis was that transthyretin level and duration of acute malnutrition have no impact on weaning from MV and clinical outcome in children.

Materials and Methods: We examined data of 27 patients at the age 13-18 years, who needed invasive mechanical ventilation. 23 patients were included in the study results analysis. The level of transthyretin was obtained on 1st, 3rd, 5th and then every five days during MV. Transthyretin level less than 100 mg/l was considered a marker of acute malnutrition. The primary outcome was the time to liberation from MV. Secondary outcomes were complications: prolonged ventilation or death. Statistical Package for the Social Sciences was used and the results were presented using median [IQR], adjusted hazard ratio (HR), duration ratio.

Results and Discussion: It was found that among patients with duration of acute malnutrition below 3 days successfully weaned from mechanical ventilation during the first 14 days were 52% and duration of weaning from MV was 11.2 [8.5; 13.1] days, while among patients with duration of acute malnutrition over 5 days successfully weaned from mechanical ventilation during the first 14 days were 9% and duration of weaning from MV was 21.5 [18.7; 33.6] days. Low level of transthyretin was associated with lower daily probability of liberation from ventilation (adjusted HR 1.94, 95%CI 1.54-2.35, per 10% decrease). There were no patients at day 1st who had transthyretin more than 100 mg/l, however, at days 3rd and 5th there were 61% (transthyretin 121 [118 to 146] mg/l) and 70% (transthyretin 248 [164 to 251] mg/l) of patients with transthyretin over 100 mg/l. Mortality level was 9% and was associated with acute malnutrition over 10 days.

Conclusion: Serum proteins level disturbances and acute malnutrition might prolonged duration of MV and impact clinical outcomes.

6780

Difficult airway management: Be prepared for the rarest scenario

Windels A.¹, Guimarães D.², Fernandes P.², Pratas A.²
¹Hospital do Espírito Santo - Évora (Portugal), ²Hospital do Espírito Santo - Évora (Portugal)

Background: "Can't intubate can't oxygenate"(CICO) situations are very rare and most anaesthetists will not experience them throughout their careers. Scalpel cricothyroidotomy is the fastest and most reliable method of securing the airway in a CICO situation.

Case Report: 59-year-old male patient with medical history of cervical spondylotic myelopathy, spastic tetraplegia, asthma, emphysema, chronic respiratory insufficiency, dysphonia, paresis of the right hemilarynx due to a probable laryngocele, hypertension, anemia of chronic disease, alcohol and tobacco use. The patient presented at the ER with dyspnoea at rest, wheezing and bronchospasm, SpO₂ of 92%. Despite medical treatment, progressive clinical and blood gas deterioration culminated in severe respiratory acidemia. At the ER, endotracheal intubation was attempted by two anaesthetists, resorting to videolaryngoscopy, with 6.0 and 4.5mm endotracheal tubes. Three attempts were executed without success. CICO was declared owing to a voluminous glottic mass. Percutaneous cricothyroidotomy with jet ventilation allowed emergent oxygenation, but blood gas revealed an immeasurable pCO₂. The patient developed cardiac arrest, successful CPR was achieved after cricothyroidotomy. An emergent surgical tracheostomy was performed in the OR by a general surgeon and the patient was transferred to the ICU. Evaluation by ENT identified a right vocal cord tumour occupying the entire glottic space. At the internal medicine ward the patient developed nosocomial pneumonia, multiples periods of respiratory distress with desaturation and general muscle wasting. At the 12th day, the worsening respiratory condition lead to cardiac arrest and the patient was not resuscitated due to DNR order.

Discussion: Anatomical and pathophysiological disturbances contributed to a difficult airway. Highlights of the airway management were the early call for help, prioritization of oxygenation, initial use of videolaryngoscope, limited number of ETI attempts, switch of anaesthetist performing the attempt and reduction in tube size. As a plan B in most difficult airway algorithms, placement of a supraglottic airway device could have been tried, but considering the visualization of the large glottic mass an emergent scalpel cricothyroidotomy was the most indicated approach.

Learning points: Thorough knowledge of algorithms and regular training in difficult airway management allows timely action and is essential for all anaesthesiologists.

6831

High-flow nasal cannula oxygen therapy implementation at emergency tracheostomy in the operating room

Dincer M. B.¹, Buyuk D.¹, Kara H.², Altun-Bingol D.¹, Camcı E.¹
¹Istanbul University Faculty of Medicine, Anaesthesiology and Reanimation - Istanbul (Turkey), ²Istanbul University Faculty of Medicine, Ear, Nose and Throat Surgery - Istanbul (Turkey)

Background: High-flow nasal cannula (HFNC) is a modality of oxygen therapy applied in ICUs for acute hypoxemic respiratory failure primarily and other utilizations are preoxygenation before intubation in the operation room (OR) and COPD exacerbations(1). In this case report, we mention the usage of HFNC in the OR for oxygenation and ventilation support while emergency tracheostomy was performing.

Case Report: 63 years old male patient with a diagnosis of ductal carcinoma at the hard palate needed an emergency tracheostomy due to upper airway obstruction. Tachypnea, dyspnea, and stridor were clinically seen; neck, face, lips, and tongue were edematous, neck extension was restricted, Mallampati score was IV. Consequently, difficult bag-mask ventilation and intubation were predicted. Inhalation anesthesia was maintained with sevoflurane and 100% FiO₂ with bag-mask ventilation under spontaneous ventilation and local anesthetic was infiltrated to the skin by the surgeons. Bag-mask ventilation was difficult and etCO₂ was not seen properly at the monitor. A nasal airway was inserted but the spontaneous respiration pattern worsened due to possible hypercarbia. Therefore HFNC was implemented to the patient with settings 45 L/min flow and 95% oxygen. About 5-10 minutes after implantation, the respiration pattern improved. At the end of the operation, the respiration circuit was connected to the tracheostomy cannula, etCO₂ was 80 mmHg at the monitor; pH:7.22, pO₂:371 mmHg, pCO₂:70 mmHg were at arterial blood gas sample analysis. The oxygen saturation was never below 90% during the operation. After the emergence, the patient was admitted to ICU for treatment of hypercarbia and was discharged from the hospital without any complication.

Discussion: As far as we know, this is the first reported case HFNC was used while performing an emergency tracheostomy in the OR. Preoxygenation with HFNC prior to intubation reduces the risk of respiratory complications, also it helps CO₂ elimination at hypercapnic respiratory failure management (1,2). In this case, we used the HFNC after the start of the operation, for improving oxygenation and helping CO₂ elimination when the patient's spontaneous ventilation pattern worsened due to possible hypercarbia. We consider that HFNC improved outcomes in that emergency tracheostomy case.

References:

1. RespCare 2020;65(4):545-557
2. CanRespirJ 2020:740645

Learning points: HFNC can be useful in emergency situations where airway management is difficult.

6834

Tracheal rupture during emergency endotracheal tube exchange in a HDU setting. A case report.

KATSAROS D.¹, Devadze G.², Andreeva A.², Dimakopoulou A.²
¹General Hospital of Athens "G. Gennimatas" Greece - Athens (Greece),
²General Hospital of Athens "G. Gennimatas" - Athens (Greece)

Background: Tracheal rupture is a rare, but potential fatal, complication that can occur after endotracheal intubation. There are sparse reports of this occurring during endotracheal tube (ETT) exchange. Clinical presentation includes subcutaneous emphysema and respiratory distress among others. Although rare, with a reported incidence of 0,005% during tracheal intubation, we believe that such cases are extremely underreported by clinicians.

Case Report: A 60-year-old male is intubated in a HDU as of three days because of a coma due to hepatic encephalopathy on the basis of end-stage hepatic failure. Assistance is requested, from the attending physician, for an ETT exchange due to supposed ETT blockage and inadequate mechanical ventilation. Two attempts were made from a junior anesthetist, under direct laryngoscopy, for an ETT exchange with the use of a FROVA tracheal tube introducer, the second one being successful. Two hours later, bilateral subcutaneous emphysema was developed, confirmed by chest X-ray, which also revealed right pneumothorax. CT-scan confirmed the above, plus revealing anterior tracheal wall rupture. A right bulau drain was placed and the patient was admitted to the ICU, where he died one day later.

Discussion: Tracheal rupture usually occurs as a result of blunt trauma of the neck and chest. To be reported as a complication of endotracheal intubation is extremely rare whereas as a complication of ETT exchange is ever more so. We believe that such cases highlight the potential deleterious effects of adjuvant airway management devices in the setting of emergency ETT exchanges, especially in the hands of inadequately trained personnel. Moreover, care must be taken in recognizing quickly possible complications in these cases.

References:

1. Miñambres E, Burón J, Ballesteros MA, Muñoz P, González- Castro A. Tracheal rupture after endotracheal intubation: a literature systematic review. *Eur J Cardiothorac Surg* 2009; 35: 1056-62.

Learning points: Complications during airway management are not limited in the cases of tracheal intubation, but also during endotracheal tube exchange cases. Failure to predict and prevent such events can often lead to fatal outcomes for our patients. Adjuvant airway management devices can be helpful, but need to be used with care by experienced personnel or with supervision by an experienced user.

6881

Combined airway technique in a patient with tracheal stenosis following intubation and ventilation for Covid-19 pneumonia

Dow Q.¹, Yeow C.¹
¹Royal Surrey County Hospital NHS Foundation Trust - Guildford (United Kingdom)

Background: Tubeless anaesthesia using jet ventilation is a frequently used method required for laryngeal surgery(1). Tracheal stenosis is a debilitating and potentially life-threatening condition which is known to occur following prolonged intubation secondary to ischaemia of the trachea. During the COVID-19 pandemic unwell patient were needing prolonged intubation and ventilation, increasing the risk of acquired laryngotracheal stenosis(2).

Case Report: A 47-year-old lady was admitted with a fever and cough during the first COVID surge in April 2020. She had a background of asthma, hypertension and obesity(BMI 50). She was intubated and ventilated and a tracheostomy was inserted after 3 days and remained in situ for 17 days. Upon follow-up she reported severe shortness of breath and voice changes and was scheduled for a microlaryngoscopy. Preoxygenation was started using Transnasal Humidified Rapid-Insufflation Ventilatory Exchange (THRIVE) at 70L/min prior to induction. The patient was induced using total intravenous anaesthesia and once asleep the patient's position was reclined and microlaryngoscopy was performed showing

severe subglottic stenosis. Supraglottic Jet ventilation(Monsoon III Jet Ventilator) was started at 1.5 bar, FiO2 100%, PP 30 with simultaneous use of THRIVE, pausing during tracheal dilatation.

Discussion: Jet ventilation uses high frequency ventilation and allows gas exchange by several mechanisms including bulk flow, laminar flow, Taylor dispersion and Pendelluft effect. The additional use of THRIVE allowed for further entrainment of oxygen via the jet path. We believe that this combined airway technique together with optimal patient positioning has improved and sustained prolonged oxygenation.

Learning points: There may be an increasing burden of laryngotracheal stenosis following the COVID-19 pandemic as warned by the European Laryngeal Society(2). This case report highlights the benefits of using a combined THRIVE and jet ventilation technique to manage these cases intraoperatively.

References:

1. CROCKETT DM, SCAMMAN FL, MCCABE BF, LUSK RP, & GRAY SD.(1987).Venturi jet ventilation for microlaryngoscopy: technique, complications, pitfalls.The Laryngoscope.97,1326-30.
2. PIAZZA C, et al.(2021).Long-term intubation and high rate of tracheostomy in COVID-19 patients might determine an unprecedented increase of airway stenoses: a call to action from the European Laryngological Society.European Archives of Oto-Rhino-Laryngology.278.

6897

Blind vs videolaryngoscope guided laryngeal mask insertion: a prospective randomized comparison of oropharyngeal leak pressure and fiberoptic grading

Saracoglu A.¹, Simsek T.¹, Sezen O.¹, Cakmak G.², Saracoglu K. T.³
¹Health Sciences University Kartal Dr. Lutfi Kirdar City Hospital - Istanbul (Turkey),
²Marmara University Medical School Pendik Training and Research Hospital - Istanbul (Turkey),
³EAMS - Istanbul (Turkey)

Background and Goal of Study: Laryngeal Mask Airway (LMA) insertion may not always be smooth and without complications. Controversial results of several studies evaluating ideal insertion conditions have been published. We aimed to compare the oropharyngeal leak pressure values and fiberoptic grading scores between blind and video-laryngoscope guided LMA insertion.

Materials and Methods: Following the Ethics Committee approval (date: 27/03/2019, protocol no: 2019/514/150/21) and study registration (NCT04311775), patients were randomly into blind insertion (n=50) and video-laryngoscope guided insertion (n=50) groups. The oropharyngeal leak pressure, peak airway pressure, fiberoptic grading score, first attempt success rate, hemodynamic parameters, and complications were recorded.

Results and Discussion: In both groups all laryngeal mask airways were inserted at first attempt successfully. The fiberoptic staging scores, peak airway pressures, and LMA insertion time were found similar between groups. The oropharyngeal leak pressure before extubation was found to be significantly higher in the video-laryngoscope guided insertion group than blind insertion (36.29±7.09 vs 33.79±8.84 cmH2O respectively, p=0.04).

Conclusion: The findings of our study suggest that the video-laryngoscope guided classical LMA insertion with a standard blade technique may be a useful alternative to blind insertion.

6900

Impact of video games on training - can it change the game of endotracheal intubation?

Saracoglu K. T.¹, Sezen O.², Simsek T.², Cakmak G.³, Shallik N.⁴, Saracoglu A.³

¹EAMS - Istanbul (Turkey), ²Health Sciences University Kartal Dr. Lutfi Kirdar City Hospital - Istanbul (Turkey), ³Marmara University Pendik Training and Research Hospital - Istanbul (Turkey), ⁴Tanta Faculty of Medicine, Tanta, Egypt, Weill Cornell Medical College Qatar. - Doha (Qatar)

Background and Goal of Study: Video games are activities that require active hand-eye coordination and 3D thinking is at the forefront. Studies have shown that participants who play video games while teaching both laparoscopic surgery and robotic surgery techniques complete training more easily and their success rates increase. Videostylers are newly developed devices that allow the use of video technology in airway management. We aimed to compare the performances of assistants who played video games with assistants who did not play in order to determine whether playing video games has positive effects on the use of videostyle. **Materials and Methods:** After the approval of the ethics committee of our hospital, the residents of our clinic were questioned about whether they had played video games before, and they were divided into two groups as those with experience and those without. Those who had previous gaming experience (Group I, n=14) were played a video game (PUBG mobile) for 0.5 hours a day for 5 days. No game was played in the other group (Group II, n=15). Then, training was given to all participants about the video style. Tracheal intubation time, number of attempts, need for maneuver for optimization, presence of complications, hemodynamic findings of the patient during the application, age, height, weight, gender, ASA, Mallampati and Cormack values of the patients were recorded.

Results and Discussion: There was no statistical difference between the patients in terms of age, height, weight, gender, ASA, Mallampati, Cormack values. While 13 assistants in Group I performed videostyle endotracheal intubation successfully, 12 assistants were successful in Group II. The average duration of the videostyle in Group I was 29.06 seconds and the average of Group II was 59.92 seconds, and it was observed that the residents with video playing habit performed faster. ($p < 0.0006$). When the number of attempts was compared, the average of Group I was 1.14 and the average of Group II was 1.47, and there was no statistical difference between the groups ($p > 0.19$). Maneuvering support for optimization was provided to 3 assistants in Group I, while Group II was provided to 8 assistants.

Conclusion: In conclusion, We observed that the habit of playing video games previously improved the endotracheal intubation skill made through videostyle.

6915

Evaluation of Video Mask, a new SAD device with a camera and optical lighting, in a case series of patients.

Martinez-Hurtado E.¹, Aracil Escoda N.¹, De La Varga Martinez O.¹, Saez Ruiz E.¹, Gadin Lopez S.¹, Abad Gurumeta A.¹, FIDIVA, GEVAD, GVAH ¹Hospital Universitario Infanta Leonor - MADRID (Spain)

Background: classically it has been said that Supraglottic Airway Devices (SADs) must have high airway seal pressures during spontaneous and positive pressure ventilation, low resistance to the flow of gases, and some form of protection against pulmonary aspiration, including gastric drainage 1. Besides, it should allow for perfect insertion rates at first try, minimal rate of complications, and minimal incidence of postoperative symptoms 2. We have used Video Mask, a new SAD device with a camera and optical lighting to visualize insertion, enable maneuvering to optimize position, verify placement, and seal 3.

Case Report: under HUIIL common practice and with written informed consent, 20 adults aged 18-65 yr and ASA physical status 1 or 2, undergoing elective gynecological, urological or general surgical procedures under general anesthesia in which the LMA was considered appropriate, were enrolled into this case series. We want to determine the first attempt success rate under direct vision, and other parameters as ease of insertion, overall success rate, and opinion about device. Patients were pre-oxygenated and induced with no neuromuscular blocking agents. Device was used completely deflated and lubricated, according to creator recommendations, and only size 4 was available. All insertions were successful, and no one presents complications or injuries. Device was at least as good as existing SADs, with the added bonus of a direct view of placement.

Discussion: vision Mask allows traditional ventilation use as a laryngeal mask, and continuous vision allows control of the placement process, with corrective maneuvers, avoiding damage to structures that could be damaged by the SAD.

References:

1. Edelman DA, et al. Difficult airway management algorithms. *Anaesthesia*. 2019 Sep;74(9):1175-1185.
2. Joanna Gordon, et al. Supraglottic airway devices. *Minerva Anestesiologica*. 2018 Mar;84(3):389-397.
3. Van Zundert AAJ, et al. The case for a 3rd generation supraglottic airway device facilitating direct vision placement. *J Clin Monit Comput*. 2021 Apr;35(2):217-224.

Learning points: blind insertion of SADs must left behind, as has been done in other fields of anesthesia. Direct vision guided maneuvers should be the gold standard of safety for airway management. However, more studies with more patients will be needed to determine if this device is 100% effective, or if it needs to be modified and improved to increase its efficacy and safety.

6938

Shoulder arthroscopy and fluid extravasation: a rare but potentially fatal complication

Laranjo M.¹, Roriz C.¹, Gonçalves L.¹, Fidalgo A.¹, Castro D.¹, Valente E.¹
¹Centro Hospitalar de Leiria - Leiria (Portugal)

Background: An optimal view of the surgical field is required to ensure arthroscopic procedures, for which fluid irrigation is performed. However, excessive pressure or flow may cause fluid extravasation (FE) into the soft tissues, and although considered rare, this can be life-threatening due to potential airway edema.^{1,2}

Case Report: A 63-year-old woman, ASA II, with painful rotator cuff rupture and acromioclavicular and bicipital tenosynovitis underwent right shoulder arthroscopy (SA). Preoperative physical examination and laboratory findings were normal. Combined general anesthesia and superficial cervical plexus and interscalene blocks were performed. The patient was positioned in left lateral decubitus and a pump irrigator with 100 mmHg pressure was used for fluid irrigation (FI). After 2.5 hours of surgery, 69 L of saline solution had been irrigated and facial, neck, and chest wall edema were identified. The SA was converted to open surgery to avoid additional FI, and intubation was kept due to observed airway edema. The patient was admitted to the intensive care unit (ICU). Two days later, the edema solved and she was extubated safely. The patient recovered and was discharged 4 days after the SA.



Discussion: Careful intraoperative monitoring is paramount in early detection of SA-associated FE and preventing further.² In this case, FE during SA led to airway edema, which could be life-threatening. Actions taken included irrigation interruption, intubation maintenance to keep airway control and postoperative controlled monitoring in ICU, as these complications tend to resolve without additional action.² Other factors contributing to this complication included the long operative duration and lateral decubitus position which assists the movement of fluid from the shoulder to the neck.²

References:

1. Martínez-Gómez JM et al. *Rev Esp Cir Ortop Traumatol.* 2008;52:250-9.
 2. Memon M et al. *Orthop J Sports Med.* 2018;6:2325967118771616.

Learning points: Intraoperative monitoring for signs and symptoms of fluid extravasation during SA, as well as monitoring the volume of fluid irrigated, are essential for early detection of this complication and its prompt management.

6962

Preoperative airway assessment indices for difficult intubation prediction

Tzima M.¹, Kapanidis K.¹, Zemou S.¹, Mavropoulos C.¹, Katsanoulas K.¹, Katsika E.¹

¹Hippokrateion General Hospital Thessalon - Thessaloniki (Greece)

Background and Goal of Study: The management of difficult intubation is a stressful procedure for the anaesthesiologist, let alone the ability to predict it. To meet this challenge, several airway-related indices were assessed, beyond the already established El Ganzouri Risk Index (EGRI).

Materials and Methods: 409 patients scheduled for general anaesthesia were assessed preoperatively and at induction for several indices, both quantitative and qualitative; sex, age, weight, height, BMI, Mallampati classification, ability for jaw protrusion (ULBT), neck mobility and circumference, mouth opening, thyromental distance (TMD), snoring, sleep apnoea history, history of previous difficult intubation, beard or artificial dentures presence, bag mask ventilation difficulty, number of intubation attempts, BURP maneuver, use of advanced airway tools and years of clinician's experience. SPSS was used for statistical analysis.

Results and Discussion: 71% were women, median age 56, weight 76, height 165cm. 52,3% were classified as Mallampati I and only 2% as Mallampati IV. Only 22% showed mouth opening under 4cm and 13,3% had TMD < 6cm. 5,8% had no ability for jaw protrusion. 8,5% were unable to extend their neck above 80°. Mean neck circumference was 37,5cm, TMD 7,1cm and circumference/TMD ratio 5,54. 9% had a previous history of difficult intubation. Half of them were snoring at sleep. 10% had a beard and 23% carried artificial dentures. 7,8% had a history of sleep apnoea. Only 3,5% had difficult bag mask ventilation requiring a Guedel airway insertion and two hands technique. 67% were intubated with blade no 3. 60% had Cormack-Lehane (C-L) I, 20% IIA, 12% IIB, 6,5% III and 2% IV. 78% had an EGRI ≤ 3. 1,14 were the mean intubation attempts and 7,8 years of clinician's experience. Analysis showed that female sex, Mallampati classification I, EGRI ≤ 3, and small neck circumference could credibly predict a low C-L classification. Furthermore, apart from the established EGRI parameters, snoring, sleep apnoea and artificial dentures could be added to this index, due to statistical significant correlation.

Conclusion: The above described indices deserve consideration during preoperative airway assessment. After the first unsuccessful intubation attempt, difficult airway management protocols should be triggered.

7001

Issues with submental intubation

Miguel B.¹, Barata J.², Rodrigues I.², Ormonde L.²

¹Instituto Português de Oncologia de Lisboa Francisco Gentil - Lisboa (Portugal), ²Centro Hospitalar Universitário de Lisboa Norte - Hospital de Santa Maria - Lisboa (Portugal)

Background: Airway management in patients with complex maxillofacial injuries is a challenge to anesthesiologists. To improve surgical exposure, tracheostomy or submental intubation are the preferred techniques. Tracheostomy is known to be associated with numerous complications. However, submental intubation can also become a source of harm to the patient.

Case Report: A 30-year-old man victim of a high impact motorcycle accident with facial trauma (bilateral type I and II Le Fort fractures) was intubated in the field and transported to the hospital to be submitted to an open reduction and osteosynthesis of his lesions. Upon arrival to the operating room, we attempted to exchange the regular endotracheal tube for a reinforced one, without success. Afterwards, in cooperation with the surgical team, a submental incision was performed and the superior part of the orotracheal tube was inserted through the incision and emerged in the submental area. As the surgical procedure progressed, the capnogram revealed an obstructive waveform and blood gas analysis revealed increased CO₂ levels with respiratory acidemia (maximum pCO₂ 90mmHg and pH 7.06). The course of action was to reposition the tube to orotracheal position again, relieving the obstruction caused by the angle of submental insertion. The following blood gas analysis showed clear improvement and the rest of the surgery was uneventful.

Discussion: This case highlights the risks of submental intubation without a reinforced endotracheal tube, due to the risk of kinking from the acute angle of the tube. To prevent this complication, we tried but failed at exchanging the regular endotracheal tube to a reinforced one. With this in mind, tracheostomy could have been a safer option. On the other hand, the late recognition of the issue led to a serious respiratory acidemia with hemodynamic instability. Nonetheless, the reposition of the tube was sufficient to reverse the event and to prevent further harm to the patient.

References:

1. Jacob, D. D., Tuncer, F. B., Kashan, D. & Gurunluoglu, R. (2020). Clinical Anatomy of Submental Intubation: A Review of the Indications, Technique, and a Modified Approach. *Annals of Plastic Surgery*.

Learning points: Submental intubation is one of the preferred techniques to secure airway in surgical procedures of patients with complex facial fractures. However, the anesthesiologist must be aware of the risk of kinking of the endotracheal tube and prevent it by placing a reinforced one.

7011

Ultrasound-based assessment of hyomental distance for prediction of difficult airway in the obese Indian population

Sharma A.¹, Bhalla S.²

¹Queen Elizabeth Hospital Birmingham - Birmingham (United Kingdom),

²Jaipur Golden Hospital - Delhi (India)

Background and Goal of Study: Pre-operative assessment of airway in obese patients is of prime importance in avoiding potential catastrophies. However, even predictors like body mass index cannot be taken as an endpoint for prediction of difficult intubation in obese patients and the optimum way to predict a difficult laryngoscopy in obese patients remains debatable¹. Ultrasound imaging can be a useful tool for rapid airway assessment. The feasibility of ultrasound in predicting difficult laryngoscopy in Indian population was evaluated by studying the correlation between USG guided measurements of hyomental distances and Cormack-lehane grading.

Materials and Methods: 70 obese patients with BMI > 30 Kg/m² posted for elective surgery under general anaesthesia were enrolled. The hyomental distance (HMD) was measured at first with the head in neutral position and then in the extended position from the upper border of the hyoid bone to the lower border of the mentum using a 5-2 MHz curved transducer. Clinical parameters and hyomental distance were evaluated with respect to difficulty laryngoscopy.

Results and Discussion: The incidence of difficult laryngoscopy (III and IV) in our study population was 24.3% (17 out of 70 cases). In head neutral position, the hyomental distance in the difficult laryngoscopy group was 4.14 (±0.22) cm while in the easy laryngoscopy group, it was 4.36 (±0.09) cm, p-value < 0.001. In head extension position, the hyomental distance in the difficult laryngoscopy group was 4.34 (±0.20) cm while in the easy laryngoscopy group, it was 5.00 (±0.25) cm, p-value < 0.001. Hyomental distance ratio (HMDR) was then calculated by taking a ratio of hyomental distance in extended head position and in neutral position. A lesser HMDR was associated with difficult laryngoscopy at 1.05 (±0.07) as compared to 1.15 (±0.05) for the easy laryngoscopy with the difference being statistically significant, p value < 0.001

Conclusion: USG measured hyomental distances has got a good correlation with difficult intubation in obese Indian population.

References:

1. Lundstrøm LH, Møller AM, Rosenstock C, Astrup G, Wetterslev J. High body mass index is a weak predictor for difficult and failed tracheal intubation: a cohort study of 91,332 consecutive patients scheduled for direct laryngoscopy registered in the Danish anesthesia database. *Anesthesiology*. 2009 Feb;110(2):266–74. doi: 10.1097/ALN.0b013e318194cac8

7012

Noonan syndrome – a case of difficult airway management

Alves C. V.¹, Rodrigues A.¹, Marques C.¹, Pedro D.¹

¹Hospital Garcia de Orta - Almada (Portugal)

Background: Noonan syndrome (NS) is a genetically autosomal dominant disorder characterized by anatomic and pathophysiologic derangements. The cardinal features of NS include unusual facies, such as hypertelorism, down-slanting eyes with a webbed neck, short stature, chest deformity and congenital heart disease (the most common congenital cardiac lesion is the presence of pulmonary valve stenosis in almost 50%–60%). Approximately 25% of individuals with NS have mental retardation.¹ We report a case of a child with NS proposed to strabismus surgery under general anesthesia.

Case Report: A 13-year-old male with NS was proposed to strabismus surgery. He had no history of cardiac disease and physical exam revealed short stature, micrognathia and dental malocclusion. Airway evaluation revealed a Mallampati 3 and reduced thyromental distance. He was previously submitted to two surgeries abroad and, since there was no access to medical records, anesthetic complications were unknown. After anesthetic induction, intubation was successful with videolarinoscopy at second attempt. There were no events during the procedure. After reversal of neuromuscular blockade, he was extubated and taken to recovery room uneventfully.

Discussion: Accordingly to the difficult airway algorithm, the patient should have been induced with an halogenated agent in order to maintain spontaneous ventilation. However, since he had no past history of difficult intubation and we wanted to avoid inhalation agents due to an eventual risk of malignant hyperthermia, we chose to do an intravenous induction and, after a successful bag mask ventilation, rocuronium was administered. A successful intubation was done at second attempt, after altering the endotracheal tube to a smaller one.

Learning Points: Patients with NS may represent a difficult laryngoscopy and should be screened for a history of difficult intubation. A careful preoperative airway assessment should be performed, and difficult airway equipment should be readily available. A fiberoptic intubation may be necessary.² Due to a relatively high prevalence as a genetic disease, pediatric anesthesiologists are likely to encounter patients with the diagnosis of NS during their careers and they should be aware about the various anatomic anomalies and pathophysiologic considerations.

References:

Saudi J Anaesth. 2011;5(3):345-7.

Society for Pediatric Anesthesia, 2017; 30 (4)

7023

A case of a “shared” airway – anterior cervical spine surgery in a tracheostomized patient

Silva R. L.¹, Santos R.¹, Pires A. C.¹, Moura F.¹

¹Centro Hospitalar Tamega e Sousa- E.P.E - Penafiel (Portugal)

Background: Surgical cases where the anaesthesiologist has to maintain a patient's airway and ventilation in the same anatomical space in which the surgeon operates are referred to as shared airway anaesthesia.¹

Case Report: We report a case of a mid-fifties, male patient, ASA III, who was scheduled for an anterior cervical spine fusion surgery, at the C3-C4 level. The patient had been tracheostomized in the Intensive Care Unit (ICU) following a diagnosis of cervical spinal cord injury. After a thorough preoperative assessment and adequate monitoring, balanced general anaesthesia was induced and the anaesthetic machine's breathing circuit was connected to the tracheostomy cuffed tube. Because the surgical field shared the same anatomical level of the tracheostomy, in order to avoid exteriorization of the tracheostomy tube with the placement of the surgical drapes and during surgery, suture of the flange of the tracheostomy cannula to the skin was conducted (figure 1). The overall result was a fixed tracheostomy tube and a guaranteed patent airway with ensured ventilation and oxygenation. Surgery was performed with no complications. After surgery the sutures were removed and the tracheostomy cannula was secured with twill tape. The patient was transferred back to the ICU.

Discussion: The situation of a shared airway is a common challenge among head and neck surgery.¹ Even though the case presented does not qualify as a true shared airway, being that the surgery was not held in the airway, it still represents a situation where an anatomical conflict exists between the airway and the surgical field. Additionally, reports on anterior cervical spine surgery after tracheostomy are scarce, hence the relevance of this case.

References:

1. Fox CJ III, Cornett EM, Ghali GE, editors. Catastrophic perioperative complications and management: A comprehensive textbook. Cham: Springer International Publishing; 2019.

Learning points: Situations of a shared airway represent a real anaesthetic challenge. Anaesthesiologists must guarantee airway patency and anticipate possible complications.



Figure 1: Sutured tracheostomy cannula

7030

Food Aspiration or Congenital Hypoplastic Lung in 21 Old Girl with Cerebral Palsy: Acute Respiratory Failure

Boran E.¹, Boran M.²

¹Düzce University, Faculty of Medicine, Department of Anesthesiology and Reanimation - Düzce (Turkey), ²Düzce University, Faculty of Medicine, Department of Thoracic Surgery - Düzce (Turkey)

Background: Congenital lung disorders and concomitant respiratory failure can be recognised in intrauterine period or shortly after birth (1,2,3). We report a case of congenital lung disorder recognised 20 years later.

Case Report: 21 year old girl was accepted to our ICU intubated and receiving mechanical ventilatory support due to acute respiratory failure. From the patient survey we can learn that the girl has a health problem that has started in the first month after birth. There were features as: lack of cooperation, mental retardation, dysmorphic body shape, bad dependency and continue need for care. Congenital cerebral palsy was our possible diagnosis. From patient history we learn that in last 3 days there were coughing episodes after feeding and different breathing sounds accompanying. Result was transport to the hospital. The patient respiratory insufficiency was connected with possible food aspiration according to given information. The X-Ray revealed total opacity in right lung and no heart shadow in the left. Dextrocardia was firstly in mind. After flexible bronchoscopy no food aspiration material was seen.

As second step of investigation thoracic CT and Echocardiography was performed. Congenital hypoplastic right lung and dextrocardia was diagnosis and highlighted our therapy. Patient's vital capacity was very low but enough for one lung ventilation and she was extubated successfully.

Discussion: Acute respiratory failure due to unknown reason is challenge to clinicians giving them new research horizons.

References:

1. Laura MR, et al, Pulmonary Hypoplasia: pathogenesis, diagnosis and antenatal prediction. *Obstet Gynecol* 1995;86: 466-75.

2. Berrocal T, et al, Congenital anomalies of tracheobronchial tree, lung and mediastinum: embryology, radiology and pathology. *Radiographics* 2004;24:17

3. Chin TW, et al, Pediatric Pulmonary Hypoplasia. *Medscape* 2019,1005696

Learning points: Careful investigation is beneficial in correct therapy.

7069

Patient safety during deep sedation with propofol in a Turkish university hospital

Baytas V.¹, Vural C.¹, Özcelik M.¹, Torrejon Torres R.², Blueher M.³, Alkis N.¹

¹Ankara University - Ankara (Turkey), ²Coreva Scientific GmbH & Co KG - Königswinter (Germany), ³Coreva Scientific GmbH & Co KG - Königswinter (Germany)

Background and Goal of Study: Patients receiving procedural sedation are at risk of respiratory compromise.(1) The goal of this work is to quantify potential adverse events during propofol sedation for GI endoscopy and to assess the impact of capnography monitoring on the incidence of these events.

Materials and Methods: This investigation at a large university hospital in Ankara was designed as a retrospective cohort study for pre- and post-capnography implementation analysis. A cumulative endpoint was defined focusing on the incidence of oxygen desaturation (mild or severe), bradycardia, and tachycardia. It was calculated that 666 patients per group (pre and post) were required to power the analysis of a 20% or greater reduction in the cumulative endpoint following capnography implementation. Data were collected between February 2020 and January 2021. Results were collected on-site in an Excel-based data tool. No patient identifiers were recorded.

Results and Discussion: Data on 730 procedures pre, and 880 post capnography were collected. All received propofol alone or in combination with other agents. 70% of procedures were gastroscopies and/or colonoscopies. The utilization of capnography reduced the cumulative endpoint incidence from 7.53% to 2.95%, corresponding to a 60.8% reduction. This was driven by the incidence of mild oxygen desaturations which was reduced from 6% pre to 1.6% post.

This reduction was highest in patients classified as ASA 1 where the incidence decreased from 6.2% to 0.6% after using capnography. Our work supports previous findings that monitored anaesthesia care could be associated with reduced cardiopulmonary event risk in healthy patients.(2)

Conclusion: Introduction of capnography monitoring led to a substantial reduction in patient safety events, suggesting that this technology should be considered as a potential gold standard during any propofol sedation, including healthy patients.

References:

1. Saunders R, Struys M, Pollock RF, Mestek M, Lightdale JR. Patient safety during procedural sedation using capnography monitoring: a systematic review and meta-analysis. *BMJ Open*. 2017;7(6):e013402.

2. Vargo JJ, Holub JL, Faigel DO, Lieberman DA, Eisen GM. Risk factors for cardiopulmonary events during propofol-mediated upper endoscopy and colonoscopy. *Aliment Pharmacol Ther*. 2006;24(6):955-63.

7085

Negative pressure pulmonary edema following reversal of neuromuscular blockade

Guímaro J.¹, Tinoco J.¹, Cordeiro L.¹, Diaz A.¹, Ferreira I.¹
¹Hospital Sao Bernardo - Setubal (Portugal)

Background: Negative pressure pulmonary edema (NPPE) is an uncommon (0.05%-0.1%), but potentially life-threatening condition. It has a multifactorial pathogenesis that mainly consists of generating a negative intrathoracic pressure by a forceful inspiration against a closed glottis. Mostly reported by anaesthesiologists after extubation, the diagnosis is made by the clinical history, presence of hypoxemia, tachypnea, increased work of breathing, pink frothy sputum, and by ruling out other causes of cardiogenic and non-cardiogenic edema. There are few reports on the literature that hypothesize an incomplete reversal of neuromuscular blockade (NMB) of the upper airway even with TOF >0.9 after administration of sugammadex.

Case Report: A 38-year-old male was admitted for an emergency laparoscopic appendectomy. Classified as ASA I, without previous surgeries and no risk factors for difficult airway management. Preoperative tests were within normal limits, except a CRP of 20 mg/dL. A balanced general anesthesia was administered with orotracheal intubation, after NMB with rocuronium. The 90 minute procedure was uneventful. After reversal of NMB with sugammadex and extubation, he presented with laryngospasm. It was easily reversed with positive pressure mask ventilation. 20 minutes later in the PACU he started to expectorate pink, frothy sputum, decreased saturation and had to start mechanical ventilation due to a severe pulmonary edema caused by NPPE. The patient was admitted to the ICU for 48h and was discharged on the 7th postoperative day.

Discussion: NPPE is a type of non-cardiogenic pulmonary edema that occurs suddenly, usually in men, classified as ASA I or II. Early identification of this life-threatening condition is essential to avoid serious complications. Although NMB reversal was completed, a healthy patient can still lead to a catastrophic situation. Some reports hypothesize a relation between the use of sugammadex and incomplete recovery of airway muscles as a laryngospasm cause. This case points out the need for future studies.

References:

1. Pediatric Anesthesia and Critical Care Journal 2020; 8(2):88-93.
 Case Reports in Anesthesiology 2014; 2014: ID 135032. Anesthesiology 2009; 110(6),1253–1260.

Learning points: Anesthesiologists have a key role in identification and treatment of NPPE. They should rapidly recognize this rare but fatal complication. NPPE continues to occur and is more usual in healthy young men apparently without comorbidities.

7092

The use of the delayed sequence intubation technique in the emergency :a narrative review

de Mattos R.¹, Goncalves R.², Lazarini L.³

¹Santa Casa de Belo Horizonte - Belo Horizonte (Brazil), ²puc minas - Belo Horizonte (Brazil), ³instituto biocor - Belo Horizonte (Brazil)

Background and Goal of Study:One of the fundamental steps to obtain a definitive airway safely is pre-oxygenation. In this context, the Delayed Sequence Intubation (DSI) uses ketamine in dissociative doses, allowing the preservation of the respiratory drive, airway reflexes while maintaining cardiovascular stability. This work aims to investigate the potential of this technique in improving intubation conditions, the pharmacokinetic benefits of ketamine and to suggest whether or not it is possible to use it on a large scale.

Materials and Methods:To carry out this work, a review of the literature was used in the databases "Embase", "PubMed" and "UptoDate". The descriptors "Delayed", "Sequence", "Intubation" were used, and meta-analyses, prospective, retrospective studies, reviews and guidelines in English were included. The timeframe established was between 2011 and 2020, and studies that were not related to the theme or with a low level of evidence were excluded.

Results and Discussion: Weingart et al ,2015 ,were the authors of the

study that described and named the procedure of DSI, coming up with the hypothesis that administration of ketamine before neuromuscular blockers facilitates preoxygenation in agitated patients. On this prospective observational study, patients in the emergency department (N=62), characterized as uncomplicated airway and that remained uncooperative after three prior intubation attempts, received the new technique. The average increase in patient saturation was 8.9% (95% CI: 6.4% - 10.9%). Another prospective study ,2018, (N = 104),carried out in , in a pre-hospital environment, showed a 97.5% success rate of intubation in the first two attempts. It concludes that the procedure is safe when used in that context. Similarly, Arasch Wafaisade et al,2019, compared retrospectively the use of sedatives in the emergency. The authors favored ketamine for pre-hospital trauma patients.

Conclusion: Delayed sequence intubation seems to increase saturation, provide good intubation conditions and be hemodynamically stable. The assessed studies had limitations especially due to the sample size, and due to the technique being performed only by professionals familiarized with ketamine. Therefore, more studies with greater scientific evidence are needed to define which are the real benefits and limitations of the technique, and thus enable its application on a large scale.

7099

Emergent tracheostomy in a critical airway – which anesthesia to use?

Saldanha Marques J.¹, Rodrigues D.¹, Moreira A.¹

¹Centro Hospitalar Universitário São João - Porto (Portugal)

Background: A critical airway is a life-threatening scenario of hypoxemia ultimately leading to hypoxia, following failed or inadequate ventilation. When the etiology is upper airway obstruction (UAO), in order to avoid catastrophic consequences, an emergency surgical access is needed and there is still no consensus on the optimal strategy for airway and anesthesia management in these cases. We report a successful anesthetic approach of a patient with acute UAO undergoing emergent tracheostomy under sedoanalgesia.

Case Report: A 60-years old man was admitted in the emergency department with acute development of severe hypoxemia, stridor and increased work of breathing. The patient was a heavy smoker and chronic alcoholic. CT scan revealed a laryngeal mass. He was evaluated by an otorhinolaryngologist and the nasal fibroscopy revealed a laryngotracheal neof ormation involving the valleculae, epiglottis and right pyriform sinus. Due to the patient's clinical status, it was decided to perform a tracheostomy to secure the patient's airway. The anatomy of the lesion precluded orotracheal intubation and the use of supraglottic devices. Consequently, it was decided to start the procedure with inhalation sedoanalgesia using sevoflurane and 100% oxygen provided by a facial mask, titrated to a BIS of 60-80. Additionally, 20mg ketamine was administered. Patient maintained spontaneous breathing and CPAP was used. The definitive airway was established in 21 minutes, after that 150mg of propofol and 3mg of midazolam were administered, and mechanical ventilation was started. Analgesia was achieved with 4mg of morphine and 1g of paracetamol. There were no intercurrents. Duration of procedure was 35 minutes and after that the patient was awakened and transferred to the Intensive Care Unit.

Discussion: There is a lack of consensus on the management of acute UAO and each patient presents a different challenge making a tailored approach, possibly, the best option. Our case offers a possible anesthetic approach for patients in which intubation or use of supraglottic devices are extremely difficult and maintaining a spontaneous ventilation is imperative until the definitive airway is established. Use of CPAP helps maintain airway patency during the procedure.

References:

1. J Emerg Trauma Shock. 2012;5(4):279-284
 2. BJA Education, 2018; 18(2):46e51

Learning points: Sedoanalgesia may be a useful approach in a patient presenting with severe UAO undergoing emergent tracheostomy.

7117 Difficult Supraglottic Airway Ventilation : A prospective observational study to assess the performance of supraglottic airway device (The SAVE Study)

Qureshi M.¹, Shallik N.¹, Thomas P.¹, Kumar N.¹, Alkhelaifi M.¹, Lance M.¹, SAVE STUDY GROUP

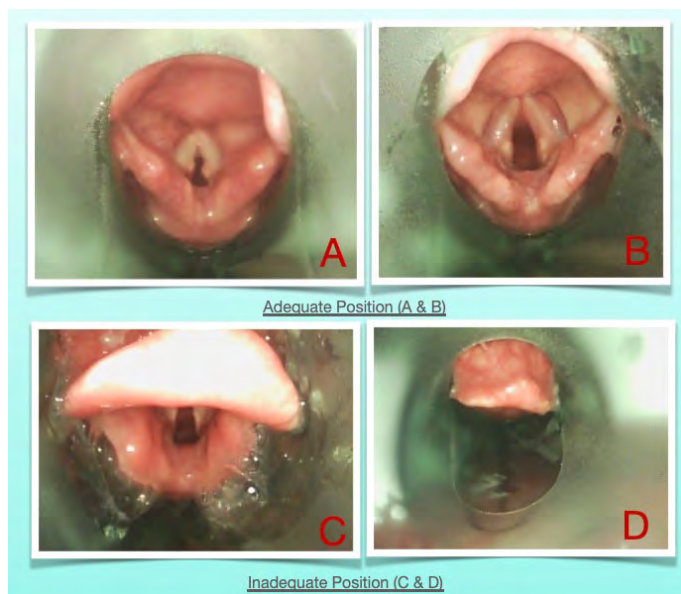
¹Hamad Medical Corporation - Doha , Qatar - Doha (Qatar)

Background and Goal of Study: There are no recommendations on how to manage difficult supraglottic airway ventilation. The aim of this study is to determine the incidence of difficult supraglottic airway ventilation in adult surgical patients & assess the performance of supraglottic airway devices based on a new definition that we proposed.

Materials and Methods: In this prospective observational study, we included adult surgical patients; weighing 50-100 kg with ASA status I & II after written informed consent. After the induction of general anesthesia, (without muscle relaxation) performance of supraglottic airway device (Ambu™) was assessed. The ventilatory parameters were recorded. While the fiberoptic bronchoscope was used to assess the position of the supraglottic airways. Using these components, we proposed a new classification and divided the overall performance of the supraglottic device into three grades; Grade 1 (Easy), Grade 2 (Difficult), and Grade 3 (Failed).

Results and Discussion: 151 patients were recruited (required sample size: 138 & expected incidence of from literature & pilot study (n: 50) : 10%). We found; Grade 1 (58/151: 38.4%), Grade 2 (66/151 :43.7%), and Grade 3 (22/151 :14.6%). Thirty patients (20%) required intervention to achieve adequate ventilation intraoperatively i.e., reinsertion (5.3%), different size (7.3%), different design (2.0%), and endotracheal intubation (4%). Inadequate cuff position was found in 71 patients (47%) while 18 patients (11.9%) had a tidal volume leak of >20%. Pearson chi square showed a strong association between abnormal cuff position & tidal volume leak.

Conclusion: Difficult Supraglottic Airway Ventilation is a serious complication, and its incidence is higher than previously reported in retrospective studies. When it comes to the performance of the supraglottic airway, more attention should be paid to the position of its cuff. Our study shows that a tidal volume leak > 20% can be used as an indicator for an inadequate position of supraglottic airway devices and rescue measures can be taken to avoid potential complications.



7121 Successful airway management of a patient with an intrathoracic goiter: a case report

Duarte A.¹, Castro M. D. L.¹, Bernardino M.², Antunes C.², Silva Pinto J.³
¹Centro Hospitalar Lisboa Central, EPE (CHLC,EPE) - Polo de Santa Marta - Lisboa (Portugal), ²Instituto Português de Oncologia de Lisboa Francisco Gentil - Lisboa (Portugal), ³Centro Hospitalar Universitário Lisboa Central, EPE (CHLC,EPE) - Lisboa (Portugal)

Background: Recognizing a potentially difficult airway presents a core competence in the practice of an anesthesiologist. Mediastinal masses are an uncommon entity¹.

Case report: A 57-year-old, 80kg male, ASA II, presents for total thyroidectomy. A nodular formation on the right hemithorax with trachea compression was detected on a routine chest X-ray. CT revealed mass effect and deviation of the mediastinum, and an awake nasal fiberoptic inspection revealed right vocal cord paralysis. The patient had no symptoms or signs, even when changing to supine position. Preoperatively, the blood bank was informed of a possible massive transfusion. The presence of the surgeon was requested during anesthesia induction and the difficult airway trolley was placed inside de OR. Nerve monitoring, ASA standard, invasive arterial pressure and BIS were established. An uneventful anesthesia induction with Remifentanil and Propofol TCI, intubation with videolaryngoscopy (reinforced NIM ETT), and an US-guided femoral central venous access were done. Intraoperatively, antibiotic, dexamethasone and tranexamic acid were administered. A regime of severe pain multimodal analgesia was implemented. After excision of the cervical portion of the mass, a thoracotomy was planned. A double-lumen ETT was placed with a tube exchanger and videolaryngoscopy assistance. Given the need for recurrent laryngeal nerve monitoring, it wasn't possible place this ETT at the beginning of the surgery. The tumor was excised without bleeding complications, and the patient remained hemodynamically stable. At the end, due to the presence of edema of the glottis (visualized by videolaryngoscopy), it was decided to keep the patient ventilated. Again, with the help of a tube changer and videolaryngoscopy, the ETT was replaced by a single-lumen one. During hospitalisation, the patient had a favourable evolution, was extubated in an ICU 24h later and was discharged 9 days later.

Discussion: The anesthesiologist should be able to anticipate difficulties, especially in patients with a clinical history which suggest upcoming difficulties.

Reference:

1. P. Thaur et al. "Anesthesia for mediastinal mass," Indian J. of Anesthesia, vol. 58, pp. 215–217, 2014.



7123

Awake tracheostomy with BiPAP: A case report.Uncio Veyrat J.¹, Romero Vargas E.², Robert Sanchez L.²¹Hospital Clínico Universitario de Valenc - València (Spain), ²Hospital Clínico Universitario de Valenc - Valencia (Spain)

Background: Non-invasive mechanical ventilation is any form of ventilatory support administered without the need for intubation or deep sedation and that preserves the defense mechanisms of the upper airway. It is a tool that has made its way into the respiratory clinic, becoming characteristic of the treatment of respiratory failure, acute or chronic, in the ICU or at home.

Case Report: A 72-year-old man diagnosed with carcinoma of the left vocal cord who underwent surgery in 2018, 40 packs/year ex-smoker, emphysematous COPD with home oxygen and hypertension who attended an otorhinolaryngology consultation due to orthopnoea of two weeks of evolution caused by an occupying mass of 75% of the glottic space. Due to the patient's symptoms, it was decided to perform an urgent tracheostomy under local anaesthesia, light sedation with Remifentanyl 0.06 mcg/kg/min and BiPAP to reduce orthopnoea.

Discussion: Non-invasive mechanical ventilation is a frequently used technique in critical care units, pulmonology wards or simply people with obstructive apnoea at home, but it is scarce in the surgical field due to the lack of ventilators with this modality in the operating rooms. The management of the airway with an occupying mass and without devices to secure it is an anaesthetic challenge. Previous studies on the performance of tracheostomy in awake patients described the use of NIV such as HFNC¹ or Venturi masks to maintain oxygenation during the procedure. In the current case and due to the patient clinic, these devices were insufficient due to the orthopnoea. Given the difficulty in maintaining the airway, instead of progressing to general anaesthesia, it was decided to use the BiPAP modality as an alternative method that allowed the patient to be kept in decubitus under light sedation and an adequate oxygenation.

References:

1. Ffrench-O'Carroll R, Fitzpatrick K, Jonker WR, Choo M, Tujjar O. Maintaining oxygenation with high-flow nasal cannula during emergent awake surgical tracheostomy. *Br J Anaesth.* 2017 Jun 1; 118 (6): 954-955. doi: 10.1093/bja/aex149. PMID: 28575343.

Learning points: The BiPAP modality is proposed as a useful tool for performing surgical procedures in which it is not necessary to intubate the patient but which, due to their clinical manifestations such as significant orthopnoea, elements such as HFNC or Venturi masks do not provide adequate oxygenation and comfort of the patient.

7137

Difficult airway management in an ankylosing spondylitis and rheumatic arthritis patientVullo P. A.¹, Navarro Echevarria P.¹, González Del Pozo I.¹, Garcia Barrasa I.¹, Sanchez Lopez A.¹¹Hospital Central de la Defensa Gomez Ulla - Madrid (Spain)

Background: Ankylosing spondylitis (AS) with severe thoracic kyphosis, rigid cervical flexion deformity and an inability to supine position is challenging to anesthesiologist.

Case Report: An 83 years old male with AS and rheumatic arthritis (RA) with severe spinal deformation and moderate extrinsic restrictive pulmonary was programmed for total colectomy due to colon carcinoma. The day of the surgery premedication was performed with intravenous atropine, metilprednisolone, and nebulized lidocaine 2%. He was positioned in semi seated position. Under topic anesthetic in the oropharynx we performed oral awake intubation with flexible fibrobronchoscopy. No spray-as-you-go technique either sedation were needed. Once the tube was placed and capnography was present, anesthesia induction was performed. Otorhinolaryngologists were present and cricoidotomy set was prepared. Under ultrasound guidance, yugular internal vein was cannulated in the supraclavicular fossa. There were no complications with ventilation. Surgery was performed by laparotomy with no incidence. Once the patient remained consciousness, a Cook airway exchange catheter® was used during extubation. Patient was taken to reanimation

unit hemodynamically stable, in spontaneous ventilation.

Discussion: Spinal deformation in AS alter the airway management, the central venous access cannulation, patient's surgical position and the mechanical ventilation. Difficult airway management guidelines support awake intubation as the safest option.¹ Some authors recommend the use of videolaryngoscope or other optic devices.² We chose fibreoptic intubation because we have extensive experience with this device. The venous access must be planned beforehand by ultrasonography and the position should also be prepared in advance. Mechanical ventilation must be performed with low volumes, high RR and guided by the etCO₂. To reduce the time of mechanical ventilation, extubation was made in the operating room, although we use an interchangeable catheter in case of a failed extubation.

References:

1. J. Adam Law MD et al. The difficult airway with recommendations for management – Part 2 – The anticipated difficult airway. *Can J Anesth* (2013) 60: 1119-1138

2. McGuire BE. Use of the McGrath video laryngoscope in awake patients. *Anaesthesia.* 2009;64(8):912-914

Learning points: When a difficult airway is expected, awake intubation with proper planning reduces the risks and improves patient safety.

7148

The challenging anaesthetic approach in a patient with major facial deformity – Case ReportPimenta M.¹, Pires de Oliveira S.², Coelho I.³, Spencer L.¹¹Hospital de São José - Lisboa (Portugal), ²Hospital Espirito Santo Evora EPE - Evora (Portugal), ³Centro Hospitalar Médio Tejo - Abrantes (Portugal)

Background: Facial reconstruction surgery and anesthesia after cancer removal of the head and neck is demanding. The anesthetic management is complex, not only due to face and neck deformities, and potential difficult airway, but also to their several comorbidities. Tracheostomy, despite possible complications, is often necessary to ensure patency of the airway as part of a surgical procedure.

Case Report: A 62-year-old male patient, ASA III, with a personal history of smoking and excessive alcohol consumption, had been diagnosed with right genian basal cell carcinoma. Following surgery for tumor resection and reconstruction with nasolabial flap, there was a local recurrence and need for enlargement of margins, as such, a right upper maxillectomy was performed.



Prior to reconstructive surgery, he was proposed for tracheostomy under general anaesthesia. Since face mask ventilation was foreseeable problematic (due to difficulty in effective mask seal), the patient was preoxygenated, and afterwards submitted to rapid sequence induction and orotracheal intubation, using videolaryngoscopy.

Discussion: We report a case in which tumor progression and surgeries required for cancer resection led to major facial deformity, posing a significant anaesthetic challenge for reconstructive surgery. Although unusual, alerts for the need to carefully plan anaesthetic technique and airway management.

References:

Nusrath, A. (2017). Anaesthesia for head and neck cancer surgery. *BJA Education*, 17(12), 383–389. doi: 10.1093/bjaed/mkx028
 Lewith, H., Athanassoglou, V. (2019). Update on management of tracheostomy. *BJA Education*, 19(11), 370-376. doi: 10.1016/j.bjae.2019.08.002

Learning points: Most cases of head and neck cancer are associated with tobacco and alcohol use. In head and neck cancers, prior anesthesia records should be reviewed, focusing on airway management. Tracheostomies can be done after induction of anesthesia, to avoid airway trauma, tumor disturbance, and tracheostomy tube displacement or obstruction. Upmost importance of administer face mask preoxygenation and ensure advanced airway device before management of a suspected difficult airway.

7184**The factors affecting difficult airway management in obese patients: Single-center, retrospective study**

Buyurgan S.¹, Akca B.², Ankar Yılbaş A.¹, Canbay Ö.¹
¹Hacettepe University School of Medicine - ANKARA (Turkey),
²Hacettepe University School of Medicine - (Turkey)

Introduction: It is a well known entity that anesthetic management of obese patients carries risks in terms of airway management. The aim of this study was to investigate the factors related to difficult airway management in obese patients who underwent surgery under general anesthesia.

Methods: Following ethical committee approval, obese patients who underwent elective surgery under general anesthesia between 2014-2018 were included into this retrospective study. Demographic data, comorbidities, preoperative airway examination results, the incidence of difficult mask ventilation (DMV) and difficult intubation (DI), the methods used for airway management were recorded.

Results: A total of 375 patients with a mean body mass index (BMI) of 38.4±6.4 kg/m² were included. The frequency of DMV and DI were 21.6% and 7.5%, respectively. Majority of DIs were handled with videolaryngoscopy. The frequency of DMV was 1.83 times higher in those with BMI≥40 kg/m², and 3.08 times higher in those with BMI≥50 kg/m² compared to patients with BMI 30-40 kg/m². Although the increase in BMI was found related with an increased risk of DMV, it had no impact on the incidence of DI. Mallampati score was an independent risk factor for DMV, two-handed mask ventilation, oral airway usage, DI and the success rate of first intubation attempt. DI was more common in males compared to females. Obstructive sleep apnea (OSA) was found to increase the frequency of DMV and DI 4.5 times and 4.9 times, respectively. Endotracheal intubation success at the first attempt was significantly lower in patients with OSA.

Conclusion: The widespread use of videolaryngoscopes seem to ease the intubation difficulty in obese patients except for extreme BMI values. However, the possibility of DMV still exists. OSA, which accompanies obesity at a high rate, is also an independent risk factor for both DMV and DI.

7200**Review of the risk of transmission of SARS-COV2 in patients with high-flow nasal cannula.**

Palau Marti C.¹, Pascual Millán D.², Palacios Castelló C.², Moliner Velázquez S.¹, De Andrés Ibáñez J.¹

¹Consorcio Hospital General Universitario de Valencia - Valencia (Spain), ²Consorcio Hospital General Universitario de Castellón - Castellón (Spain)

Introduction: High-flow oxygen therapy through a nasal cannula increases airway pressure, thereby improving lung compliance and recruitment. Increases the inspired fraction of oxygen and favors the washing of the dead space. It facilitates a decrease in the respiratory drive, with improved mechanics and a decrease in work of breathing and, ultimately, an increase in patient comfort. It should be noted that the effect of High-flow nasal cannula is flow-dependent (the higher the benefit, the higher the flow used).

Objective: Analyze in the published literature whether the use of High Flow Oxygen Therapy in the patient with SARS-COV2 is safe.

Material and Methods: A bibliographic review was carried out in the Pub-Med MEDLINE database. The word coronavirus was used as Mesh Term and high Flow nasal cannula was added as terms to appear in the title and/or abstract. After a selection by two researchers, of the total of 64 references, 4 were finally selected.

Results: In our review, we see that it has already been shown that the generation of aerosols associated with OAF is lower than that of other ventilatory support techniques with an OR of 0.4 (0.1-1.7) versus 3.1 (1.4-6.8) in NIV and 6.6 (4.1-10.6) in orotracheal intubation.

Geatckle et al. evaluated the generation of particles with different oxygen therapy devices, in a room with negative pressure in healthy volunteers. And they found no differences depending on the different oxygenation systems. Only changes with coughing and recruiting maneuvers. The dispersion of the generated particles also appears to be lower than that of other devices, even at high fluxes.

Guy T et al. carried out a 30-day follow-up with PCR to health personnel in contact with patients infected by SARS-COV2 whose respiratory support was OAF and only found an infected nurse and probable domestic contact. Anh JY, et al. show that half of the surfaces close to patients with OAF present viable viruses, but all air samples were negative. Despite this, the use of a surgical mask over the FAO is important, since it has been shown to reduce the expansion of the particles and could improve oxygenation in these patients, due to a rebreathing phenomenon.

Conclusion: OAF appears to be a safe technique in patients with SARS-COV2 infection since it does not show greater expansion of aerosols according to the published literature.

7223

Respiratory mechanics and mechanical power during low vs. high positive end-expiratory pressure in obese surgical patients - A Substudy of the PROBESE Randomized Controlled Trial

Bluth T.¹, Scharffenberg M.¹, Ball L.², Wittenstein J.¹, Gama De Abreu M.³, Huhle R.¹

¹University Hospital Dresden - Dresden (Germany), ²Department of Surgical Sciences and Integrated Diagnostics, IRCCS AOU San Martino IST, University of Genoa - Genoa (Italy), ³Department of Intensive Care and Resuscitation, Anesthesiology Institute, Cleveland Clinic - Cleveland (United States)

Background and Goal of Study: In obese patients submitted to surgery under general anaesthesia, a mechanical ventilation (MV) strategy with high positive end-expiratory pressure (PEEP) and lung recruitment manoeuvres (RM) yielded lower distending pressures, but did not reduce postoperative pulmonary complications compared to low PEEP. Detailed lung mechanics and mechanical power (MP) have not yet been calculated.

Materials and Methods: This was a substudy of the large multicentre PROBESE clinical trial [1] at two University Hospitals in Europe. Patients received low tidal volume of 8 mL/kg PBW and either PEEP of 4 cmH₂O (LowPEEP), or PEEP of 12 cmH₂O with repeated RM (HighPEEP+RM). Respiratory signals were recorded after induction of anaesthesia (IND), at end of surgery (EOS), and during surgery. Driving pressure (ΔP), volume-independent (E1) and -dependent elastance (E2), flow-independent (R1) and -dependent resistance (R2), inertance (I), percentage of E2 (%E2), as well as total, elastic, and resistive MP were calculated. Statistics included paired and unpaired non-parametric tests as well as analysis of variance.

Results and Discussion: In total, 47 patients were analysed. Median duration of anaesthesia was 254 (220-350) and 276 (220-350) min in LowPEEP and HighPEEP+RM, respectively. PEEP, mean airway pressure, E2, and I were higher in HighPEEP+RM than in LowPEEP. ΔP , elastance, E1, resistance, R1, MP, as well as resistive and elastic MP were lower in HighPEEP+RM. At IND, %E2 was lower in LowPEEP than in HighPEEP+RM before RM, but not different from directly after RM. At EOS, %E2 was lower in LowPEEP than in HighPEEP+RM both before and after RM. Tidal volume, respiratory rate, R2, peak and plateau pressure did not differ between groups. In HighPEEP+RM, peak, plateau, mean, and driving airway pressure, elastance, E1, MP as well as elastic and resistive MP were lower after RM than before RM. Only at IND, %E2 was decreased by RM.

Conclusion: In this population of obese surgical patients, high PEEP+RM reduced MP, but promoted alveolar overdistension compared to low PEEP, which might have counteracted possible benefits of a MV strategy with higher PEEP.

References:

1. Writing Committee for the PROBESE Collaborative Group of the PROtective VEntilation Network (PROVENet) for the Clinical Trial Network of the European Society of Anaesthesiology. JAMA. 2019 Jun 18;321(23):2292-2305. doi: 10.1001/jama.2019.7505.

7234

Efficacy of Dexmedetomidine in Drug Induced Sleep Endoscopy: a case report.

Costa F.¹, Arantes R.¹, Alves P.¹, Gomes C.¹

¹Hospital de Braga - Braga (Portugal)

Background: In patients with obstructive sleep apnea (OSA), drug-induced sleep endoscopy (DISE) is a useful method to identify the sites of obstruction. Although midazolam and propofol were the sedative agents initially used in DISE, dexmedetomidine (dexdor) has been proposed due to its shorter half-life and reduced respiratory depression (1).

Case report: We report a case of a 61-year-old male patient with hypertension, diabetes mellitus, dyslipidemia, obesity (BMI 32kg/m²) and moderate OSA (with nocturnal continuous positive airway pressure). The patient was proposed for DISE at the beginning of the surgery for confirmation of the airway obstruction site. The patient was monitored according to American Society of Anesthesiologists standards and depth of anaesthesia (Bi-Spectral Index). A bolus of 1mcg/kg of dexdor was administered during 10 minutes. Then, infusion was maintained at 1.4mcg/kg/h. About 20 minutes later, when BIS reached the target values (about 60), DISE was performed. There was no record of desaturation. Endoscopy identified antero-posterior collapsibility of the pharyngeal velum and oropharynx, without retrolingual or epiglottis collapsibility. Thus, it was decided to perform uvulopalatopharyngoplasty, revision of septoplasty and electrocoagulation of the nasal cornets based on these findings. The patient was induced and intubated and the surgery went uneventful. At the end of the surgery, the patient was extubated and monitored for 24 hours in an intermediate care unit. The postoperative period was uneventful and the patient was discharged 2 days after surgery.

Discussion: Dexdor is a short-acting drug with unique properties of sedation and analgesia. Sedation induced by dexdor parallels natural sleep and does not induce significant respiratory depression. This is especially important in DISE as it must be performed without supplemental oxygen therapy. Despite it was possible to identify the site of airway obstruction in our case, whether dexdor produces an arousable sleep state with minimum effects on airway collapsibility has been questioned (1). Although dexdor is a questionable option for DISE, it can be an excellent option for intubation of a predictable difficult airway, since it is associated with less desaturation.

References:

1. Sleep Breath, 2017; 21, 727–735. 2. The Laryngoscope, 2020; 130: 257-262.

Learning points: Dexdor is an excellent sedative for procedures in which the maintenance of spontaneous ventilation is essential.

7284

Laryngeal mask airway use is not inferior to endotracheal tube management in catheter ablation procedures for atrial fibrillation: a randomized controlled trial

Zhang E.¹, Rowe J.¹, Prasanna P.¹, Nelson M.¹, Kamara Y.¹, Potter J.¹
¹Virginia Commonwealth University-HS - Richmond (United States)

Background and Goal of Study: Catheter ablation, performed under general anesthesia (GA), is an effective treatment for atrial fibrillation (AF). Airway management during GA commonly utilizes the endotracheal tube (ETT) but this has been associated with increased risk of airway trauma since these patients are fully anticoagulated. The primary objective of this study was to determine whether the use of a less traumatic laryngeal mask airway (LMA) is non-inferior to ETT in terms of procedure time in primary catheter ablation procedures for AF. Secondary outcomes include intra- and post-operative medication use, patient satisfaction, and AF recurrence.

Materials and Methods: A prospective single-blind randomized trial was conducted on 100 patients who were randomized to either the LMA (n=50) or ETT (n=50) groups. Analysis used an intention-to-treat model. T-tests were used for comparisons of primary and secondary outcomes and chi-square tests were used for secondary categorical outcomes. Relative risk regression model was used for AF recurrence. All analyses were conducted using Stata version 14 ($\alpha = 0.05$).

Results and Discussion: No statistically significant difference in the primary outcome ($p=0.216$) was observed with a mean total procedure time for the ETT group of 128 minutes (95% CI 124.5-132.9 min) and the LMA group of 137 minutes (95% CI 131.7-144.9 min). There were also no differences in secondary outcomes.

Conclusion: The use of LMA does not increase primary catheter ablation procedure time for AF patients compared to ETT. Given the safety benefits of LMA use, we recommend the use of LMA over ETT when appropriate in this patient population.

	ETT	LMA	P-value
Procedure time (min)	128.7 (4.2)	137.8 (6.1)	0.216
Fluoroscopy (min)	27.1 (1.7)	28.7 (1.9)	0.523
Total anesthesia time (min)	179.0 (4.9)	184.7 (6.3)	0.414
Total Fentanyl (mcg)	111.7 (6.8)	109.2 (11.4)	0.850
Total Ephedrine (mg)	8.8 (2.2)	5.4 (1.6)	0.231
Total Phenylephrine (mg)	0.2 (0.03)	5.5 (5.2)	0.300
Intra-operative anesthetic (MAC)	0.78 (0.02)	0.76 (0.03)	0.741

7312

Practice of oxygen use in anaesthesiology – Results of a survey of the European Society of Anaesthesiology and Intensive Care

Scharffenberg M.¹, Weiss T.¹, Gama De Abreu M.² for the European Society of Anaesthesiology and Intensive Care

¹University Hospital Carl-Gustav-Carus - Dresden (Germany),

²Department of Intensive Care and Resuscitation / Department of Outcomes Research, Anesthesiology Institute, Cleveland Clinic, Cleveland, Ohio - Cleveland (United States)

Background and Goal of Study: Oxygen is one of the drugs most commonly used by anaesthesiologists. The World Health Organization (WHO) published recommendations regarding peri-operative oxygen administration, but the practice of oxygen use in anaesthesia, critical emergency, and intensive care medicine remains unclear.

Materials and Methods: We conducted an online survey among members of the European Society of Anaesthesiology and Intensive Care (ESAIC). The questionnaire consisted of 46 queries appraising the perioperative period, emergency medicine and in the intensive care, knowledge about current recommendations by the WHO, oxygen toxicity, and devices for supplemental oxygen therapy.

Results and Discussion: 798 ESAIC members (2.1% of all ESAIC members) completed the survey. Most respondents were board-certified and worked in hospitals with >500 beds. The majority affirmed that they do not use specific protocols for O₂ administration. WHO recommendations are unknown to 42% of respondents, known but not followed by 14%, and known and followed by 24% of them. Respondents prefer inspiratory oxygen fraction (FiO₂) ≥80% during induction and emergence from anaesthesia, but intraoperatively <60% for maintenance, and higher FiO₂ in patients with diseased than non-diseased lungs. Postoperative oxygen therapy is prescribed more commonly according to peripheral oxygen saturation (SpO₂), but shortage of devices still limits monitoring. When monitoring is used, SpO₂ ≤95% is often targeted. In critical emergency medicine, oxygen is used frequently in patients aged ≥80 years, or presenting with respiratory distress, chronic obstructive pulmonary disease, myocardial infarction, and stroke. In the intensive care unit, oxygen is mostly targeted at 96%, especially in patients with pulmonary diseases.

Conclusion: The current practice of perioperative oxygen therapy among respondents does not follow WHO recommendations, and access to postoperative monitoring devices impairs the individualization of oxygen therapy. Further research and additional teaching about use of oxygen are necessary.

7357

Minimizing lung injury during laparoscopy in steep Trendelenburg position

De Meyer G.¹, Morrison S.¹, Schepens T.¹, Saldien V.¹ Departments of anaesthesiology and critical care medicine
¹Antwerp University Hospital - Edegem (Belgium)

Background and Goal of Study: Increased abdominal pressure during laparoscopy induces regional atelectasis and hyperinflation, which may lead to ventilator-induced lung injury.¹ Positive end-expiratory pressure (PEEP) can alleviate atelectasis but may aggravate hyperinflation. We hypothesized that higher PEEP (>6 cmH₂O) mitigates atelectasis without causing hyperinflation during laparoscopy in the Trendelenburg position.

Materials and Methods: A single-center crossover study in 23 non-obese, lung-healthy patients requiring elective pelvic laparoscopy was approved by our IRB. The lungs were recruited to 15 cmH₂O PEEP before peritoneal insufflation. The following data were collected during 20-25° head-down tilt at 15, 10 and 5 cmH₂O PEEP: arterial blood gases, bilateral lung ultrasound clips at 3 pulmonary levels, volumetric capnography (Vcap), esophageal balloon (Pes) and airway (Paw) pressures (FluxMed, MBMED, Argentina). Transpulmonary pressures (PL_{ee}) were calculated as Paw – Pes at end-expiration. Atelectasis was quantified by the cumulative lung ultrasound score (LUSS).² Dead space ventilation (VD/VT) was derived from Vcap. Data analysis used the Friedman test. Post-hoc comparisons were made using the paired Wilcoxon signed rank test with Bonferroni-Holm correction.

Results and Discussion: In a preliminary analysis (n=9), LUSS and PL_{ee} varied across the 3 PEEP levels whereas VD/VT and PaO₂ (partial pressure of arterial oxygen) showed no statistical differences with post hoc testing. A lower LUSS and less negative PL_{ee} indicate greater recruitment at higher PEEP during laparoscopy in Trendelenburg.

	PEEP 15 (n=9)	PEEP 10 (n=9)	PEEP 5 (n=9)	p value
Cumulative LUSS	3 (3-4)	6 (5-7)	10 (8-13)	<0.001
PL _{ee} (cmH ₂ O)	-0.5 (-4 – +1.3)	-2.1 (-6.3 – -0.3)	-4.8 (-8.9 – -2.5)	<0.001
VD/VT (%)	38 (35-41)	37 (34-41)	36 (34-38)	0.014
PaO ₂ (mmHg)	209 (173-218)	213 (169-215)	187 (161-207)	0.014

Friedman Test; VD/VT (n=5)

Conclusion: During laparoscopy in the Trendelenburg position, PEEP levels as high as 15 cmH₂O reduce atelectasis without increasing hyperinflation.

Acknowledgments: Schepens T. is supported with a grant from the Research Foundation Flanders (FWO-TBM T004620N)

References:

- Deng BJA 2020
- Monastesse A&A 2017

7387

Airway management in laparoscopic cholecystectomy – a comparative analysis

Videnovic N.¹, Pavlovic A.², Mladenovic J.², Trpkovic S.², Videnovic J.³, Zdravkovic R.⁴

¹University of Pristina, Faculty of Medicine - Kosovska Mitrovica (Serbia), ²University of Pristina-Kosovska Mitrovica, Faculty of Medicine - Kosovska Mitrovica (Serbia), ³University of Nis, Faculty of Medicine - Nis (Serbia), ⁴Institute of Cardiovascular Diseases of Vojvodina - Sremska Kamenica (Serbia)

Background and Goal of Study: The use of laryngeal mask type classic in laparoscopy remains controversial due to increased risk of regurgitation and pulmonary aspiration. New supraglottic devices offer a range of advantages over endotracheal intubation (ease and speed of placement, stable hemodynamic, favorable respiratory mechanics, lower incidence of complications, smooth emergence). In this study we aimed to compare supraglottic airway devices (Supreme and i-gel laryngeal mask) with tracheal tube with respect to airway control and efficiency in ventilation and oxygenation.

Materials and Methods: The study included 325 patients, of ASA I-II, who underwent laparoscopic cholecystectomy. In the first group, the airway was secured using endotracheal intubation (115 patients). In the second group (103 patients), LMA Supreme was applied. I-gel mask was used for airway management in the third group (107 patients). Monitoring parameters were recorded and compared using t-test, Analysis of variance, Tukey's test and χ^2 test. Monitoring included: insertion time, number of attempts for device placement, oropharyngeal seal pressure etc.

Results and Discussion: Insertion time was the longest in group I (14.7+1.65s), compared to group II (15.5+1.05s) and group III (14.1+1.27s). Anova test reported statistically significant difference ($p < 0.01$). Insertion success rate was almost identical in all three studied groups ($p = 0.907$, χ^2 test). The comparison of oropharyngeal seal pressure between the second (35.95+2.92cmH₂O) and third group (36.47+1.43cmH₂O) reported no statistical difference ($p = 0.314$, t-test). Statistical analysis of recorded values for P_{peak} and lung compliance using Anova test revealed high significance ($p < 0.01$) over all time intervals (T_1 - T_4). Tukey's honestly significant difference (HSD) post hoc test revealed significant difference ($p < 0.01$) in comparison ETT vs LMAs and ETT vs i-gel groups. Comparison of mean values of PaO_2 and SaO_2 , heart rate and MAP, revealed no significant differences between the groups (Anova test; Tukey's range test).

Conclusion: Endotracheal tube, Supreme and i-gel laryngeal mask are shown to be equally efficient in managing the airway in laparoscopic cholecystectomy. All three of these devices secure efficient ventilation and oxygenation despite certain pathophysiological changes associated with laparoscopy.

7413

Looking beyond first impressions – unexpected airway trauma in the emergency room: a case report

Sousa Dias C.¹, Da Silva Pereira F.A.², Silva M.², Nóbrega S.², Ferreira J. L.²

¹Centro Hospitalar Universitário de Lisboa Central - Lisboa (Portugal), ²Centro Hospitalar Universitário de Lisboa Central - Lisbon (Portugal)

Background: Tracheal intubation is a lifesaving procedure that carries operator and patient-related risks, especially in an emergency setting¹. We herein describe a case of intubation induced airway trauma in a predicted difficult airway (DA) patient.

Case report: A 56-year-old woman, ASA III, was brought to the emergency department (ER) with a suspected benzodiazepine overdose and a Richmond Agitation Sedation Scale of -4. Following a suspected vomit aspiration episode an ER attending placed an endotracheal tube (ETT) through direct laryngoscopy with the aid of a stylet, under propofol sedation. The patient became hypoxemic and seemed to develop facial and cervical oedema. Manual ventilation proved increasingly difficult with high airway pressures. An anaphylactic reaction to propofol was suspected but no response occurred to epinephrine protocol administration. The patient was extubated and manual face-mask ventilation started with improvement of oxygenation parameters. She remained hemodynamically stable throughout. The anesthesiology team was called upon to assess the situation.

Anaphylaxis seemed unlikely owing to the hemodynamic stability, lack of cutaneous symptoms and clinical improvement after extubation.

Discussion: The anesthesiologist performed a new ETT placement, under propofol sedation, using videolaryngoscopy which was successfully confirmed by capnography. High airway pressures, low tidal volume and no pulmonary sounds on auscultation were noticed when switched to a mechanical ventilator. Aspiration through the ETT proved unsuccessful in improving such parameters. What appeared to be oedema was then revealed to be extensive subcutaneous emphysema. Pulmonary echography revealed bilateral pneumothorax. After X-ray confirmation, bilateral chest tubes were placed with immediate improvement of the ventilatory parameters. A CT scan confirmed extensive tissue emphysema congruent with upper airway iatrogenic perforation. This highlights the necessity of an experienced (versus competent) airway physician when confronted with a predicted possible DA intubation in the emergency room. Additionally, it reinforces the importance of early recognition of airway-related complications and rapid specialized intervention for successful outcomes.

References:

1. John F.Boylan, Brian P.Kavanagh; Emergency Airway Management: Competence versus Expertise? *Anesthesiology* 2008; 109:945–947

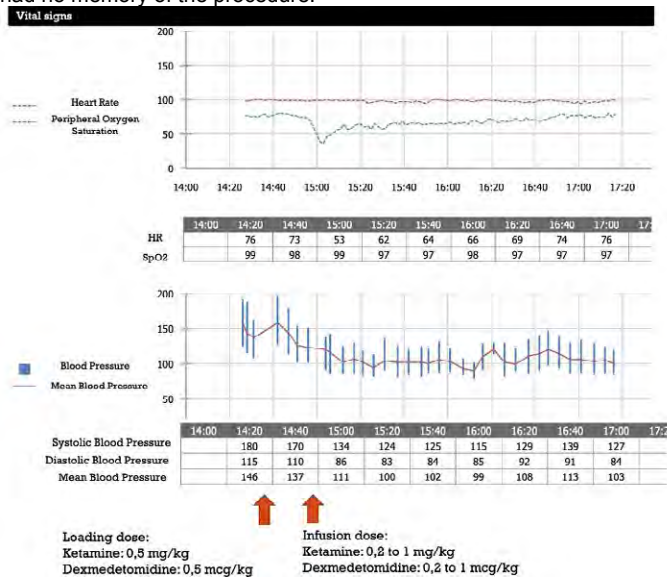
Learning points: Difficult airway management requires careful planning and an experienced approach so as to avoid unnecessary complications.

7433 Dexmedetomidine and ketamine: a safe alternative for thyroplasty surgery

Costa P.¹, Rodrigues Oliveira R.¹, Ferreira A.¹
¹Hospital Vila Franca Xira - Vila Franca de Xira (Portugal)

Background: Thyroplasty is performed to improve the patients' voice and ability to cough. Its success is correlated with the patients' collaboration to assess implant size. The patient must remain in spontaneous ventilation while providing adequate sedation so that the procedure is tolerated.¹ We present a case of thyroplasty successfully performed under sedation with dexmedetomidine and ketamine.

Case Report: 74-year-old male, 60 kg, ASA III (arterial hypertension and KDIGO 4) with dysphonia due to left recurrent laryngeal nerve paralysis was scheduled for thyroplasty type I surgery. Standard ASA and depth of anesthesia monitoring were assured. The sedation was accomplished by a loading dose administered for 5 minutes (instead of 10, as initially predicted) followed by an infusion (figure below). The surgical team performed field infiltration with ropivacaine 0,75%. The procedure lasted 3 hours, with the patient's cooperation, who remained comfortable. He had no memory of the procedure.



Discussion: When used together, dexmedetomidine and ketamine have a synergetic effect in sedation and analgesia, antagonization of the cardiovascular side effects of each drug, and inhibition of sialorrhea and hallucinations associated with ketamine.² The patient's age may have conditioned a lower loading dose and the local anesthesia may also have contributed to a lower infusion rate. The success of this case led to a protocol for future use in similar procedures.

References:

- Hamre, M. et al. (2020) "Anesthetic Management for Medialization Laryngoplasty Performed Under Concurrent Dexmedetomidine, Remifentanyl, and Propofol Infusions", *Journal of Voice*,34(1), pp. 134-139. DOI: 10.1016/j.jvoice.2018.09.002.
- Tobias, J. (2012) "Dexmedetomidine and ketamine", *Pediatric Critical Care Medicine*,13(4), pp. 423-427. DOI: 10.1097/pcc.0b013e318238b81c.

Learning points: Dexmedetomidine and ketamine were conjugated for conscious sedation, allowing adequate pain control and hemodynamic stability in procedures where the patients' collaboration is fundamental. This method allows safe sedation in procedures where the airway must be accessible both to the surgical and anesthesia teams.

7443 The incidence of a positive AIR-test under general anesthesia for surgery and the occurrence of postoperative pulmonary complications (PPC)

Hol L.¹, Nijbroek S.¹, Schultz M.¹, Hollmann M.¹
¹Amsterdam University Center, location AMC - Amsterdam (Netherlands)

Background and Goal of Study: Many patients receiving general anesthesia for surgery develop atelectasis, which is associated with the occurrence of PPC. PPC confer into increased mortality rate and length of hospital stay. The AIR-test, a test performed during intraoperative ventilation wherein the FiO₂ is set at 21% and SpO₂ is monitored may identify the presence of atelectasis. The AIR-test has been found to be positive in up to 80% of laparoscopic surgery patients. It is unknown how frequent the test is positive in general surgical patients. The aim of this analysis is to determine the incidence of positive AIR-tests and their association with PPC in general surgical patients.

Materials and Methods: A single-center chart review. We selected patients in whom an AIR test was performed. A SpO₂ <97% was defined as a positive test.

Results and Discussion: In a series of 97 patients, 62 (64%) patients had a positive AIR-test (Table 1). A positive AIR-test was not associated with a higher incidence of PPC (OR 1.54 CI 0.32 to 8.74, P=0.601).

Conclusion: The incidence of a positive AIR-test in general surgery patients is high but is not associated with the occurrence of PPC.

	Positive AIR-Test n=62	Negative AIR-test n=35	P
Men, n(%)	29 (46.8)	17 (48.6)	1.000
Age, years	58 [49 - 69]	44 [20 - 55]	<0.001
BMI, kg/m ²	25.8 [23.5 to 29.6]	23.2 [21.7 to 25.2]	0.001
Smoker, n(%)			
Current	14/53 (26.4)	4/33 (11.4)	
Former	22/53 (41.5)	5/33 (15.2)	0.001
Never	17/53 (32.1)	24/33 (72.7)	
Open surgical approach, n(%)	54 (87.1)	28 (80.0)	0.390
Type of airway, n(%)			
ET tube	53 (85.8)	29 (82.9)	0.774
LMA	9 (14.5)	6 (17.1)	
PPC*, n(%)			
Hypoxemia	6 (9.7)	0 (0.0)	0.155
Atelectasis	3 (4.8)	3 (8.6)	0.664
Pleural effusion	1 (1.6)	0 (0.0)	1.000
Pneumothorax	1 (1.6)	0 (0.0)	1.000
Bronchospasm	1 (1.6)	0 (0.0)	1.000
Pulmonary edema	1 (1.6)	0 (0.0)	1.000

Table 1. Data are in median [IQR] or number (%). *Pulmonary infection or infiltration, aspiration pneumonitis, severe hypoxemia, and acute respiratory distress syndrome did not occur.

7471

An unlikely incident during videolaryngoscopy intubation

Miguel B.¹, Leal B.¹, Serrano N.¹, Veiga N.¹¹*Instituto Português de Oncologia de Lisboa Francisco Gentil - Lisboa (Portugal)*

Background: Videolaryngoscopes such as the Glidescope® are useful tools for airway management, mainly due to an improved laryngeal view. However there are some risks associated with videolaryngoscopy which may severely harm pharyngeal structures. These complications are thought to be associated with the use of rigid stylets and if the operator's visual attention is diverted from the mouth to the monitor while introducing the ETT. We report a unique case of an incident during Glidescope® intubation.

Case Report: We report a case of a 59 year old man proposed for surgical debridement of a necrotic oropharyngeal flap following right parotidectomy and buccopharyngectomy due to oropharyngeal carcinoma. After induction of anesthesia, intubation with a Glidescope® blade was performed. Immediately it was noticed that the endotracheal tube had been inserted through a surgical suture on the right wall of the hypopharynx. The tube was carefully removed and followed by uneventful reintubation. No harm resulted from the incident.

Discussion: This case exposes some of the risks associated with videolaryngoscopy intubation. The limited space to introduce the endotracheal tube and blind spots associated with indirect visualization during the introduction of the tube were responsible for the incident. In order to reduce these risks, we propose a five-step technique which is a modification from the technique described by the Glidescope® manufacturer and will allow to maintain direct eye contact with the endotracheal tube until it is seen on the monitor, increasing the safety of the procedure. Furthermore, the short space to introduce the tube with videolaryngoscopes increases the likelihood of the pharynx (2). To overcome this issue, the endotracheal tube should be inserted as close and as parallel as possible to the videolaryngoscope.

References:

1. Greer, D., Marshall, K. E., et al. (2017). Review of videolaryngoscopy pharyngeal wall injuries. *Laryngoscope*.
2. Lewis, S. R., Butler, A. R., et al. (2017). Videolaryngoscopy versus direct laryngoscopy for adult patients requiring tracheal intubation: A Cochrane Systematic Review. *British Journal of Anaesthesia*.

Learning points: Acknowledge the main risks related to videolaryngoscopy intubation and how to avoid them.

7488

Tapia's syndrome after orotracheal intubation: A case report.

Coto C.¹, Pérez C.¹, Williams A.¹, Baeza L. M.¹, López J. M.¹, García P.¹¹*Hospital Universitario Central de Asturias - Oviedo (Spain)*

Background: Tapia's syndrome is a rare condition defined by signs and symptoms associated with unilateral lingual as well as vocal cord paralysis caused by extracranial compression of the hypoglossal nerve (XII) and the recurrent laryngeal branch of the vagus nerve (X). Most cases appear as a complication of airway manipulation after any type of surgery, most commonly after tracheal extubation. The inflated cuff or different head positions during the procedure can lead to a compression of the larynx or pharynx that can damage nerves in this area. Most cases recover in 4-6 months spontaneously suggesting neuroapraxia, nerve damage secondary to compression injuries.

Case Report: We present a case of a 34 year-old female patient with no relevant medical history, scheduled for mammoplasty surgery. The operation was performed under general anaesthesia and orotracheal intubation. During the procedure, after changing the position of the patient's head, an episode of desaturation and elevation of airway pressure was observed. The reposition of the tube, alveolar recruitment maneuvers and bronchodilators were required with the following recovery of the arterial oxygen saturation. The perioperative course was otherwise uneventful. On the first postoperative day, the patient reported dysphonia, dysphagia and lingual paralysis. A complete neurological examination

revealed unilateral lingual and left cord paralysis. A head and neck MRI was performed to exclude central nervous injury, showing no pathological findings. A fiberoptic laryngoscopy revealed unilateral lingual and left vocal cord paralysis. Diagnosis of Tapia's syndrome was performed.

Discussion: We postulate that either an unnoticed compression of the endotracheal tube or the inflated cuff or the change in the position of the patient's head might have been the source of the unilateral nerve compression that was observed. Both anesthesiologists and surgeons should be aware of this postoperative complication in patients reporting dysphagia and dysphonia after tracheal extubation. The diagnosis was based on a complete head and neck neurological examination and imaging test, both essential to exclude central causes.

References:

Bilbao, Itxarone, et al. «Isolated Bilateral Tapia's Syndrome after Liver Transplantation: A Case Report and Review of the Literature». *World Journal of Hepatology*, vol. 8, n.o 36, 2016, p. 1637.

Learning points: Tapia's syndrome, Postoperative complications.

7521

Ranking videolaryngoscopes and Macintosh laryngoscope for orotracheal intubation in pediatrics: a systematic review with network meta-analysis.

Carvalho C.¹, Regueira S. L. P. D.², Souza A. B.², Medeiros L.², Manoel M.²¹*Instituto de Medicina Integral Professor Fernando Figueira - IMIP - Recife (Brazil)*, ²*Universidade Federal de Campina Grande - Campina Grande (Brazil)*

Background and Goal of Study: Different videolaryngoscopes (VLs) are deemed to have differential intubation performance in adult patients and children. However, we currently don't know which one would be the best device for pediatrics. We designed this systematic review (SR) with network meta-analysis to rank different VLs and direct laryngoscopes (DLs) for failed first intubation attempt in pediatrics.

Materials and Methods: This analysis is part of a larger SR of multiple outcomes. We conducted a search through PubMed and further five databases on 27/01/2021. We included randomized clinical trials with patients aged ≤ 18 years, comparing different types of laryngoscopes (VLs or DLs) for failed first intubation attempt. We used ROB 2 tool to assess the risk of bias within individual studies. We carried a bayesian random-effects network meta-analysis to rank the devices. The GRADE approach was used to assess the quality of the evidence.

Results and Discussion: We had 28 studies with 2144 patients evaluating 12 different devices (see Figures 1 and 2). Only one device reached statistically significant reduced risk of failed first intubation attempt in comparison to the Macintosh laryngoscope: Airtraq™ (Figure 1). The ranking of the different devices is presented in Figure 2. The evidence underpinning the ranking was overall judged as of very low quality. The comparison between the Airtraq and the Macintosh was regarded as of moderate quality.

Conclusion: Different videolaryngoscopes have differential performance for orotracheal intubation in pediatrics. In this scenario, the Airtraq was the top-rank device with the highest probability of being the best choice to reduce the risk of failing to intubate children at the first attempt.

7522

Comparison between video laryngoscopy and direct laryngoscopy for failed first intubation attempt in children: a systematic review with meta-analysis of randomized clinical trials.

Carvalho C.¹, Regueira S. L. P. D.², Medeiros L.², Souza A. B.², Manoel M.²

¹Instituto de Medicina Integral Professor Fernando Figueira - IMIP - Recife (Brazil), ²Universidade Federal de Campina Grande - Campina Grande (Brazil)

Background and Goal of Study: video laryngoscopes have shown lower risk of failed first intubation attempt in adult patients. However, such performance has not been clearly demonstrated in pediatrics. We conducted this systematic review with meta-analysis to investigate whether available evidence show differences between video laryngoscopes and direct laryngoscopes for failed first intubation attempt in children.

Materials and Methods: the present analysis is part of a larger systematic review evaluating multiple outcomes. We conducted searches through PubMed and further five databases on 27/01/2021. We included randomized clinical trials with patients aged ≤ 18 years, comparing different types of laryngoscopes for failed first intubation attempt. All steps of screening and data collection were performed in duplicate by independent reviewers. We judged the risk of bias in the individual studies through the Cochrane's RoB 2 tool. We conducted random-effects meta-analyses as well as evaluated the risk of selective reporting by funnel plot assessment. We also evaluated the quality of evidence based on the GRADE recommendations.

Results and Discussion: we included 24 studies evaluating 2,545 patients. There was not significant differences between video laryngoscopy and direct laryngoscopy for failed first intubation attempt (RR = 0,89; 95% CI: 0,54 – 1,44; $p = 0,613$; heterogeneity: $I^2 = 50,3\%$; $Chi^2-p = 0,003$). However, sensitivity analyses demonstrated influence of type of video laryngoscope over the pooled results. We have found significant funnel plot asymmetry ($p = 0,014$). The overall quality of evidence was considered very low (risk of bias in the individual studies, significant heterogeneity, relevant imprecision, and risk of reporting bias).

Conclusion: We could not find significant differences between video laryngoscopy and direct laryngoscopy for failed first intubation attempt in pediatrics. However, it may have been due to the combined summarization of different devices with differential intubation performances. An individual evaluation of each device would hence be worthwhile in this scenario.

7523

Subcutaneous emphysema of head and neck in the recovery room, as a complication of post-intubation tracheal laceration, a case report

Silvestre Cepeda M.¹, Ruiz Velasquez E.¹, Carré Rubio X.¹, Talavera Sánchez E.¹, Mostany Terés M.¹, Sala Francino P.¹

¹Hospital Universitari Sant Joan de Reus - Reus (Spain)

Background: Post-intubation tracheal laceration is a rare complication with an incidence of 0.005%, but potentially fatal, which requires early diagnosis and treatment.

Case Report: A 73-year-old woman who underwent replacement of the reverse prosthesis of its right shoulder, under general anesthesia and ultrasound-guided interscalene block, without incidents. Five hours after surgery, the patient presented edema on face, neck, chest and dysphonia, with extensive subcutaneous emphysema. Chest CT showed laceration in the left posterolateral wall of the trachea, extensive diffuse pneumomediastinum, and severe subcutaneous emphysema. She was admitted to the ICU, deciding conservative treatment due to clinical stability, not requiring mechanical ventilation or surgery. Fiberoptic bronchoscopies were performed for diagnostic confirmation and follow-up of the lesion, with correct evolution.

Discussion: The main clinical sign of postintubation tracheal laceration is subcutaneous emphysema in head and neck, associated with pneumomediastinum and/or pneumothorax. The main risk factors are difficult intubation, overinflation of the cuff, use of stylet, and female gender over 50 years old. Given the clinical suspicion, a chest X-ray

or CT scan should be performed, followed by bronchoscopy to confirm the diagnosis, size, and site of the lesion. Treatment is controversial, preferring to be conservative if the injury and the patient's condition allow it. The tracheal tear is usually longitudinal, in the posterior pars membranous.

References:

1. Lim H, Kim JH, Kim D, et al. Tracheal rupture after endotracheal intubation. A report of three cases. *Korean J Anesthesiol*. 2012;62(3):277-280. doi:10.4097/kjae.2012.62.3.277
2. Miñambres E, Burón J, Ballesteros M, et al. Tracheal rupture after endotracheal intubation: a literature systematic review, *European Journal of Cardio-Thoracic Surgery*, Volume 35, Issue 6, June 2009, 1056-1062, <https://doi.org/10.1016/j.ejcts.2009.01.053>
3. Romic M, Becejac T, Grbavac D, et al. Conservative treatment of postintubation tracheal laceration with pneumomediastinum, bilateral pneumothorax, and massive subcutaneous emphysema. *Lung India*. 2021;38(1):77-79. doi:10.4103/lungindia.lungindia_322_20

Learning points: Post-intubation tracheal laceration is a rare condition, but with high morbidity and mortality. Rapid diagnostic suspicion is essential, subcutaneous emphysema is considered a protective factor, which encourages early diagnosis and treatment.

7525

Rupture risk: unexpected giant bullous emphysema

Conde R.¹, Conde P.¹, Alves Â.¹

¹Centro Hospitalar Lisboa Norte - Hospital Santa Maria - Lisbon (Portugal)

Background: The anesthetic management of patients with bullous emphysema undergoing non-thoracic surgeries is challenging. These patients are at risk of life-threatening complications during anesthesia and positive pressure ventilation due to the increased risk of bullae rupture and tension pneumothorax¹.

Case Report: A 68-year-old male, submitted to an axillofemoral bypass surgery, presents to the emergency department 20 days later with a pulsatile left infraclavicular tumefaction (near to the operatory suture) and left arm paresthesia. A computed tomography (CT) scan was performed and revealed a left axillary perianastomotic pseudo-aneurysm with 4 cm diameter which needed urgent surgical correction. The CT also showed diffuse paraseptal emphysema with bilateral bullae not previously diagnosed. Pulmonary function testing was not performed due to the urgency of the surgery. The patient was submitted to a false aneurysm resection and anastomosis revision under general anesthesia. Anesthesia was induced with a perfusion of remifentanyl and boluses of propofol and rocuronium. Airway was secured with an endotracheal tube. Anesthesia was maintained with sevoflurane, and remifentanyl and rocuronium infusions were continued throughout the operation. The ventilation mode was adjusted to pressure controlled. A chest tube was available inside the operating room and a cardiothoracic surgeon was in close reach.

Discussion: Maintenance of adequate FiO_2 , minimal ventilation pressures and prevention of air trapping are some of the ventilatory strategies used in these patients. Moreover, the avoidance of nitrous oxide, good intraoperative analgesia and neuromuscular relaxation, periodic chest auscultation and smooth extubation seem to decrease the risk of ventilator-induced lung injury^{2,3}.

References:

1. Mottaghi K. et al; Anesthesia Management of Bullous Emphysema in Patient Candidate for Craniotomy; *Ann Anesthesiology Crit Care*; 2016;
2. (1):e10190/²Gholmieh L., Jalbout Y.; Laparoscopic Diaphragmatic Hernia Repair in a Patient with Bullous Emphysema under General Anesthesia: A Case Report; *J Clin Case Report Trials*; 2019; 3. Vol.2:2/³Valasareddy S. K. et al; Anaesthetic Management of a Patient with Giant Pulmonary Bullae for Surgical Resection of Carcinoma Upper Alveolus: A Case Report; *JCDR*; 2019; Vol-13(8):UD01-UD03.

Learning points: Bullous emphysema is associated with a risk of barotrauma. Ventilatory and anesthetic management is important in the prevention of these events.

7530

Difficult airway in a fire scenario: case report

Crisóstomo J. N. R. S. R.¹, [Cerqueira R.](#)¹, Tomé I. I.¹, Pires R.¹
¹Centro Hospitalar de Lisboa Central, Hos - Lisboa (Portugal)

Background: The initial airway management of thermally injured patients is a clinical challenge and is even more difficult when performed in the prehospital environment. Early intubation is indicated in patients with symptomatic inhalation injury, or any burn injury that threatens airway patency¹.

Case Report: A 57-year-old male, victim of a building fire in a dense urban area, is approached on the scene by the prehospital emergency team. He presents with hoarseness and stridor. The patient is sedated and curarized and an unsuccessful attempt to protect the airway is made. As bag mask ventilation is also unsuccessful, an emergency cricothyrotomy is attempted, but with same result. Upon arrival at the ER, the patient was poorly ventilated using a laryngeal mask and hypoxemic. After further sedation, orotracheal intubation was attempted with videolaryngoscopy. There was a good visualization of the glottic cleft, noticing edema of the supraglottic space. Although it was possible to introduce a TOT 6.0 until the vocal cords, it didn't progress further. A second attempt was made with a TOT 5.0 with similar result. The cuff was then insufflated on the vocal cords pressing the tube firmly downwards. It was possible to optimize the ventilation and improve the oxygenation, gaining time to perform an urgent tracheostomy. Later on, it was found that the patient had a surgical background of a laryngeal prosthesis. Since then, he had chronic symptoms of hoarseness. The initial bronchoscopy revealed exuberant edema and a 90% subglottic stenosis.

Discussion: Delay in intubation may lead to increase of pharyngeal edema and may increase the risk of airway obstruction, making further intubation even more difficult. As in this case, the occurrence of hoarseness and stridor were indications for immediate intubation. Nevertheless, clinical judgment is paramount. In many cases of upper airway burns, it is prudent to hold off on immediate intervention and maintain continuous monitoring².

References:

1. Dries DJ, et al. Inhalation injury: epidemiology, pathology, treatment strategies. *Scand J Trauma Resusc Emerg Med* 2013;21:31–46.
2. Ahuja, Rajeev B. et al; ISBI Practice Guidelines for Burn Care; Burns, Volume 42, Issue 5, August 2016, Pages 953-1021; Elsevier, 2016.

Learning points: The purpose of this report was to alert to the need to carefully consider the risks and benefits of approaching the airway in places with deficient resources and facilities.

7537

Comparison between videolaryngoscopes with Macintosh and hyperangulated blades for failed intubation: a systematic review with trial sequential analysis.

Agra I.¹, Carvalho C.¹, [Pinto G.](#)¹, Ramos I. I.¹, Costa Y.¹
¹Universidade Federal de Campina Grande - Campina Grande (Brazil)

Background and Goal of Study: Diverse videolaryngoscopes (VLs) are believed to have different intubation performances. We conducted a systematic review to compare VLs with hyperangulated blades to VLs with Macintosh blade for risk of failed intubation.

Material and Methods: This analysis is part of an ongoing systematic review of multiple outcomes. We conducted a search through PubMed and further 5 databases on 11/01/2021. We also searched the reference lists of the included studies. For the current analysis, we included randomized clinical trials fully reported with patients aged ≥ 16 years – not manikins, comparing hyperangulated VLs with Macintosh VLs for failed intubation. We used ROB 2 tool to assess the risk of bias within individual studies. We carried a random-effects pairwise meta-analysis with trial sequential analysis to summarize available data. For multi-arm studies, we divided out evenly the reference (Macintosh blade) group to hold pairwise comparisons. The GRADE approach was used to assess the quality of the evidence.

Results and Discussion: We included 23 comparisons from 20 studies

(2,635 participants). We did not include 11 comparisons in the analysis because both arms presented zero events. No statistically significant difference was found between hyperangulated and Macintosh blades (RR = 1.37, 95% CI: 0.50 to 3.73, 12 comparisons, 10 studies, 1,377 participants, $p = 0.504$; heterogeneity: $I^2 = 53.0\%$, $\text{Chi}^2\text{-}p < 0.0155$). The pooled frequency of failed intubation for Macintosh VLs was 1.28% (95% CI: 0.47 to 3.48%). Sensitivity analyses for operator experience, population and predicted difficult airway did not show any significant influence over our results. The results from TSA are presented in Figure 1. The evidence was judged as of very low quality (high risk of bias, risk of selective reporting, relevant inconsistency, and important imprecision). **Conclusion:** Current available evidence does not support the assumption of significant difference between hyperangulated and Macintosh videolaryngoscopes for risk of failed intubation in adult patients. More well-designed studies are still necessary to have a better idea over this issue.

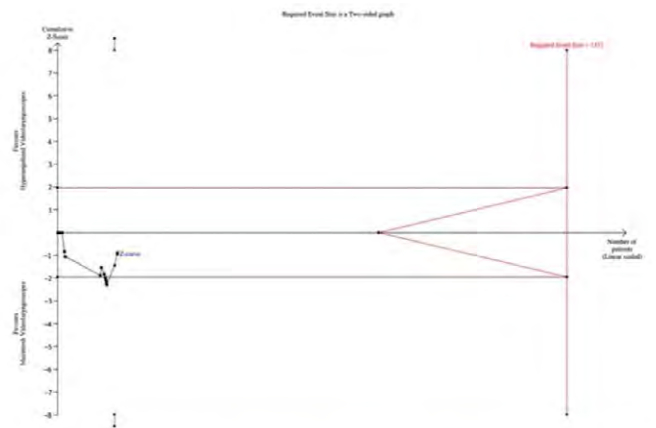


Figure 1. Trial Sequential Analysis for the comparison between hyperangulated and Macintosh videolaryngoscopes for failed intubation. X-axis represents the accumulating number of participants, while y-axis shows the Z scores and represents the statistical summary of the accrued data. We can see that the reached Z score from available data is not enough to consider either difference or equivalence between the interventions as it did not cross either the trial sequential or the futility boundaries.

7539

Increased chances of ideal intubating conditions with videolaryngoscopes compared to Macintosh laryngoscope: a systematic review and meta-analysis of randomized controlled trials.

Ramos I.¹, Carvalho C.¹, [Pinto G.](#)¹, Agra I. I.¹, Costa Y.¹
¹Universidade Federal de Campina Grande - Campina Grande (Brazil)

Background and Goal of Study: A recent meta-analysis has shown videolaryngoscopes to be easier to use when compared to Macintosh laryngoscopes. However, the results of only seven studies were pooled together. As several studies have been published since then, we conducted this systematic review to have an updated analysis over the current evidence comparing VLs to ML for the intubation difficulty score.

Materials and Methods: This analysis is part of a larger systematic review. We conducted a search through PubMed and further 5 databases on 11/01/2021. We also searched the reference lists of the included studies. We included randomized clinical trials fully reported with patients aged ≥ 16 years – not manikins, comparing VLs with ML for difficulty of intubation by IDS. We used ROB 2 tool to assess the risk of bias within individual studies. We carried a random-effects pairwise meta-analysis to summarize available data. For multi-arm studies, we divided out evenly the ML group to hold pairwise comparisons. The GRADE approach was used to assess the quality of the evidence.

Results and Discussion: We included 32 comparisons from 26 studies (2,019 participants). One comparison was not included in the analysis because both arms presented zero events. Videolaryngoscopes significantly increased the chance of easy intubation (IDS = 0) compared to ML (RR = 2.14, 95% CI: 1.49 to 3.10, 31 comparisons, 25 studies, 1,845 participants, $p = 0.0002$; heterogeneity: $I^2 = 80.4\%$, $\text{Chi}^2\text{-}p < 0.0001$). The pooled frequency of easy intubation for ML was 26.86% (95% CI: 13.85 to 45.61%). Sensitivity and subgroup analyses for type of videolaryngoscope blade (hyperangulated vs Macintosh) did not show any significant difference. The evidence was judged as of very low quality

(high risk of bias, risk of selective reporting, relevant inconsistency, and important imprecision).

Conclusion: Very low-quality evidence showed significantly increased chance of getting easy intubation with videolaryngoscopes. Larger and more well-designed studies, however, are still necessary to improve quality of evidence and confirm this finding.

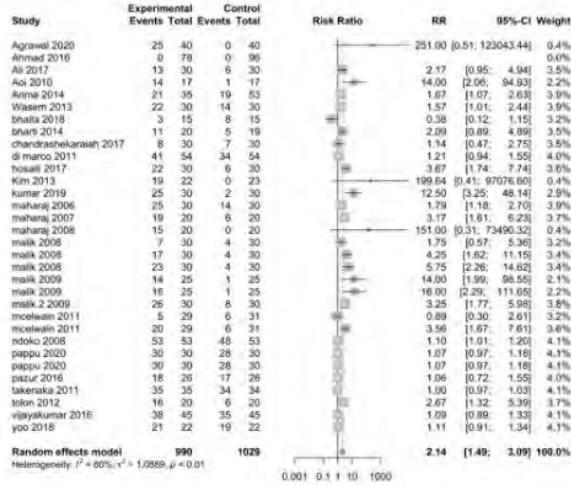


Figure 1. Forest plot from the comparison between videolaryngoscopes and Macintosh (reference) for difficulty of intubation by IDS score. Relative Risk assesses the chance of having an IDS score of zero – easy intubation.

7540 Ranking videolaryngoscopes for glottic visualization: a systematic review with network meta-analysis.

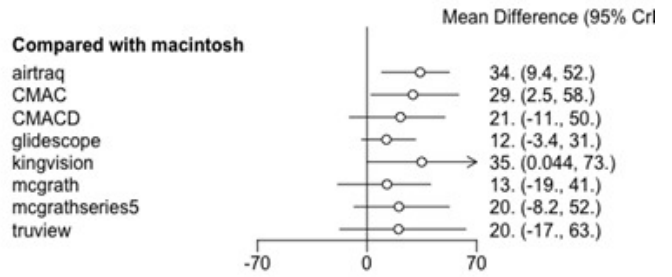
Soares Y.¹, Carvalho C.¹, Agra I.¹, Pinto G.¹, Ramos I.¹
¹Universidade Federal de Campina Grande - Campina Grande (Brazil)

Background and Goal of Study: Videolaryngoscopes (VLs) are deemed to improve glottic visualization as compared to direct laryngoscopy.^{1,2} We don't have, however, evidence of individual performance of the VLs in general population. We performed this network analysis to rank VLs and Macintosh laryngoscope (ML) for improved glottic view.

Material and Methods: This analysis is part of a larger systematic review. We conducted a search through PubMed and further 5 databases on 11/01/2021. We also searched the reference lists of the included studies. We included randomized clinical trials fully reported with patients aged ≥ 16 years – not manikins, comparing VLs with ML for percentage of glottic opening (POGO). We excluded studies published in language other than English, Spanish, or Portuguese, those with contradictory data, and those where we could not abstract data from parallel arms. All screening and data collection steps were performed in duplicate by independent authors. We used ROB 2 tool to assess the risk of bias within individual studies. We carried a random-effects network meta-analysis to summarize the data. The GRADE approach was used to assess the quality of the evidence.

Results and Discussion: We included 19 studies (1,782 participants) assessing nine different devices. Three videolaryngoscopes significantly increased the POGO compared to ML (Figure 1): Airtraq (MD = 34.0%; 95% CI: 9.4 to 52.0%), CMAC (MD = 29.0%; 95% CI: 2.5 to 58.0%), and Kingvision (MD = 35.0%; 95% CI: 0.04 to 73.0%). No significant inconsistency between direct and indirect evidence was found by nodesplit method. The median POGO for ML was 67.9% (range: 15 to 90.6%; IQR: 59.9 to 76.3%). The evidence was judged of low quality (high risk of bias and important imprecision).

Conclusion: Current evidence do not support superiority of any device among VLs for glottic visualization in adult patients from general population.



7544 Ranking videolaryngoscopes for difficult intubation: a systematic review with network meta-analysis.

Soares Y.¹, Carvalho C.¹, Agra I.¹, Pinto G.¹, Ramos I.¹
¹Universidade Federal de Campina Grande - Campina Grande (Brazil)

Background and Goal of Study: Videolaryngoscopes (VLs) are believed to have differential intubating performance.^{1,2} We conducted this network analysis to rank VLs and Macintosh laryngoscope (ML) for difficult intubation.

Material and Methods: This analysis is part of a larger systematic review. We conducted a search through PubMed and further 5 databases on 11/01/2021. We included randomized clinical trials fully reported with patients aged ≥ 16 years – not manikins, comparing VLs with ML for difficult intubation (> 2 intubation attempts). We excluded studies published in language other than English, Spanish, or Portuguese, those with contradictory data, and those where we could not abstract data from parallel arms. All screening and data collection steps were performed in duplicate by independent authors. We used ROB 2 tool to assess the risk of bias within individual studies. We carried a random-effects network meta-analysis to summarize the data. The GRADE approach was used to assess the quality of the evidence.

Results and Discussion: We included 120 studies (12,921 participants) assessing 16 different devices. Four videolaryngoscopes significantly reduced the risk of difficult intubation as compared to ML (Figure 1): AP Advance (OR = 6.6x10⁻⁷; 95% CI: 7x10⁻¹³ to 0.021), CMAC (OR = 0.16; 95% CI: 0.045 to 0.56), Pentax AWS (OR = 0.23; 95% CI: 0.057 to 0.98), and Tosight (OR = 2.7x10⁻¹⁵; 95% CI: 2.3x10⁻²⁸ to 0.011). Significant inconsistency between direct and indirect evidence was found by nodesplit method mainly for the comparisons involving Pentax AWS. The estimated frequency of difficult intubation for ML was 1.2% (95% CI: 0.65 to 2.1%). The evidence was judged as of low quality for all between-drug comparisons (some concerns to high risk of bias and relevant imprecision).

Conclusion: Low quality evidence suggest differential performance amongst VLs for difficult intubation in adults. However, we could not demonstrate the superiority of a single device over the others.

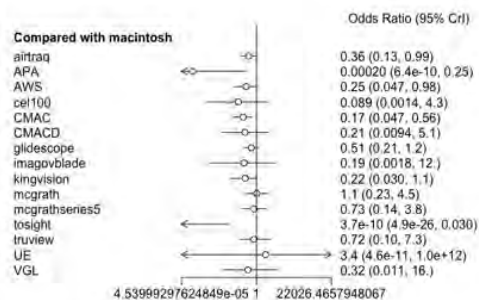


Figure 1. Forest plot of a network meta-analysis for difficult intubation comparing different videolaryngoscopes to Macintosh laryngoscope.

7545

Comparison between videolaryngoscopes and Macintosh laryngoscope for failed intubation: a systematic review with trial sequential analysis.

Pinto G.¹, Carvalho C.¹, Agra I.¹, Costa Y.¹, Ramos I.¹¹Universidade Federal de Campina Grande - Campina Grande (Brazil)

Background and Goal of Study: A recent meta-analysis has shown videolaryngoscopes (VLs) to reduce the risk of failed intubation as compared to Macintosh laryngoscope (ML).¹ However, correction for possible random errors due to subsequent analyses is not available. We then aimed at performing a systematic review with trial sequential analysis (TSA) to control for type-I and type-II errors.

Material and Methods: This analysis is part of an ongoing systematic review of multiple outcomes. We conducted a search through PubMed and further five databases on 11/01/2021. We also searched the reference lists of the included studies. For the current analysis, we included randomized clinical trials with patients aged ≥ 16 years – not manikins, comparing VLs with ML for failed intubation. We used ROB 2 tool to assess the risk of bias within individual studies. We carried a random-effects pairwise meta-analysis, due to qualitative heterogeneity, with trial sequential analysis to summarize available data. The GRADE approach was used to assess the quality of the evidence.

Results and Discussion: We included 113 studies (12,150 participants), with 64 not being considered in the meta-analysis because they presented zero events in all arms. VLs reduced the risk of failed intubation as compared to Macintosh laryngoscope (RR = 0.40, 95% CI: 0.24 to 0.66, $p = 0.0005$, 49 studies, 5,575 participants; heterogeneity: $I^2 = 0.0\%$, $\text{Chi}^2\text{-}p = 0.592$). The pooled frequency of failed intubation for Macintosh was 0.67% (95% CI: 0.34 to 1.34%). The results from TSA are presented in table 1 and confirm VLs superiority. The evidence was judged to be of moderate quality, downgraded mainly due to risk of bias in outcome measurement as assessors could not be blinded to the interventions.

Conclusion: Moderate quality evidence show significantly reduced risk of failed intubation for VLs compared to ML. The results from TSA endorse this conclusion and show available evidence to be sufficient to accept VLs superiority for this outcome.

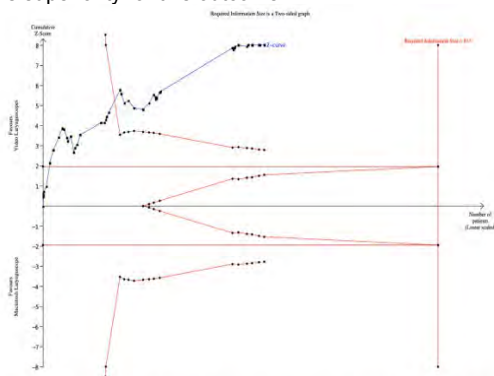


Figure 1. Trial Sequential Analysis for the comparison between videolaryngoscopes and Macintosh laryngoscope for Failed Intubation. X-axis represents the accumulating number of participants, while y-axis shows the Z scores and represents the statistical summary of the accrued data. We can see that the reached Z score from available data crosses the top trial sequential boundary (curved red line at top left-hand corner) and confirms sequential analysis statistical significance.

7568

A novel application of 2019 Difficult Airway Society guidelines for Awake Tracheal Intubation using Videolaryngoscopy (ATI:VL) for a diagnostic biopsy of a hypopharyngeal tumour

O'Brien S. J.¹, Burlacu C. L.¹¹St. Vincent's University Hospital - Dublin (Ireland)

Background: Upper airway tumours can be challenging for the anaesthesiologist. This case describes a novel application of the 2019 Difficult Airway Society guidelines¹ for Awake Tracheal Intubation using Videolaryngoscopy (ATI:VL) to facilitate a biopsy of a large hypopharyngeal mass.

Case Report: A 60-year old female presented with a history of dysphagia, cough and anorexia on a background of 50-pack year smoking and immunosuppression. A CT revealed a large hypopharyngeal tumour extending into the supraglottic area. An urgent diagnostic tissue biopsy was necessary to plan the treatment. There was a high risk of airway obstruction and difficult intubation with general anaesthesia (GA). An elective tracheostomy under local anaesthesia was also discussed yet not immediately warranted. The agreement was to attempt a biopsy under topical anaesthesia, sedation and visualization of the hypopharynx using VL with progression to ATI using flexible bronchoscopy (ATI:FB), if necessary. Transnasal humidified high flow oxygen 30l/min was administered. The hypopharynx was topicalized with 6ml of 4% Lidocaine (4.6mg/kg) and a remifentanyl infusion (50mcg/ml) was commenced at 10ml/hr and titrated to clinical effect and entropy. A McGrath videolaryngoscope was gently inserted by the anaesthetist into the oropharynx until the tumour came into view on the screen. Using a biopsy forceps, the ENT surgeon successfully took tissue samples. The patient continued to ventilate spontaneously with no episodes of desaturation. There was no cough or gag reflex, and there was no need for an endotracheal tube.

Discussion: This is a novel application of ATI:VL guidelines to facilitate a diagnostic biopsy of a hypopharyngeal mass without having to use FB and GA. The ATI:VL technique was used safely and effectively for this short but difficult airway procedure.

References:

1. Ahmad I, El-Boghdady K, Bhagrath B, et al. Difficult Airway Society guidelines for awake tracheal intubation (ATI) in adults. *Anaesthesia* 2020;75(4):509-528.

Learning points: Effective upper airway topicalization allows VL and tissue biopsy. ATI:VL can safely and effectively replace ATI:FB for suitable procedures.

7605

Major airway bleeding during renal transplantation surgery - getting to know Osler-Weber-Rendu Syndrome (ORWS)

Barbosa R.¹, Maia N. A. D. S.¹, Portugal F.¹, Vieira A.¹, Castro M.¹, Santos S.¹¹Centro Hospitalar e Universitário de Coimbra - Coimbra (Portugal)

Background: OWRS is an autosomal dominant genetic disorder characterized by mucocutaneous telangiectasis and arteriovenous malformations (AVM). Patients have a propensity for bleeding from the oronasopharynx, gastrointestinal tract and rupture of AVM in other organs.¹

Case Report: A 59-year-old female with stage 5 renal insufficiency caused by autosomal dominant polycystic kidney disease was submitted to orthotopic renal transplantation. The patient had recurring epistaxis caused by OWRS. She was on iron, vitamin B12, folic acid supplementation and erythropoietin hormonal stimulation. Nevertheless, hemoglobin concentration (HbC) was 7,5g/dL, which prompted pre-operative transfusion of 2 units of erythrocyte concentrate (EC).

During the surgical procedure, a spontaneous epistaxis happened with anterior and posterior drainage. There was an estimated 900mL of sudden blood loss. Aspiration, Trendelenburg positioning, tamponade of the airway were immediately done and the tube cuff had its adequate

pressure assured. Transfusion of 2 units of EC was started after a measured HbC of 6,5g/dL. ENT surgery collaboration was emergently called for hemostatic control through nasal tamponade and aminocaproic acid (EAC). For additional airway protection the patient remained sedated and ventilated in the post-anesthesia care unit. Extubation was successfully achieved after 24h. Post-operative prophylactic anticoagulation was withheld against institutional protocol to avoid risk of additional life-threatening bleeding. There were no more bleeding events during the remaining hospital stay. At discharge the patient had fully functioning renal graft.

Discussion: Peri-operative blood management can be specially challenging in a patient with chronic renal disease, past blood transfusions and recurring epistaxis. Therapy with EAC is particularly challenging in a host of recent renal transplant considering the risk of graft loss by thrombosis.

References:

1. Indian J Anaesth. 2014 Jul;58(4):493-4
2. Braz J Anesth. 2009 vol.59, n1, p.74-78

Learning points: OWRS can produce perioperative blood loss greater than surgically expected. Since bleeding does not result from a defect in the coagulation cascade but from exposure of AVM, perioperative care includes the use of antifibrinolytics, hemostatic control, and induced hypotension in the absence of contraindications. Preanesthetic evaluation must include the search for brain, lung, and gastrointestinal AVM.²

7609

Airway management in the prone position:

A case of impaled knife injury in the posterior spine

Ferreira L.¹, Gouveia B.¹, Castro Fernandes R.¹, Sousa M.¹

¹Cento Hospitalar Universitário de São João - Porto (Portugal)

Background: Airway management in the prone position is a very challenging procedure for the Anesthesiologist(1). Difficult facial mask ventilation, inability to insert a laryngeal mask airway, and difficult endotracheal intubation are possible complications(2). In emergent trauma victims with posterior spine penetrating injuries, supine position may not be feasible for airway management (2).

Case Report: We present a 28 -year-old man patient, ASA physical status II, with an impaled knife protruding out of the mid-thoracic spine. The patient was sedated and hemodynamically stable. A computed tomography revealed a small pleural effusion on the right lung without signs of pneumothorax and no major vessels nor organs involvement, except damage on the vertebral body, central canal, and spinal cord at T8 level and knife proximity to the descending thoracic aorta. It was proposed for exploratory surgery of the vertebral column. Because of possible dislodgment of the knife, supine and lateral decubitus positions were not considered. An airway management plan was designed and it was outlined alternative plans. The patient was uncooperative and awake fiber-optic intubation was not possible. Before intubation, the patient was monitored according to ASA Standards for Basic Anesthetic monitoring and preoxygenated with 100% O₂ for 3 minutes. The first attempt using a C-mac® videolaryngoscope follow rapid sequence induction in the prone position was tried. However, because of limited mouth opening intubation was not successful and an I-gel® supraglottic airway device was inserted to assure airway patency and ventilation. Fiber-optic intubation through a supraglottic device was attempted and the placement of the endotracheal tube was successful. During airway management and positing of the patient in the operating theatre the knife was not dislodged. After surgery, the patient was admitted in a ICU for postoperative vigilance.

Discussion: This case indicates that fiber-optic intubation through a supraglottic device is a good option and a less risky approach to airway management, especially when awake fiber-optic intubation is not an option and when supine and lateral decubitus might be hazardous to the patient.

References:

1. Bonhomme V, Hans P. Management of the unstable cervical spine: elective versus emergent cases. *Curr Opin Anaesthesiol.* 2009;22(5):579-85.
2. Beckers SK, Brokmann JC, Rossaint R. Airway and ventilator management in trauma patients. *Curr Opin Crit Care.* 2014;20(6):626-31.

7621

Nebulized tranexamic acid in a recurrent airway-obstructing blood clot from the lower airway.

A case report

Gadomski J.¹, Ibrahim R.¹, Zawadka M.¹

¹Medical University of Warsaw - Warsaw (Poland)

Background: Endotracheal suctioning may cause mucosal damage, which in turn can lead to bleeding or clot formation. In this setting, a thrombus can impede airflow and cause complete airway obstruction. Removal of airway blockage using a fibrobronchoscope (FBS) may be challenging due to mismatch between the dimensions of the suction port and the thrombus. Tranexamic acid (TXA), a synthetic derivative of the amino acid lysine, exerts anti-fibrinolytic effects which can make it a useful agent in mucosal bleeding. In this case report we present an alternative method for thrombus extraction as well as reduction of bleeding with the use of nebulized TXA [1].

Case Report: We present a case of a 45-year-old man, brought to the emergency department after sustaining a traumatic head injury causing cerebral edema and intracranial hematoma in the posterior fossa. Progressing ventilation problems were observed and urgent FBS through the tracheostomy revealed a large thrombus at the level of the carina, impairing the patency of both main bronchi. Several methods were unsuccessfully attempted to remove the thrombus; principally aspiration with the suction channel of the FBS, followed by the use of endoscopic forceps and external suction on the tracheostomy tube. Finally, the tracheostomy tube was replaced with an endotracheal tube (ETT), a suction was connected and the thrombus was slowly extracted along with the ETT [2]. Due to re-bleed, nebulization with TXA was opted. 250 mg of TXA was administered 3 times every 8 hours. Control FBS at 24-h post initiation of TXA visualized a largely healed mucosa in the area of the bifurcation of the trachea. No re-bleeding or thrombus formation was observed in the following days.

Discussion: Traditional strategies of thrombus removal may be inadequate in the setting of a large tracheal thrombus blockage. We present an effective method, utilizing direct ETT suctioning for life-threatening airway obstruction. In addition, repetitive catheter clearing of obstructive contents in the lower respiratory tract may lead to mechanical injury of the mucosa. TXA nebulization seems to have a promising future potential in this subgroup of patients.

References:

1. B. J. Hunt, *Anaesthesia* 70, 50-53, 2015
2. A. R. Bodenham, *Anesthesia* 52, 40-43, 2002

Learning points: In case of larger blood clots impeding airflow, a direct suction through the ETT may be considered. TXA could have a role in recurrent mucosal bleeding in the trachea.

7635

Right lung obstruction after endotracheal tube exchange: Case report

Ferros C.¹, [Vieira L.](#)¹, Antunes P.¹, Silva C.¹, Paulo L.¹, Assunção J.¹
¹Centro Hospitalar Tondela-Viseu - Viseu (Portugal)

Background: When expecting long periods of endotracheal intubation, a cuffed non-armoured ETT is preferred. If an armoured ETT is in use but long mechanical ventilation is expected, switching for a non-armoured ETT is advisable, using airway exchange catheters (AEC) for this purpose.

Case Report: A 78yo male entered the ER following a fall, with a GCS of 14 but quickly deteriorated to 8, with subsequent intubation. He was anticoagulated but no other clinical information was known. CT scans showed a large subdural hematoma in need of emergent surgery. A decompressive craniectomy was performed, after which a supraventricular tachycardia causing hemodynamic instability ensued. Pharmacological cardioversion was unsuccessful, and the patient was electrically cardioverted. The ETT was changed for a non-armoured ETT using an AEC, and the patient was transferred to the PACU because no beds were available in the ICU. However, the patient needed progressive increments in the inspired oxygen to maintain peripheral oxygen saturation (SpO₂ 92% with a FiO₂ of 100%). Pulmonary sounds were absent on the right side and lung expansion was not symmetrical. A chest x-ray showed a complete collapse of the right lung, with ipsilateral tracheal deviation. A bronchoscopy was performed by the anesthesiology team in charge of the patient and evidenced a secretion plug on the right mainstem. After aspiration and secretion mobilization, a chest x-ray revealed reinflation of the right lung. The FiO₂ was progressively reduced, and peripheral saturation and peak airway pressures improved.

Discussion: There is a paucity of reported complications using these airway devices.¹ We hypothesize that a secretion plug was dislocated during tube exchange. Following a complete collapse of the right lung, airway pressures increased and ICP was difficult to manage. Despite the advantages of using these devices, care must be given to possible morbidity and iatrogenic events. Moreover, with increasing ICU bed occupation due to the COVID-19 pandemic, anaesthesiologists are being called to provide care for intensive care patients.

References:

1. Osman Ali¹, et al. Hypoxic Respiratory Failure Further Complicated During Airway Exchange Catheter Placement. *The Journal of Critical Care Medicine* 2020;6(3):186-189. DOI: 10.2478/jccm-2020-0023

Learning points: There are risks associated with AECs such as mobilizations of mucus plugs, airway loss or injury that should be considered when exchanging ETTs.

1% lidocaine. The patient was sedated using 0,5 MAC of sevoflurane and 1 mcg/kg of fentanyl. After insuring effective spontaneous ventilation, fiberoptic orotracheal intubation was performed using a number 5 endotracheal tube. After confirmation of a secure airway, induction of general anesthesia, guided by Bispectral index and neuromuscular blockade was performed using rocuronium. The surgery went uneventful but a delayed recovery from anesthesia was observed. Extubation was successful after reversal of neuromuscular blockade and clinical criteria were verified.

Discussion: Patients with mucopolysaccharidosis have multiple comorbidities requiring general anesthesia, with various genetic and phenotype manifestations. Preferably, a full diagnosis and comorbidities optimization should occur before an elective procedure. Early recognition of difficult airway allowing for timely planning and management is crucial for patient safety.

References:

1. Kamata M, et al, General anesthesia with a native airway for patients with mucopolysaccharidosis type III, *Pediatric Anesthesia*, 2017

Learning points: Difficult airway management has been reported so planning and preparation for all possible scenarios is important to assure the safety of our patients.

7645

Anesthetic Management in a Patient with Treacher-Collins Syndrome Undergoing Cleft Lip Repair

Özen Ö.¹, [Usta G.](#)¹, Kılıç Çakmak E.¹, Ankar Yıbaş A.¹, Canbay Ö.¹
¹Hacettepe University Hospital - Ankara (hacettepe) (Turkey)

Background: TreacherCollins Syndrome(TCS) is a developmental craniofacial disorder characterized by absence of external ear structures,malformation of middle ear bones,hearing loss,mandible/zygomatic bone hypoplasia,cleft palate/lip(1).We aim to discuss the perioperative management of our patient with TCS.

Case Report: In the preoperative evaluation of 4 month old patient diagnosed with TCS, who applied for cleft lip repair. He had retromicrognathia, frontal bossing, prominent nasal root, hypertelorism, proptosis of left eye, cleft lip, bilateral microtia, atresic outer ear, macrostomy and snoring. Difficult airway management preparation included informing the ENT surgery team in case of a possible CICO (cannot intubate, cannot oxygenate) situation. Two-hand mask ventilation was comfortable following uneventful inhalation induction. Following adequate depth of anesthesia, the patient was intubated with Glidescope LoProS2 at the first attempt. The surgery was completed without complications. Extubation process was again accompanied by appropriate difficult airway management preparation. While high-flow humidified nasal oxygen was being administered to the patient, neuromuscular blockade was reversed with sugammadex and the patient's trachea was extubated. The patient, who had a large tongue leading closure of the airway, was placed in sitting position and tongue sutures were placed. The patient was transferred to the pediatric intensive care unit. The patient who had respiratory cardiopulmonary arrest on postoperative day 1 was ventilated with a balloon-valve-mask and spontaneous circulation and breathing returned after 1 cycle of cardiopulmonary resuscitation. Elective tracheotomy was performed because the risk of upper airway obstruction persisted due to the large tongue. He was weaned off mechanical ventilator on the 2nd postoperative day and discharged home on the 5th day.

Discussion: TCS patients have a high risk of difficult mask ventilation and difficult intubation. Retro-micrognathia, macroglossia and mouth opening getting narrowed after cleft lip repair made it more difficult for the patient to maintain airway patency and paved the way for postoperative arrest. It should be kept in mind that airway control may be difficult not only in the intraoperative but also in the early postoperative period, especially in pediatric TCS patients undergoing airway surgery.

References:

1. Anesthesia for Treacher Collins syndrome: a review of airway management in 240 pediatric cases, Jane Hosking

7642

Mucopolysaccharidosis type IIIA - anesthesia approach, a case report

Dias M.¹, [Oliveira S. M.](#)¹, Jorge J. V.¹, Ormonde L.¹
¹Centro Hospitalar Universitário Lisboa Norte - Lisboa (Portugal)

Background: Mucopolysaccharidosis type IIIA is an autosomal recessive disorder characterized by the deficiency of enzymes that catalyze the metabolism of the glycosaminoglycan heparan sulfate, leading to its accumulation. Some of the typical manifestations include growth impairment, unusual facial features, skeletal dysplasia, cervical instability and cognitive impairment. Difficult airway management has been reported with difficult ventilation, intubation and post-intubation problems.⁽¹⁾

Case Report: A 10-year-old child with 23kg diagnosed with Mucopolysaccharidosis type IIIA was submitted to dental surgery under general balanced anesthesia. Preoperative anesthesia evaluation was made with a multidisciplinary approach. She suffered from global development delay and scoliosis and had an airway distorted with severe retrognathism, large tongue and limited mouth opening. Difficult airway was predicted and a fiberoptic intubation expert was called. Before the induction of anesthesia, midazolam 5mg oral was given and a 24G peripheral venous access was assured. Topical anesthesia of the nostrils and pharynx was achieved using the Mackenzie technique with 6 mL of

7655

Emergency Difficult Airway Management in a Mucopolysaccharidosis Type III Patient: Case Report

Yildiz Canakci M. N.¹, Kilic Cakmak E.¹, Uzumcugil F.¹
¹Hacettepe University Faculty Of Medicine - Ankara (Turkey)

Background: With this case report, we aimed to share the airway interventions and anesthesia management applied due to respiratory depression in a 15-year-old mucopolysaccharidosis (MPS) Type III patient.

Case Report: A patient with a history of mucopolysaccharidosis type 3 and scoliosis, who was followed up and treated by pediatrics due to lobar pneumonia, and who was administered intravenous midazolam for sedation before aspiration developed respiratory depression and failed intubation attempts, and we requested an evaluation before the tracheostomy plan. In the first evaluation, swollen and edematous face and short neck were observed. It was observed that a supraglottic airway device (AMBU brand, no: 4) was placed to ensure airway patency. The patient was ventilated via a balloon-mask with a well-established supraglottic airway device and transported to the operating room. The patient who received midazolam infusion for sedation was taken to the operating room. Invasive arterial blood pressure monitoring was performed in addition to standard 3-channel ECG, NIBP, pulse oximetry and capnograph. Difficult airway equipment was readily available. While the ENT team was ready for tracheostomy, Rocuronium was administered intravenously and Sugammadex was readily available. The glottis was evaluated through the supraglottic airway device with a fiberoptic laryngoscope; it was swollen and edematous. Methylprednisolone 1 mg/kg administered in the emergency was completed to 2 mg/kg. When muscle relaxation was achieved, after intraoral aspiration, he was intubated at the first attempt using a video-laryngoscope (Storz MAC III blade) and a spiral endotracheal tube (No: 5.5, cuffed) by applying cricoid pressure. Cormack-Lehane was rated Grade III. For the safety of ventilation, he was manually ventilated throughout the operation.

Discussion: In MPS patients, macroglossia, adenotonsillar hypertrophy, and thickened soft tissues in the laryngopharynx can be seen with glycosaminoglycans accumulating in the upper airway(2). It is risky in terms of atlantoaxial subluxation due to odontoid hypoplasia and spinal cord compression due to spinal canal narrowing, neck movement should be limited to prevent injury. These problems may complicate conventional direct laryngoscopy; for intubation, alternative airway techniques such as fiberoptic endotracheal intubation or video-laryngoscopy should be considered(3).

Learning points: Airway management in MPS type III.

7656

Can't Intubate, can't ventilate" situation in patient with unexpected superior vena cava syndrome

Sánchez C. M.¹, Martín Jaramago J.¹, Ramírez Fandiño Ó.¹, Martínez González E.¹, Madrid Martínez E.¹, Llau Pitarch J. V.¹
¹Hospital Universitario Doctor Peset - Valencia (Spain)

Background: An unpredicted difficult airway situation implies high morbidity and mortality. Inadequate management is estimated to be responsible for 30% of anesthesia-related deaths. The most emerging is the non-ventilable-non-intubable patient situation (can't intubate-can't oxygenate CICO), with an incidence of 0.01-2 per 10,000 cases. The airway management guidelines establish that the surgical or percutaneous airway access is the indication in this scenario (front of neck access FONA).

Case Report: A 56-year-old male patient with intellectual disability and end-stage chronic kidney disease, with a history of multiple central venous catheter cannulation and dysfunctional arteriovenous fistulas. He was admitted for a new vascular access for dialysis. A tunneled catheter was implanted in the right internal jugular vein and a left humerus-cephalic arteriovenous fistula was performed under general anesthesia. The patient presented predictors of a difficult airway (short and thick neck, MPT III) and orotracheal intubation was performed with McGrath® MAC video laryngoscope (C-L IIb). After extubation, sudden onset of cervico-facial venous congestion with laryngeal stridor and impossibility of spontaneous ventilation. Early help was requested, oxygen was

administered and manual ventilation with two hands and guedel cannula was achieved with great difficulty. The patient was declared non-ventilating and non-intubable and urgent tracheostomy was indicated. Venous angiogram revealed thrombus in the left innominate trunk and complete occlusion in the right jugular vein up to the junction with the right subclavian vein due to pericatheter thrombus where there was a previous stenosis. The following day, endovascular rescue of both bilateral shafts was performed with angioplasty and stent implantation, and after resolution of the situation, the tracheostomy could be closed five days later.

Discussion: Acute superior vena cava syndrome caused by central venous occlusion resulted in congestion of the soft tissues of the neck and oropharynx and inability to intubate/ventilate. Early call for help and prompt declaration of this situation allowed securing the airway.

Learning points: Upper airway obstruction can be acutely caused by superior vena cava syndrome. After declaring a CICO situation, early FONA decision making is key to patient survival. The anesthesiologist should have regular training in performing these techniques.

7671

Difficult airway management: the importance of defining alternative plans and their inexistence.

Costa M.¹, Silva L.¹, Araújo A.¹, Mexêdo C.¹, Saraiva A.¹
¹CHP - Centro Hospitalar do Porto - Porto (Portugal)

Background: This case reports to a patient with predictable difficult airway (DA), in whom only awake fiberoptic intubation was possible.

Case Report: A 30-year-old woman with advanced Cushing Disease (CD) presented for transsphenoidal hypophysectomy. The patient had a BMI of 59 kg/m². Airway evaluation presented several signs of predictable DA: Mallampati IV, short neck (70cm circumference), limited neck extension (redundant non-complacent tissue), reduced mouth opening, large tongue. Considering preoperative airway evaluation and the surgical approach, an awake nasal fiberoptic intubation was performed with topical anesthesia (oropharyngeal atomizer), uneventful at the first attempt. Propofol and remifentanyl infusions, and rocuronium were then initiated for the induction and maintenance of general anesthesia (GA). At the end of the surgery, a cerebrospinal fluid leak and airway edema were noted. Considering the probability of respiratory complications in the postoperative period and the contraindication for non-invasive ventilation, extubation was postponed. The patient was transferred to an intensive care unit (ICU) and was extubated after 48h.

Discussion: Presented with a DA, we must decide between awake intubation vs intubation after induction of GA. In this case, induction of GA could lead to a series of problems: difficulties on face-mask ventilation, placement of supraglottic airway devices, difficult intubation, and emergent front of neck access. Awake fiberoptic intubation was the only possible plan to safely secure the airway. Previous studies indicated that awake fiberoptic intubation is successful in 88-100% of DA patients¹. However, the paucity of alternative plans to awake intubation is a serious concern to the anaesthetic practice.

Reference:

1. Practice Guidelines for Management of the Difficult Airway: An Updated Report by the American Society of Anesthesiologists Task Force on Management of the Difficult Airway. *Anesthesiology* February 2013, Vol. 118, 251–270.

Learning points: The prolonged clinical course of CD raised specific concerns to the anesthetic plan (extreme obesity, uncontrolled arterial pressure, difficult peripheral vein accesses) being the DA management the focus of this case report. Additionally, the surgery was associated with airway management particularities: airway edema secondary to surgical position and contraindication for non-invasive ventilation in postoperative period. Accurate planning and multidisciplinary discussion were crucial for the uneventful unfolding of this case.

7674

Anaesthetic challenges of Beckwith-Wiedemann syndrome: a case report.Gonçalves Ribeiro S. R.¹, Sá P. A.¹¹Centro Hospitalar Universitário do Porto - Porto (Portugal)

Background: Beckwith-Wiedemann syndrome (BWS) is characterized by macroglossia, omphalocele and gigantism with predisposition for organomegalies, childhood tumours and hypoglycemia.¹ Of all features, airway management is the greatest challenge faced by the anaesthesia team.

Case Report: A 17 years-old female patient diagnosed with BWS was admitted with the diagnosis of spondylolysis. Pars interarticularis reconstruction with iliac graft and posterior instrumentation of L4-L5 and L5-S1 was performed. Clinical features included macroglossia, transient loss of conscience, bilateral renal cysts, umbilical herniation, ear pits and left side hemihyperthrophy. She had been previously submitted to macroglossia reduction, hernia repair and limb shortening surgery. Airway evaluation revealed a Mallampati II and a large tongue. Electrocardiography showed a sinus rhythm and incomplete right bundle branch block. The anaesthetic plan comprised a total intravenous anaesthesia and airway was management with C-MAC videolaryngoscopy. Extubation was successfully performed. Anaesthesia and surgery were uneventful. The patient had well-controlled pain and was discharged home within 48 hours after surgery.

Discussion: For patients with BWS, airway management can be quite challenging. Our patient had previously been submitted to multiple anaesthetic procedures including macroglossia repair surgery with no history of anaesthetic complications. Nonetheless, a large protrusive tongue was evident during airway examination leading us to performed C-MAC videolaryngoscopy-assisted orotracheal intubation. Although surgery was performed in prone position which is associated to complications such as tongue swelling resulting in airway compromise, extubation was performed at the end of surgery.²

References:

1. Tsukamoto M, Hitosugi T, Yokoyama T. Perioperative airway management of a patient with Beckwith-Wiedemann syndrome. *J Dent Anesth Pain Med.* 2016;16(4):313-316.
2. Chui, J, Craen, RA. An update on the prone position: Continuing Professional Development. *Can J Anesth/J Can Anesth.* 2016; 63:737–767.

Learning points: Airway management and metabolic disturbances are the most frequent challenges in patients with BWS undergoing anaesthetic procedures. When facing a child with an unusual syndrome, even the most experienced pediatric anesthesiologist needs a source to consult on the multisystem ramifications that can influence the anesthetic plan.

Transfusion, Haemostasis and Thrombosis

6586

Perioperative continuation of blood thinners did not increase intraoperative blood loss and blood transfusion rate in cystectomy patients: an observational cohort study.Beilstein C.¹, Furrer M. A.², Huber M.², Engel D.², Loeffel L.², Wuethrich P. Y.²¹Inselspital, Bern University Hospital - Bern (Switzerland), ²Inselspital, Bern University Hospital, University of Bern - Bern (Switzerland)

Background and Goal of Study: Perioperative management of antithrombotic therapy in major surgery is unclear and evidence for decision making is limited. The inherent risk of bleeding must be balanced against the risk of thromboembolism. Objective was to assess if perioperative continuation of blood thinners affects blood loss and blood transfusion rate during cystectomy.

Materials and Methods: We conducted an observational single-centre cohort study of a consecutive series of 1431 cystectomy patients between 2000 and 2020. Cystectomy was performed in patients without anticoagulation, under low-dose aspirin (ASS), oral anticoagulants (OAC, with international normalized ratio of 2-2.5) or bridging with low weight molecular heparin (LWMH). Outcome measures were intraoperative blood loss (ml/kg/h, according to body weight and duration of surgery), blood transfusion rate in the first 24 hours after initiation of surgery and rate of major adverse cardiac events (MACE) at 90 days. We used propensity score matching analysis to adjust for imbalances between groups with or without blood thinners.

Results and Discussion: Median blood loss was 2.11 ml/kg/h [95%-confidence interval 1.48-3.04] in patients with blood thinners vs. 2.09 [1.50-2.94] in patients without blood thinners, p=0.742. Blood transfusion rate was 30.1% vs. 26.1% respectively, p=0.317. Subgroup analysis did not reveal any significance between ASS, OAC or LMWH. Incidence of MACE was 9.1% in the group with blood thinners versus 8.7% in those without, p>0.99. Limitations include selection bias and retrospective analysis from prospectively assessed data.

Conclusion: Perioperative continuation of ASS, uninterrupted OAC with low INR goal or bridging with LMWH had no impact on blood loss and transfusion rate in cystectomy patients. Therefore, there is no need for discontinuation of blood thinners.

6632

Low anti-factor Xa activity is not associated with venous thromboembolism in critically ill patients: a retrospective observational studyDibiasi C.¹, Gratz J.¹, Wiegele M.¹, Baierl A.², Schaden E.¹¹Medical University of Vienna - Vienna (Austria), ²University of Vienna - Vienna (Austria)

Background and Goal of Study: Anti-factor Xa activity (antiXa) is often used as a surrogate parameter for effectiveness of anticoagulation in critically ill patients. However, a relationship between antiXa and venous thromboembolism (VTE) has not been established for critically ill patients receiving low molecular weight heparin for thromboprophylaxis. We therefore analysed antiXa obtained for clinical purposes and investigated the relationship between antiXa and VTE.

Materials and Methods: We analysed antiXa in patients receiving prophylactic subcutaneous enoxaparin (cumulative daily dose ≤1 mg/kg body weight) at six intensive care units at the Medical University of Vienna, an academic tertiary care centre between 01/2015 and 12/2018. AntiXa was categorised into peak (3-5 hours after enoxaparin), 12-hour trough (11-13 hours after enoxaparin) and 24-hour trough (23-25 hours after enoxaparin) levels. To adjust for multiple antiXa measurements, we

calculated median antiXa per patient. In addition, we assessed if patients developed radiographically confirmed VTE, i.e. deep vein thrombosis or pulmonary embolism. Categorical variables are given as absolute and relative frequencies, continuous variables are given as median and interquartile range.

Results and Discussion: We included 1352 patients with 8231 antiXa measurements, who received a median daily enoxaparin dose of 4000 IE (4000-4500). Pharmacological thromboprophylaxis was started 8 hours (6-16) after ICU admission. The incidence of VTE was low (n=19; 1.4%), despite 12-hour and 24-hour trough antiXa below thresholds that have been considered as effective in previous studies (1). AntiXa was similar between patients with and without VTE.

	No VTE (n=1352)	VTE (n=19)	P-Value
Peak	0.22 (0.14-0.32)	0.33 (0.14-0.32)	0.18
12-hour trough	0.1 (<0.1-0.16)	0.12 (<0.1-0.26)	0.61
24-hour trough	<0.1 (<0.1-<0.1)	<0.1 (<0.1-<0.1)	0.42

Conclusion: AntiXa may not be a suitable surrogate parameter to judge the thromboprophylactic effect of enoxaparin.

References:

1. Vahtera A et al. „Plasma anti-FXa level as a surrogate marker of the adequacy of thromboprophylaxis in critically ill patients: A systematic review“. *Thrombosis Research* 139 (2016): 10–16.

6651 Clinical relevance of postoperative second dose of tranexamic acid in total knee arthroplasty surgery.

Moreno Martinez C. E.¹, Pardo Bedia A.¹, Luis Garcia C.¹, Teixell C.², Bisbe Vives E.¹, Santiveri Papiol F. J.¹
¹Parc de Salut Mar - Barcelona (Spain), ²Hospital Universitari Dexeus. - Barcelona (Spain)

Background and Goal of Study: Tranexamic acid (TXA) has proven effective in reducing blood loss and transfusion requirements in total knee arthroplasty (TKA). The aim of this study is to compare the efficacy in reducing blood loss and transfusion of adding a second dose of (TXA) three hours after surgery, and its impact on outcomes.

Materials and Methods: A prospective, double-blind placebo-controlled clinical trial (EudraCT 2016-000071-24) of the 176 primary knee arthroplasty patients operated with tourniquet, who were randomized into 2 groups as follows:

	INDUCCIÓN	POSTOPERATIVE
1	TXA (15mg/kg)	Saline Solution
2	TXA (15mg/kg)	TXA (10mg/kg)

Blood loss was measured in terms of haemoglobin (Hb) at 24h and discharge, visible drain blood loss (ml), calculated blood loss (ml) and transfusion. Complications were collected within up to 30 days post-surgery

Results and Discussion: Both groups were comparable in sex, age, weight ASA, preoperative hemoglobin (Hb), surgery time, ASA and type of anaesthesia. We found no significant differences between Hb at 24h and at discharge (HB 11.5 VS 11.9) neither in calculated total bleeding (1578.8 ml vs 1558.7 ml respectively). The administration of a second dose of TXA after surgery showed a reduction in blood loss, but our findings only showed a significantly higher Hb at discharge (Hb 10.4±1.2 VS 10.8±1.037). However, the clinical relevance was low since there was no impact on the number of Transfusions or outcomes.

Conclusion: The administration of a second dose of TXA after surgery showed a clear reduction in blood loss, but our findings only showed a statistically significant higher Hb at discharge. Administration of a second dose of TXA after surgery has no impact on postoperative bleeding Hb at 24h and at discharge.

References:

1. Alvarez JC et al. Marzo 2008. Tranexamic acid reduces blood transfusion in total knee arthroplasty even when a blood conservation program is applied. *Transfusion*, 48(3), 519-25.
2. Jeffrey L. et al. Dec 2011. Liberal or Restrictive Transfusion in High-Risk Patients after Hip Surgery. *N Engl J Med* , 365, 2453-2462.

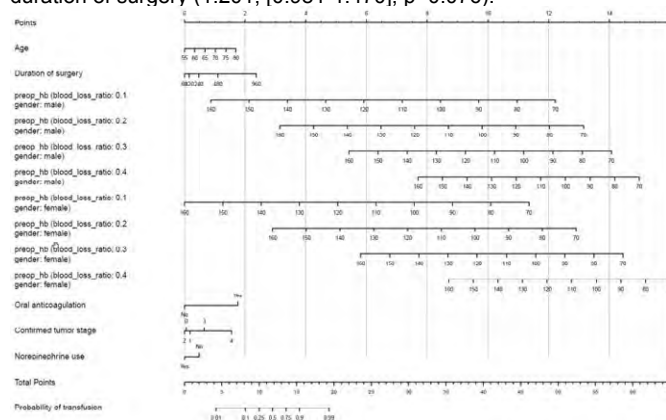
6694 Predictors for perioperative blood transfusion in patients undergoing cystectomy and urinary diversion and development of a nomogram: An observational cohort study

Engel D.¹, Beilstein C.¹, Jerney P.¹, Löffel L.¹, Burkhard F.¹, Wüthrich P.¹
¹University Hospital of Bern - Bern (Switzerland)

Background and Goal of Study: Cystectomy is associated with a substantial rate of perioperative blood transfusion, which is known to increase early postoperative morbidity and worsen cancer related outcomes. Early detection of potentially modifiable perioperative factors could reduce the need for early perioperative blood transfusion in cystectomy patients and thus positively impact outcome.

Materials and Methods: We conducted an observational, single-center cohort study on a consecutive series of 1168 patients undergoing cystectomy. Perioperative blood transfusion was defined as the need for packed red blood cells and/or fresh frozen plasma units within the first 24 hours after the begin of surgery. Patients were evaluated for risk factors for blood transfusion. Multiple logistic regression analysis was performed to model the association between variables and blood transfusion, and a nomogram was developed.

Results and Discussion: Blood transfusion occurred in 370/1168 patients (31.7%). Significant predictors were age (OR: 1.678, [95% CI: 1.379-2.042]; p<0.001), blood loss ratio (6.572, [4.878-8.853]; p<0.001), preoperative hemoglobin (0.316, [0.255-0.391]; p<0.001), tumor stage (2.067, [1.317-3.244]; p=0.002), use of oral anticoagulants (2.70, [1.163-6.270], p=0.021), and interaction between female sex and blood loss ratio (1.344, [1.011-1.787]; p=0.042). Relevant factors not reaching statistical significance, but included in the model and nomogram were administration of norepinephrine (0.722, [0.503-1.037]; p=0.078) and duration of surgery (1.201, [0.981-1.470], p=0.076).



Conclusion: Of the major predictors found to affect perioperative blood transfusion, two can be positively influenced: blood loss ratio by meticulous surgery and hemoglobin by preoperative optimization. Others such as age or advanced disease are not modifiable. This emphasizes the importance of optimal management of patients prior to surgery.

6767

First PBM's Pillar evolution in the last 4 years of oncologic colorectal surgery: A Third level Hospital experience.

mallol M.¹, López García S.¹, Barquero Lopez M.¹, Pérez Garcia L.¹, Camprubí Sociats I.¹, Colomina Soler M. J.¹

¹University Hospital of Bellvitge - Hospitalet Llobregat (Barcelona) (Spain)

Background and Goal of Study: The PBM (Patient Blood Management) is a multimodal plan to optimize transfusions and improve the clinical course of patients. It takes into consideration aspects related to the improvement of blood volume, blood loss minimization and the application of rigid transfusion criteria. Its application in colorectal cancer surgery can no longer be a matter of discussion. The aim of this study was to assess whether the application of diagnostic and preoperative anemia optimization protocols, as part of the first PBM pillar strategy, improves transfusion taxes and clinical outcomes in colorectal elective surgeries for oncological causes in our center

Materials and Methods: A prospective study was conducted over a period of 4 years on patients undergoing colorectal elective surgery for oncological causes in a tertiary hospital. The hospital was part of the MAPBM (Maturity Assessment Model in PBM). Data referring to interventions for the diagnosis and optimization of perioperative anemia was collected as parameters of the I Pillar. Also data for type of surgery, transfusion parameters and clinical results were gathered

Results and Discussion: The following tables show the evolution of the clinical and transfusion outcomes (Figure 1) and the indicators for diagnosis and optimization of anemia (Figure 2) in the 4 years of observation

Conclusion: The use of PBM programs leads to a progressive improvement in the diagnosis and optimization of perioperative anemia, which is reflected in the improvement in the transfusion rate both in open and laparoscopic surgery. In open surgery, a high number of complications and readmissions were observed. These data should be analyzed, since it cannot be ascribed to high transfusion numbers. The measurement of all those parameters has allowed us to incorporate new tools for continuous improvement

6813

Investigation of the functional state of the hemostatic system using a test of double local hypoxia of the upper limb by a low-frequency piezoelectric thromboelastography (LPTEG) in patients with morbid obesity.

Sukhonos R.¹, Tarabrin O.¹

¹Odessa National Medical University - Odessa (Ukraine)

Background and Goal of Study: Morbid obesity (MO) is one of the key problems of the XXI century and leads to an increase in morbidity and mortality and disability. The risk of venous thromboembolism (VTE) is very high in this category of patients. Plasma concentrations of fibrinogen, von Willebrand factor, and factor VII are significantly increased in patients with MO, while platelet aggregation is increased by leptin.

Materials and Methods: Studied 50 patients with BMI > 35 at the age of 20–65 years. The study excluded subjects who had episodes of VTE and those receiving specific anti-thrombotic therapy. The functional state of the hemostasis system was assessed by the method of low-frequency piezoelectric thromboelastography. As a test stimulus, we used double local hypoxia (DLH) of the upper limb, achieved by occluding arterial and venous great vessels for 5–6 minutes with an interval of 20–25 minutes.

Results and Discussion: The results of the initial study of the hemostasis system in patients with MO, LPTEG showed severe hypercoagulation. To assess the reserve capabilities of the blood aggregate state regulation system in response to the DLH effect, the type of reaction was identified: compensated, subcompensated, decompensated, and depleted. The decompensated type was observed in 47 patients (78.3%) and the depleted type - in 13 patients (21.7%). With the decompensated type,

there was an increase in the aggregate state (A0) A0 by 28.7%, the intensity of contact coagulation (ICC) - by 15%, with the retained ability to disaggregate. The intensity of coagulation drive (ICD) was increased by 13.3%, while the fibrinolytic activity (IRRS) under test conditions was reduced by 24.7%. With the depleted type of reactions, pronounced hypercoagulation and suppression of the fibrinolytic system were recorded. Compared to the baseline values, ICD and clot maximum density (MA) increased by 25.75 and 28.32%. Strengthening the ICC by 32.2%, the IRLS was reduced by 30.7%.

Conclusion: DLH test of the upper limb in patients with MO, subcompensated and decompensated types of reactions were revealed, which indicates a decrease in the reserve capabilities of the hemostasis system.

6833

Thrombotic risk during laparoscopic interventions in abdominal surgery in patients with morbid obesity.

Sukhonos R.¹

¹Odessa National Medical University - Odessa (Ukraine)

Background and Goal of Study: Laparoscopic surgery has gained popularity due to its many benefits, but despite this, patients with morbid obesity (MO) have a very high risk of intra- and postoperative venous thromboembolism (VTE). MO is considered a prothrombotic condition. Factors that contribute to the development of thromboembolic complications include increased pneumoperitoneal pressure above standard, postoperative immobilization, and general anesthesia.

Materials and Methods: The study involved 44 patients with a BMI > 35 who undergoing laparoscopic abdominal surgery (LAS). All patients were divided into 2 groups: Group 1 (n=37) received combination therapy nadroparin calcium 0.4 ml SC every 12 h and pentoxifylline 100 mg every 12 h for two days before surgery. Group 2 (n=7) - patients who undergoing LAS and, due to urgency, didn't receive specific preventive therapy. Studies of the hemostasis system were performed using low-frequency piezoelectric thromboelastography (LPTEG) immediately after hospitalization and 1, 3, 5 days after surgery.

Results and Discussion: Next constants of blood coagulation have been checked - Intensity of contact coagulation (ICC), Intensity of coagulation drive (ICD), clot maximum density (MA), and fibrinolytic activity - Index of retraction and clot lysis (IRCL). - Contact coagulation intensity (ICC), Coagulation drive intensity (ICD), maximum clot density (MA), and fibrinolytic activity - Clot retraction and lysis index (IRCL). In both groups before therapy ICC increased by 23.52%, ICD - more than normal by 38.22%, MA increased by 74.52%, IRCL was 90.11% above the norm. Group 1 on day 5 there was a decrease in ICC by 13.2% compared with normal; The parameters of coagulation and fibrinolysis are close to normal. Group 2 had ICC increased by 15, 33%, ICD increased by 17.64%, MA increased by 22.1%, and IRCL increased by 19.35% relative to baseline values. At the end of the study, patients in group 1 had no VTE, patients in group 2 had 2 episodes of deep vein thrombosis of the lower extremities, and 1 episode of thromboembolism of small branches of the pulmonary artery.

Conclusion: For adequate prevention of VTE in obese patients undergoing LAS, the combination of anticoagulants and antiplatelet agents is effective. Ignoring prophylaxis can lead to thromboembolic complications.

6837
Targeted bleeding management guided by noninvasive hemoglobin measurement in patients undergoing major surgery: a prospective randomized controlled study

Akdag S.¹, Zengin U.¹, Cakmak G.¹, Umuroglu T.¹, Aykac Z. Z.¹, Saracoglu A.¹
¹Marmara University, School of Medicine - Pendik- Istanbul (Turkey)

Background and Goal of Study: In major surgeries, the most reliable criterion for giving a blood transfusion decision is intermittent hemoglobin measurement in the perioperative period. This time-consuming method may delay the decision for blood transfusion and/or cause unnecessary blood transfusion. We aimed to give a blood transfusion decision without delay and prevent unnecessary blood transfusion in blood losses using a continuous and non-invasive hemoglobin device in our study. Our study hypothesizes that bleeding management with continuous SpHb (non-invasive Hb concentration) values during major surgery will reduce the amount of transfusion and provide better hemodynamic control than Hb measurement with intermittent blood sampling. We believe that less blood transfusion, lower morbidity, and mortality will be observed in the postoperative results.

Materials and Methods: Following the ethics committee's approval (date: 02.02.2018, no: 09.2018.134), the study was registered (ACTRN1269000129189) 120 adult patients who were planned to undergo elective major surgery and expected to lose more than 20% of total blood volume were included in the study. Patients were randomly divided into two groups to compare bleeding management via conventional blood gas sampling (Group Hb) as a result of Hb follow-up and SpHb measurement (Group SpHb).

Results and Discussion: Age, gender, BMI, ASA score, anesthesia and operation duration and surgical intervention type were not statistically significant between groups. Postoperative package of red blood cell (RBC) amount was lower in the SpHb group than the Hb group (p=0.020). The change of postoperative/intraoperative RBC values in the SpHb group was greater than the Hb group (p <0.001). Postoperative Hb values in ICU patients were statistically higher in the SpHb group than the Hb group (p <0.05, Table 1,2).

Conclusion: SpHb can provide effective patient blood management in major surgical cases. It does not delay the decision of blood transfusion during surgery.

6993
Fibrinogen measurement: Which value is the right one? Comparison of viscoelastic and standard laboratory methods.

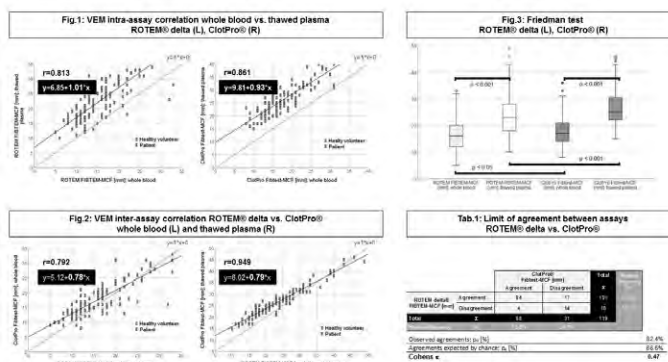
Pekrul I.¹, Adamowicz S.², Giebl A.³, Kilger E.², Spannagl M.⁴, Möhnlé P.⁵
¹Ludwig-Maximilians University Hospital - Munich (Germany),
²Department of Anaesthesiology, Ludwig-Maximilians University Hospital - Munich (Germany),
³Department of Transfusion Medicine and Hemostaseology, University Hospital Augsburg - Augsburg (Germany),
⁴Department of Transfusion Medicine, Ludwig-Maximilians University Hospital - Munich (Germany),
⁵Department of Anaesthesiology, Department of Transfusion Medicine, Ludwig-Maximilians University Hospital - Munich (Germany)

Background: Viscoelastic testing methods (VEM) have evolved to clinical standard in perioperative blood product management of acute hemorrhage. While treatment algorithms are mainly based and validated on one platform (ROTEM), new platforms like ClotPro are increasingly used. Our aim was to compare different assay types/platforms with respect to measurement of fibrinogen as the most relevant parameter in treatment algorithms.

Methods: To obtain values in a wide range, samples were obtained from surgical patients (n= 77) and from patients of an outpatients clinic (n=23). All applied assays are regularly controlled by internal & external quality control. The following parameters were obtained: -Clauss & derived fibrinogen -functional fibrinogen (FF): ROTEM delta (FIBTEM) & ClotPro (Fibtest). Measurements were performed directly on original samples (whole blood, fresh plasma samples (WBS, fPS) as well as by batch testing on thawed plasma samples (tPS). Data were analysed using the Spearman's correlations coefficient, Friedman test, the limit of agreement between methods was calculated using Cohen's κ.

Results: Interassay comparison revealed significantly different results for derived fibrinogen and the Clauss fibrinogen measurements. However, no significant variability of intra-assay results was observed for testing of fPS versus batch testing of tPS. Importantly, differing values, depicted by a parallel shift, can be observed for FF measurement from tPS vs. WB with ROTEM. ClotPro showed similar values for both settings. Moreover, compared to FIBTEM, Fibtest results were observed to shift to higher MCF values. This observation was made in WB as well as in tPS. The assays showed moderate agreement (κ=0.47).

Conclusion: Despite the correlations of two methods, the comparison of measurements of WBS and tPS with ROTEM and ClotPro hint to significant differences with potentially higher values for FF values in ClotPro as compared to ROTEM, assumingly associated to test specifications. Since these test methods are increasingly relied on in clinical practice, we suggest that future research is needed to validate and compare the test methods.



7082

Changes in the hemostasis system in patients undergoing endoscopic gynecological intervention under intravenous anesthesia with spontaneous breathing.

Tarabrin O.¹, Sukhonos R.¹, Biehlarov O.¹, Suslov O.¹
¹Odessa National Medical University - Odessa (Ukraine)

Background and Goal of Study: Hysteroscopy is a popular endoscopic diagnostic and operative gynecological procedure performed under general anesthesia (TIVA) with preservation of spontaneous breathing (SB) of the patient. There is a risk of venous thromboembolism (VTE) in this category of patients due to the lithotomy position, TIVA, etc. The goal of the research was to investigate the effect of general anesthesia on the blood coagulation system and the effectiveness of preventive measures, based on changes in low-frequency piezoelectric thromboelastography (LPTEG) data after hysteroscopy under TIVA + SB, relative to baseline values.

Materials and Methods: Diagnostics of the hemostasis system were performed in 47 gynecological patients undergoing hysteroscopy, aged 25-65 years. Patients are divided into 4 groups of pain, depending on the type of preventive measures for thrombotic complications. Group 1 (n = 10) consisted of patients who underwent intermittent pneumocompression of the lower extremities and pharmacological prophylaxis with anticoagulants; group 2 (n = 12) - patients who were prophylaxis only with anticoagulants; group 3 (n = 18) - thromboprophylaxis only by intermittent pneumocompression of the lower extremities; group 4 (n = 10) - patients who were not treated preventively. The control was performed using ultrasound examination of the veins of the lower extremities and LPTEG.

Results and Discussion: Group 1 showed a decrease in the incidence of asymptomatic deep vein thrombus formation (DVT) compared with groups 2, 3 and 4; the incidence of bleeding in groups 3,4 was significantly lower compared with groups 1 and 2; however, the incidence of DVT was lower in groups 1, 3 relative to groups 2 and 4.

Conclusion: Ignoring preventive measures can lead to thrombotic complications. The combination of intermittent pneumatic compression and pharmacological anticoagulant prevention of thrombotic complications demonstrates a higher level of safety for patients who underwent hysteroscopy compared to mono-methods.

7108

Successful perioperative management of a patient with severe hemophilia A: a case report

Duarte A.¹, Castro M. D. L.², Sousa Dias C.³, Silva Pinto J.⁴
¹Centro Hospitalar Lisboa Central, EPE (CHLC,EPE) - Polo de Santa Marta - Lisboa (Portugal), ²Centro Hospitalar Universitário Lisboa Central, EPE (CHLC,EPE) - Polo de Santa Marta - Lisboa (Portugal), ³Centro Hospitalar Universitário Lisboa Central, EPE (CHLC,EPE) - Polo Curry Cabral - Lisboa (Portugal), ⁴Centro Hospitalar Universitário Lisboa Central, EPE (CHLC,EPE) - Lisboa (Portugal)

Background: This case report aims to discuss the perioperative management of individuals with severe hemophilia undergoing major surgery.

Case Study: A 45-year-old, 80kg male, ASA III, with history of severe hemophilia A, presents for total knee arthroplasty. Preoperative hemoglobin was 15.6 g/dL, aPTT 98.5, and a factor-VIII level of 0.9 %. Preoperatively, immunohemotherapy collaboration was requested and correction of factor-VIII was planned. The presence of factor-VIII inhibitors was ruled out. Two 16G peripheral accesses, ASA standard monitoring, BIS and TOF were established. A dose of factor VIII (50 UI/kg to raise the factor till 100%) was administered 30 min before induction. An ultrasound-guided femoral nerve block with ropivacaine was performed. General anesthesia was induced, radial artery cannulation and antibiotic prophylaxis were done. Afterwards, a pneumatic tourniquet was inflated. Intraoperatively, intra-articular tranexamic acid (IATXA) was administered followed by multimodal analgesia, except for non-steroid anti-inflammatory drugs. Surgical procedure was performed without bleeding complications and patient remained hemodynamically stable. Postoperatively bleeding

monitoring was carried out with hemoglobin, aPTT, FVIII levels and antibody assay. Factor-VIII was administered as per laboratory control. Throughout hospital stay, laboratory measurements confirmed stable FVIII levels. Patient was discharged 9 days later.

Discussion: Generally, recommendations lay down a desired preoperative factor level for major surgery of 80–100%, with postoperative levels progressively decreasing to approximately 50% until the healing of the surgical wound¹. Given the imminent risk of bleeding, neuraxial anesthesia did not present as a viable option. Intraoperatively, adequate anesthetic depth and muscle relaxation for intubation was ensured to prevent orotracheal injury which could precipitate bleeding. IATXA was used as an adjuvant therapy to promote clot stability and reduce blood transfusions after surgery². This case report further enhances the importance of a structured approach to hemophiliacs undergoing major orthopedic surgery.

References:

1. Srivastava et al. WFH Guidelines for the Management of Hemophilia 2020: 26 (Suppl 6): 1- 158.
2. Madan N et al. Treatment of bleeding in hemophilic patient—A novel approach. Int J Crit Ill Inj Sci. 2011

Conclusion: Interdisciplinary collaboration is a mandatory prerequisite for an optimized perioperative management of hemophilic A patients.

7125

Biochemical quality of OctaplasLG® frozen and freeze-dried products

Heger A.¹, Hinz A. C.², Gruber G.³

¹Octapharma Pharmazeutika Produktions GesmbH - Vienna (Austria), ²Octapharma AB - Stockholm (Sweden), ³Octapharma PPGmbH - Vienna (Austria)

Background and Goal of Study: OctaplasLG® is a solvent/detergent-treated, coagulation-active plasma product for treating complex coagulation factor deficiencies, such as coagulopathy due to severe hepatic failure or massive transfusion. OctaplasLG® is also used as substitution therapy in coagulation factor deficiencies in situations where specific factor concentrates are not available, or in emergency situations where precise laboratory diagnosis is not possible. OctaplasLG® is supplied frozen; the thawed product is stable during refrigerated storage for up to 5 days. Recently, a new freeze-dried form was developed (OctaplasLG® Lyo) which offers faster reconstitution and more flexibility in storage conditions (refrigerated/room temperature) to increase ease of logistics and utilization. This study aimed to compare the biochemical quality of OctaplasLG® Lyo and OctaplasLG®.

Materials and Methods: Three OctaplasLG® Lyo batches for process performance qualification were manufactured at Octapharma AB (Stockholm, Sweden), freeze-dried and reconstituted with sterilized water. Twelve batches of frozen OctaplasLG® were used for comparison; batches were assessed directly after thawing, as well as after storage of the thawed product at 2–8 °C for ≤6 days. All batches were assessed for global coagulation parameters, important coagulation factors and protease inhibitors, and activation markers of coagulation and fibrinolysis.

Results and Discussion: Frozen OctaplasLG® and freeze-dried OctaplasLG® Lyo demonstrated identical quality profiles upon thawing and reconstitution, respectively; all parameters were in line with levels mandated by the European Pharmacopoeia. In addition, OctaplasLG® Lyo exhibited comparable/higher quality for temperature-sensitive parameters, such as levels of factor V, factor VIII, and protein S, compared with thawed OctaplasLG® after 6 days of refrigerated storage (Figure 1).

Conclusion: OctaplasLG® frozen and freeze-dried products have equally high biochemical quality. Due to its faster reconstitution time and flexible storage conditions, the new freeze-dried version (OctaplasLG® Lyo) has advantages in emergency situations and in ex-hospital settings.

7133

Association of perioperative prothrombin complex concentrate and fibrinogen concentrate administration with thrombotic complications after liver transplantation

Riede C.¹, Dehne S.¹, Klotz R.¹, Mehrabi A.¹, Weigand M. A.¹, Larmann J.¹
¹Heidelberg University Hospital - Heidelberg (Germany)

Background and Goal of Study: Thrombotic complications after liver transplantation limit organ survival and drive morbidity and mortality. The use of intraoperative prothrombin complex concentrate (PCC) and fibrinogen concentrate administration has been linked to thrombotic events. However, it is unknown if their use is associated with thrombotic events after liver transplantation.

Materials and Methods: We conducted a retrospective, single-centre, observational study in patients undergoing orthotopic liver transplantation between 2004 and 2017 at Heidelberg University Hospital, Heidelberg, Germany. Primary composite endpoint was the occurrence of hepatic artery thrombosis, portal vein thrombosis or thrombosis of the inferior vena cava within 30 days after transplantation. Secondary endpoints were: mortality, graft failure, other thrombotic events, length of ICU and hospital stay. Patients were stratified for not receiving any coagulation factor (fresh-frozen plasma only group) or receiving fibrinogen and/or PCC (coagulation factor group). Data were analyzed using uni- and multivariate Cox regression or logistic regression analysis. Mann-Whitney-U test was performed on the continuous variables. $P < 0.05$ was considered significant.

Results and Discussion: Data from 939 transplantations were included in the analysis. After multivariate analysis, perioperative PCC and/or fibrinogen administration was an independent predictor for the primary composite endpoint, HAT, PVT, and inferior vena cava thrombosis (OR 1.632, 95% CI 1.012-2.630, $p = 0.044$). PCC and/or fibrinogen administration was associated with 30-day mortality after liver transplantation (OR 4.225, $p < 0.001$), graft failure (OR 3.093, $p < 0.001$), intraoperative blood loss ($p < 0.001$), red blood cell concentrate transfusion ($p < 0.001$), platelet transfusion ($p < 0.001$), duration of hospitalisation ($p < 0.001$) and length of stay in intensive care units ($p < 0.001$). Previous findings in literature are heterogeneous, so there is partly accordance to the results from other authors.

Conclusion: A critically review of established strategies in coagulation management during liver transplantation is warranted. Perioperative care givers should exercise caution when administering coagulation factor concentrate during liver transplant surgery. Further trials should be tailored to identify patient subgroups that will likely benefit from prothrombin complex concentrate and/or fibrinogen administration.

7192

Continuous Hemoglobin Measurement during Frontal Advancement Operations Can Improve Patient Outcomes

Saracoglu A.¹, Abdullayev R.¹, Sakar M.¹, Sacak B.¹, Girgin Incekoy F.¹, Aykac Z. Z.¹

¹Marmara University School of Medicine - Istanbul (Turkey)

Background and Goal of Study: Pediatric cranioplasty operations are challenging due to potential to have significant intraoperative blood loss. Massive hemorrhage may necessitate blood transfusion, which can bring about many complications. Radical-7 Pulse CO-Oximeter (Massimo Corporation, Irvine, CA) can provide continuous hemoglobin concentration (SpHb) measurements noninvasively. In this study, we aimed to evaluate the effects of SpHb measurements on the patients' perioperative blood management and postoperative outcomes.

Materials and Methods: For this retrospective case control study data of the pediatric patients aged from 2 months to 2 years that undergone fronto-orbital advancement surgery for plagiocephaly and trigonocephaly with American Society of Anesthesiologists (ASA) physical status I-II between 2018-2021 in our university hospital were collected. The patients' demographic and clinical characteristics; intraoperative hemodynamic and laboratory variables, including blood gases; intraoperative blood losses; amount of the transfused blood products; postoperative intensive

care unit (ICU) and hospital lengths of stay were collected.

Results and Discussion: Data of 42 patients were collected, of which 29 were males (69%). Plagiocephaly was the diagnosis in 24 (57.1%) patients and others had trigonocephaly. In 16 of the patients perioperative SpHb monitoring was made (Group S). Other patients that were managed conventionally were considered as a control group (Group C). Demographic, clinical and perioperative hemodynamic characteristics of the patients were comparable between the groups. Groups S had significantly less perioperative packed red blood cell (PRBC) transfusion ($P = 0.015$), less postoperative bleeding ($P = 0.013$) and less ICU length of stay ($P < 0.001$), compared with the Groups C (Table 1). There was positive correlation between PRBC transfusion amount and ICU length of stay (Pearson correlation test, $r = 0.459$, $P = 0.003$).

Conclusion: Patients with perioperative continuous SpHb measurement have less intraoperative PRBC transfusion, less postoperative bleeding, and less ICU length of stay. SpHb, together with clinical judgement and laboratory confirmation, when necessary, can be used in decision making for PRBC transfusion perioperatively.

7299

Clinical Effectiveness of Intraoperative Cell Salvage in Aseptic Revision Total Hip Arthroplasty: a Monocentric 10-years Experience Retrospective Study

Piette N.¹, Carella M.¹, Beck F.¹, Lagny M.¹, Hans G.¹, Lecoq J. P.¹

¹University Hospital of Liège - Liège (Belgium)

Background and Goal of Study: Revision of total hip arthroplasty (rTHA) is associated with a high rate of intra- and postoperative red blood cell transfusion. Blood-sparing techniques are therefore considered a quality marker of perioperative management. Whether intraoperative cell salvage (CS) should be used routinely or be dependent on patient or procedure characteristics remains controversial.¹ The aim of this study is to identify the pre- and intraoperative risk factors associated with successful intraoperative re-infusion by CS in aseptic rTHA.

Materials and Methods: We performed a retrospective analysis of 140 patients who underwent aseptic rTHA with intra-operative CS at the Liège Orthopedic University Hospital between 01 January 2011 and 31 December 2020. rTHA was defined as the exchange of stem, acetabular or combined hip prosthesis component. Aseptic indications were implant wear or loosening causing pain and mechanical symptoms or traumatic rTHA. Patients were then divided into two groups according to whether or not cell at least 125 mL of saved blood could be re-infused. Data are presented as median [IQR] or n(%) and compared between the groups using the chi-square test or the Kruskal-Wallis test as appropriate. Multivariable logistic regression was used to identify independent predictors of successful re-infusion. A two-tailed P value < 0.05 was considered statistically significant.

Results and Discussion: CS could be used successfully in 41 (67%) stem, 14 (47%) acetabulum, 39 (80%) combined exchange respectively ($P = 0.02$). No patient-related risk factors was associated to re-infusion. Re-infused volume were 138 [0-250] ml, 0 [0-280] ml, 250 [112-390] ml for the stem, acetabulum or combined rTHA respectively ($P = 0.005$).

Conclusion: Our data suggest that the type of surgery was the single best predictor of CS usefulness and effectiveness in aseptic rTHA. Admittedly, variability in re-infused volumes is important. We however believe that the use of CS should be considered even in all case of rTHA. Indeed, even in the group of isolated acetabulum replacement, it allows blood reinfusion in almost 50 % of the cases.

References:

1. Palmer AJR, Lloyd TD, Gibbs VN, et al. The role of intra-operative cell salvage in patient blood management for revision hip arthroplasty: a prospective cohort study. *Anaesthesia*. 2020;75(4):479-486.

7345

Acute ischaemia in lower limb after complex spinal surgery: case report

Campistol Mas E.¹, Gimenez-Milà M.¹, Puig G.¹, Alvarez-Villegas D.¹, Colomina M. J.¹

¹Hospital Universitari Bellvitge - Hospitalet de Llobregat (Spain)

Background: Complex spinal surgery (CSS) is characterised by the profound physiological disturbances affecting spinal cord and other organs. Patient positioning, fluid management, pain control and avoidance of major haemorrhagic and thrombotic events are the main anaesthetic targets. Here, we present a rare thrombotic complication after CSS.

Case Report: We report a 68-year-old male patient with hypertension who was diagnosed with adult spinal scoliosis, presenting important sagittal imbalance that required surgical correction. The procedure was planned in three stages. He firstly underwent an uneventful posterior L2-S1 instrumentation and L4-L5-S1 decompression surgery. On the following day, an anterior lumbar fusion of L4-S1 was performed assisted by a vascular surgical team. Finally, he underwent a posterior approach for instrumentation L3-L4 and L5-S1 in prone position. During the whole surgery the patient remained haemodynamically stable and on sinus rhythm. He received tranexamic acid (TXA) with a loading dose of 10mg/kg and 2mg/kg/h as a maintenance dose during the 5-hours operation. Also, one unit of packed red blood cells was transfused. He was extubated in the operating theatre and transferred to a Critical Care Unit without adverse events. Two hours postoperatively he started feeling acute pain and loss of palpable pulse in left lower-extremity. Examined by vascular surgeons, he was diagnosed with acute arterial ischaemia. Thrombectomy surgery was successfully performed, removing a fresh thrombus from anterior tibial artery.

Discussion: In the presented case, two possible factors contributing to the described thrombotic complication were identified. The potential pro-thrombotic nature of TXA although latest meta-analyses have excluded an increased rate of thrombotic events (1) and the risk of vascular injury in an anterior approach of the spine. Regarding the latter, even being a rare complication, left iliac artery thrombosis is the most common described arterial injury in anterior lumbar interbody fusion due to surgical manipulation (2).

References:

1. Hariharan D, Mammi M, Daniels K, et al. *Drugs*. 2019; 79:1679-1688.

2. Inamasu J, Guiot BH. *Acta Neurochir* 2006; 148:375-387.

Learning points: Early diagnosis and treatment of eventual complications after CSS in a multidisciplinary approach with anaesthetists, intensivists, orthopaedic and vascular surgeons are related with good perioperative outcomes.

7478

Rectus sheath hematoma and an elevated aPTT: how to manage?

Alves C.¹, Duarte F.¹, Pedro D.¹, Calhau R.¹, Dias N.¹

¹Hospital Garcia de Orta - Almada (Portugal)

Background: Rectus sheath hematoma (RSH), associated with blunt abdominal trauma and anticoagulation, is a rare clinical condition due to bleeding into the rectus sheath, after damage to the epigastric arteries or a tear of the muscle. Large hematomas can cause hypovolemia and sometimes can cause urinary tract obstruction and bladder irritability. Invasive haemorrhage control of RSH is considered in hemodynamically unstable patients that don't respond to fluid resuscitation. Measurement of coagulation factors is useful in patients receiving oral anticoagulation because RSH is more likely in supratherapeutic anticoagulation.

Case Report: A 80-years-old woman with medical history of hypertension and renal cell cancer was medicated with therapeutic Enoxaparin because of a renal vein thrombosis episode. She came to the Emergency Department (ED) complaining of acute abdominal pain. She made a CT scan, which showed a RSH compressing the right ureter and causing right ureter-hydronephrosis, bladder lateral deviation and femoral vein compression. A complete blood count showed decreased haemoglobin (Hb 86g/L) and an elevated aPTT (257.2s, confirmed in two different blood samples). Plaquettes count, time of prothrombin and fibrinogen were normal. She had no previous history of coagulation disorders.

At ED, she became haemodynamically unstable and confuse, and an invasive haemorrhage control was decided. It was performed balanced general anaesthesia with orotracheal intubation. The hypovolemia and the coagulopathy were managed. At postoperative day 1, she was extubated and aPTT was 43,6s.

Discussion: There are several possible causes of the RSH, such as abdominal surgery, trauma, anticoagulant therapy, and haematological disease. In the present case, the patient was anticoagulated with subcutaneous Enoxaparin and she had an important increase of aPTT value. This combined situation contributes to the haemorrhagic tendency and to the continuous bleeding into the rectus sheath.

References:

1. Kawsar HI, Shahnewaz J, Bhansali H, Daw H. Rectus sheath haematoma. *BMJ Case Reports* 2012;10.1136; Athanasios Hatjipetrou, Dimitrios Anyfantakis b, Miltiades Kastanakis. Rectus sheath hematoma: A review of the literature, *International Journal of Surgery* 13 (2015) 267e271

Learning points: Nowadays, lots of patients are using anticoagulation, causing important disruptions in coagulation homeostasis. It is an indisputable predisposing factor for RSH and probably the most common one.

7489

Perioperative management of a patient with Bombay blood phenotype and chronic hip arthroplasty infection undergoing hip replacement surgery.

Gardeta A.¹, Berberana M.¹

¹Hospital Universitario Severo Ochoa - Madrid (Spain)

Background and Goal of Study: Bombay red blood cell (RBC) phenotype is a very rare autosomal recessive phenotype within the ABO blood group. Its estimated prevalence is 1 in 1,000,000 outside of India. RBCs lack A, B, and H antigens, and produce antibodies to A, B, and H. These patients can only be transfused with their own blood or with blood with this same Bombay phenotype. If they receive RBCs of any ABO type other than Bombay they are at high risk for a severe haemolytic transfusion reaction.

Materials and Methods: A 68 years old male patient was admitted to the hospital with chronic hip surgical infection. Personal history included hypertension, atrial fibrillation with sintrom intake, Bombay Rh negative phenotype and had suffered multiple orthopaedic surgeries. Six months before he had R idoesectionhip arthroplast surgery. He suffered a long postoperative that included bleeding and infection. He was transfused autologous blood and also alogenous Bombay Rh positive blood. On admittance day he was prescribed antibiotics and was scheduled for a two-stage replacement arthroplasty. Laboratory tests showed Anti D Rh antibodies and Hb 9.8mg/dl. He was included in a Patient Blood Program (PBM), he was received Erythropoietin (EPO) 40.000 UI weekly during 6 weeks and two times Iron IV. Five autologous Blood units were obtained, each one was microbiologically analysed. There were also 3 alogenous Bombay Rh – units.

Results and Discussion: Surgery went under general anaesthesia, Hb 12.3 and there was moderate bleeding. On the first day he was transfused 1 autologous unit due to anemization. On day 7 he suffered a lower gastrointestinal bleeding (LGIB) with Hb 7.1mg/dl but no haemodynamic impact. Endoscopy showed no bleeding point and he was transfused a second autologous blood unit. 24 hours later there was a new LGIB, Hb 4.5 mg/dl and haemodynamic instability, he was transfused the last 3 autologous units. Active bleeding continued, and despite transfusion of the alogenous Bombay units he presented dizziness, dyspnoea and heart failure that led him to death.

Conclusion: Bombay phenotype patients are not supposed to receive RBC from any other phenotype. For elective surgery, these patients should enter a PBM programme. Apart from the surgery bleeding, the LGIB and possible haemolysis increased the anemization and that led to his decease. When new circumstances appear there is little room for manoeuvre.

7618

Management of massive hemorrhage in a patient pending a heart transplant

Guerra Hernández E.¹, Becerra Bolaños Á.¹, Hussein Dib González Z.¹, Rodríguez Pérez A.¹

¹Gran Canaria Doctor Negrin Hospital - Las Palmas Gran Canaria (Spain)

Background: Thromboelastogram (TEG) has become in a helpful tool to guide transfusion in massive hemorrhage. However, in the acute moment we should act before we get the results. We present the case of a patient on the waiting list for a heart transplantation admitted to ICU for cardiogenic shock, and who suffers from hemorrhagic shock.

Case Report: A 57-year-old man with ischemic heart disease, LVEF 35%, pulmonary hypertension, moderate mitral regurgitation, anticoagulated because of intraventricular thrombus, on the waiting list for heart transplantation. He was admitted to the ICU in acute lung edema due to cardiogenic shock, where treatment with BCPIAo and catecholamines was needed and anticoagulation (sodium heparin) started. At 48 hours, he presented abdominal distension and hemodynamic instability. Abdominal ultrasound showed free fluid and emergent surgery was indicated. Protamine 50 mg, fibrinogen 2 g, prothrombin complex 1200 IU, tranexamic acid 1 g were administered prior to laparotomy for emergent splenectomy. 4 CH, 2 pools of platelets, 1200 IU of prothrombin complex and 1 g of fibrinogen were transfused. TEG test was performed after splenectomy showing normal CK, CRT and CFF, and lengthened CKH. Protamine 20 mg was administered, and next TEG results were normal.

Discussion: Damage control surgery is essential in massive bleeding, as well as avoiding the lethal triad: hypothermia, coagulopathy, and acidosis, and maintaining a permissive hypotension that allows adequate perfusion and the control of bleeding. The early and serial determination of hematological parameters (hemoglobin, lactate, excess bases and coagulation tests) are recommended, as they can be a marker of poor prognosis. The use of viscoelastic tests (TEG or ROTEM) that helps guiding early treatment in coagulopathy are also recommended: CK assesses the coagulation factors and heparin, CKH contains heparinase, CRT evaluates platelets and fibrinogen, and CFF evaluates fibrinogen. Its use has demonstrated to reduce transfusion, bleeding, costs and hospital stay when compared with traditional coagulation tests.

References:

1. Transfusion. 2020;(60):Suppl 6:S21-S28

Learning points: In acute hemorrhage management, the appearance of the lethal triad must be avoided, and permissive hypotension until bleeding control should be maintained. Clotting factors, tranexamic acid and calcium levels should be quickly replenish.

Perioperative Medicine

6469

Retrospective study of feasibility of opioid-free anaesthesia on acute postoperative pain management and the appearance of postoperative complications in cytoreductive surgery (CRS) with Hyperthermic intraperitoneal chemotherapy (HIPEC). A pilot study.

Isidro G.¹, Tejedor A.¹, Pujol E.¹, Ma Basas E.¹, Bernat M. J.¹, Fernanz J.¹
¹Consorti Sanitari Integral - Sant Joan Despi, Barcelona (Spain)

Background: Opioid free anaesthesia (OFA) has provided adequate perioperative analgesia, avoiding the side effects associated with the use of opioids in surgeries as abdominal, cardiac or thoracic surgery, among others. However, this strategy has not been evaluated in cytoreductive surgery(CRS) with Hyperthermic intraperitoneal chemotherapy(HIPEC). The main objective of the study was evaluate the feasibility of OFA on acute postoperative pain management in CRS with HIPEC.

Patients and Methods: This retrospective study evaluated postoperative epidural levobupivacaine requirement and Numerical Rating Scale (NRS) values in patients undergoing CRS with HIPEC and receiving either opioid-based anaesthesia strategy (OBA group) or a non-opioid strategy including lidocaine, ketamine, magnesium sulfate and dexmedetomidine(OFA group). All patients received postoperative multimodal analgesia including both epidural analgesia and intravenous analgesics. The primary outcome was the assessment of perioperative pain management through epidural levobupivacaine requirement and NRS values during the first postoperative 5 days. Secondary outcomes included postoperative morphine consumption, intraoperative hemodynamic events; perioperative fentanyl administered; Peritoneal Carcinomatosis Index; Intestinal resection; days of epidural analgesia; perioperative complications; and length of in-hospital stay.

Results: From May 2020 to December 2020, a total of 25 patients were recruited. Thirteen patients received an OBA strategy and 12 received an OFA strategy. At 24 postoperative hours, NRS values were lower in OFA group (p 0.02). The incidence of postoperative nausea and vomiting (PONV) was lower in OFA group (p 0.011). There were no differences in the rest of variables analysed (p >0.05).

Conclusion: OFA strategy offers an optimal control of acute postoperative pain minimizing perioperative opioids use and decreases the incidence of postoperative nausea and vomiting in CRS with HIPEC.

6470

Preoperative eConsult quality: safety and patient experience

Klok T.¹, Ransijn J.¹, Godfried M.¹, Thiel B.¹

¹OLVG - Amsterdam (Netherlands)

Background and Goal of Study: The current COVID-19 crisis with its emphasis on social distancing and avoiding unnecessary contacts leads to an increased use of online and digital tools in our society (e.g. online meeting tools, online shopping). To avoid unnecessary hospital visits for preoperative assessment we offered patients an online screenings tool (eConsult). Aim of this research is assessing patient satisfaction with this tool and assessing anesthesia care safety after an online consultation.

Materials and Methods: The online eConsult tool was commissioned by the anesthesiology department and build by Medify.com®. The tool consisted of an information part (about anesthesia, admission and recovery) and a health questionnaire part. After concluding the questions patients were given the opportunity to either give online consent or the option for a telephone contact. Both patients and attending anesthesiologists were queried using surveys.

Results and Discussion: A total of 31 participants completed the eConsult and were included in the analysis. Twenty-five (81%) patients were classified as ASA 1, five (16%) patients as ASA 2 and one (3%) patient was classified as ASA (BMI of 41). Twenty-nine (94%) patients

choose for a completely online consent. Twenty-six patients (84%) gave the eConsult an overall score of good to excellent. Asked what sort of preoperative consultation patients would prefer for future operations 23 (74%) would choose an eConsult, 4 (13%) would choose a telephone consultation and 4 (13%) would choose an preoperative outpatient clinic visit. Of the attending anesthesiologists 27 (90%) rated the eConsult as good to excellent. In 3 patients (10%) they missed anamnestic and or physical information. One patient had an unforeseen difficult intubation, which did not lead to an undesirable situation. No adverse events were noted.

Conclusion: For the majority of a relative healthy population of patients (81% ASA 1) undergoing tonsillectomy in daycare an eConsult with online consent was satisfactory (84%). In 10% information was missed by the attending anesthesiologist this did not lead to adversary events and the majority of attending anesthesiologists (90%) rated the eConsult as good to excellent.

References:

1. To infinity and beyond: the past, present, and future of tele-anesthesia. *Anesth Analg.* 2020; 130:276–284

6472
Monitoring of the respiratory health using variability and frequency analysis of the thoracic movement

Boichat C.¹, Graverot M.¹, Kindler U.², Lebrun T.¹, Carles M.³, Kindler F.⁴, none

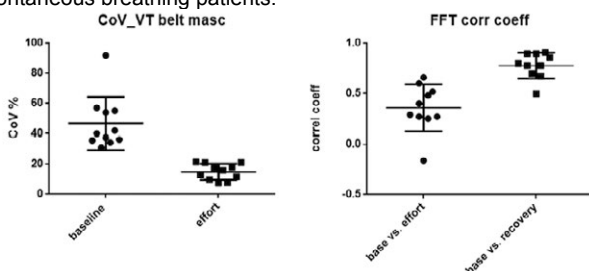
¹CHU Fort de France - Fort de France (Martinique), ²Technical University Lübeck - Lübeck (Germany), ³CHU de Nice - Nice (France), ⁴Bethesda Spital - Bâle (Switzerland)

Background and Goal of Study: Spontaneous ventilation is a non-linear and aperiodic activity, exhibiting a breath-by-breath variability. When the breathing work increases, the variability decreases. During ventilatory support, decreased respiratory rate variability is associated with increased mortality. Postoperative pulmonary complications are associated with an increase of morbi-mortality. However, the decrease of pulse oximetry is the consequence of insufficiency of compensatory mechanisms and decreases late in response to significant lung impairment. It could be interesting to have a continuous measurement of respiratory variability in post-operative room to identify early respiratory degradation. The aim of this study is to assess the effectiveness of measuring breathing variability by analyzing thoracic movement with a device composed of a single belt attached around the subject's chest.

Materials and Methods: This is a prospective, interventional, non invasive study at the Fort-de-France hospital. Eleven healthy volunteers were included. Thoracic movements were recorded by the thoracic belt device during rest, effort (70% of VO₂ max) and recuperation, firstly with the device alone then simultaneously with a spirometry mask. After calibration, tidal volume (Vt) and breathing pattern were measured, and coefficient of variation (CV) for Vt and Vt/Ti (Ti = inspiratory Time), frequency analysis by Fast Fourier Transform (FFT) and correlation coefficient for each condition were calculated. Statistical Wilcoxon Test was used.

Results and Discussion: A significant decrease of the CV of the Vt and Vt/Ti during effort compared to at rest was observed. Results obtained with the device correlated significantly to the spirometry data. The frequency analysis using the FFT was significantly different between rest and effort (figure 1).

Conclusion: The increase of respiratory work during effort led to a significant decrease of respiratory variability measured by analysis of the thoracic movement. The ease of use of this device, independent of respiratory interface, could be useful for postoperative monitoring for spontaneous breathing patients.



6476
Early changes over time in QoR-15 score are associated with the occurrence of postoperative complications

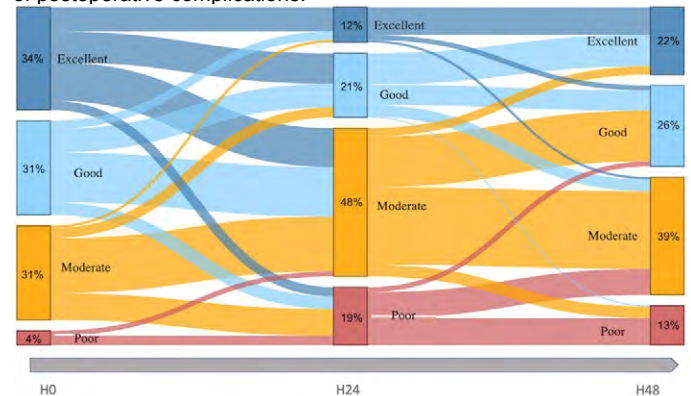
Campfort M.¹, Cayla C.¹, Rineau E.¹, Lasocki S.¹, Léger M.¹
¹CHU Angers - Angers Cedex 9 (France)

Introduction: The QoR-15 score is a validated tool to assess the quality of postoperative recovery (QoR), which is dependent on the occurrence of postoperative complications. Our objective was to assess the association between the QoR-15 values during the first 24 and 48 hours with the occurrence of early postoperative complications.

Materials & Methods: We used the data from a prospective monocentric cohort study conducted in the Angers University Hospital from July 2019 to February 2020 to validate the FQoR-15 (French version of the QoR-15). French-speaking adult patients undergoing elective surgery were asked to complete the form the day before, at 24 and 48 hours after surgery. The QoR was classified according to the QoR-15 score as excellent (QoR-15 > 135), good (122 ≤ QoR-15 ≤ 135), moderate (90 ≤ QoR-15 ≤ 121) and poor (QoR-15 < 90)¹. Postoperative complications were classified according to the POMS classification.

Results: Among the 363 enrolled patients, 217 (59,8%) were men. The median age was 60 (range 44 to 71) years old. A broad panel of surgeries was represented, from cardiac surgery to gynecological surgery, with many ambulatory surgeries (139 patients, 38.3%). 306 patients (85.5%) had general anesthesia and 52 patients (14.5%) had locoregional anesthesia. 152 (42%) patients had at least one postoperative complication at H24 and 49 (14%) at H48. The patient trajectories according to the QoR-15 value classification are represented in the Figure 1. Patients with an altered recovery at H24 had more complications than others: 75% had at least one complication in the poor recovery group and 14.3% in the excellent recovery group (p<0.0001). Results were similar at the H48 timepoint (p<0.0001). The QoR-15 score at H24 allowed a suitable discrimination of the occurrence of at least one complication at 48 hours after surgery, AUC 0.801 [0.728-0.874], with an optimal threshold according to Youden index at 95.5 (specificity 0.84, sensibility 0.67).

Conclusion: The QoR-15 score at 24 and 48 hours after surgery and its classification into severity groups are well associated with the occurrence of postoperative complications.



1. Kleif, Gögenur, J Surg Res, 2018.

6482
Improvement in pre-operative pregnancy assessment in female patients undergoing non-obstetric or non-gynaecological surgery after introduction of a checklist

Martin T.¹, Drucker A.¹, Desmond F.¹
¹Austin Health - Heidelberg (Australia)

Introduction: At our institution, a large tertiary referral hospital in metropolitan Melbourne, a previous audit found that only 8.7% of potentially pregnant patients were being asked by any staff member if they could be pregnant prior to their procedure.¹ The pre-operative checklist was strengthened with mandatory pregnancy related questions, and we conducted a post- implementation audit.

Materials & Methods: We performed a retrospective cohort analysis of all female patients aged between 16-50 years of age, having non-gynaecological and non-obstetric surgery over a one month period (May 2019). Binomial confidence intervals were calculated with a one proportion test.

Results: A total of 380 patients were included in the audit. 376 (98.9%, 95% CI 97.33-99.71) were asked if they were potentially pregnant. One patient had a known pregnancy, and one patient was possibly pregnant. Four patients were not asked, because they were having procedures with local anaesthesia only. 16 (4.2%, 95% CI 2.43-6.75) patients underwent pregnancy testing, 9 urine tests and 7 serum tests. No new pregnancies were identified. The improvement in pregnancy status documentation from 8.7% to 99% demonstrates the improvements to routine care that can be made through the introduction of checklists. Checklists have been found in systematic review to increase patient safety and improve quality of care, and are associated with increased detection of potential safety hazards.²

Conclusion: Identifying pregnant female patients prior to anaesthesia and surgery is important because of the risk of complications to both mother and foetus, with an overall miscarriage rate of 5.8%.³ No incidentally pregnant patients were found using our checklist or subsequent pregnancy testing. The introduction of a checklist improved pre-operative pregnancy assessment from 8.7% to 99% of female patients undergoing non-obstetric or non-gynaecological surgery.

References:

1. Drucker A, Desmond F. Pre-operative pregnancy assessment in female patients undergoing non- obstetric or non-gynaecological surgery at a Victorian tertiary hospital. Presented at the Post Graduate Association of Anaesthesiologists Meeting, New York, 2019.
2. Saxena S, Krombach JW, Nahrwold DA, Pirracchio R. Anaesthesia-specific checklists: A systematic review of impact. *Anaesth Crit Care Pain Med.* 2020;39(1):65–73.
3. Cohen-Kerem R, Railton C, Oren D, Lishner M, Koren G. Pregnancy outcome following non-obstetric surgical intervention. *Am J Surg.* 2005 Sep;190(3):467–73.

6511
Impact of preoperative treatment with antidepressants and/or anxiolytics on outcomes after colorectal surgery with an enhanced recovery program: A monocentric retrospective study

Hardy P. Y.¹, Joris J.²
¹CHU Liège - Liège (Belgium), ²CHU Liège - Liège (Belgium)

Background and Goal of Study: Patients on antidepressants and/or anxiolytics therefore often have a complex postoperative course due to more difficult management of postoperative analgesia, impaired self-management mechanisms and medication-related problems. Preoperative use of antidepressants and anxiolytics were reported to increase the length of hospital stay (LOS) and worsen surgical outcomes. However the surgical procedures studied were rarely performed with an enhanced recovery program (ERP). This study investigated whether these medications impair postoperative recovery after colorectal surgery with an ERP.

Materials and Methods: The data of all the patients scheduled for colorectal surgery between 2015 and 2019 prospectively included in our database were analyzed. All patients were managed with the same ERP. Demographic data, risk factors, postoperative complications incidence, LOS and adherence to the ERP were compared between patients with and without preoperative antidepressant and/or anxiolytics treatment. Quantitative variables are compared with Mann–Whitney U-test. Qualitative variables are analyzed with Chi² test when appropriate. A P-value<0.05 was considered as statistically significant.

Results and Discussion: Of the 502 patients, 157 used antidepressant and/or anxiolytic medications. They were older (65.7yo vs. 59.5yo, p<0.001), more often female (58% vs 41.2%, p<0.001) and underwent surgery more frequently for cancer (73.9% vs 56.8%, p<0.001). Overall adherence to ERP, to the postoperative items of ERP, incidence of postoperative complications, and LOS were similar in both groups.

	Global population N = 502	With antidepressant and/or anxiolytic medication N = 157 (31.3%)	Without antidepressant and/or anxiolytic medication N= 345 (68.7%)	p
Complications	171 (34.1)	56 (35.7)	115 (33.3)	0.61
Adherence to ERP protocol (21 items)	18 [17-19]	18 [17-19]	18 [17-19]	0.99
Length of stay	4 [2-7]	4 [2-7]	4 [2-7]	0.99

Conclusion: Our finding suggests that preoperative treatment with antidepressant and/or anxiolytic does not worsen outcome after elective colorectal surgery with an ERP, does not impact adherence to ERP and does not prolong LOS. ERP seems efficient in patients treated with these medications, who should not therefore be excluded from this program.

6518

Trans oesophageal doppler corrected flow time versus plethysmographic variability index for goal directed Fluid management in cirrhotic patients during liver resection. A randomized controlled trial.

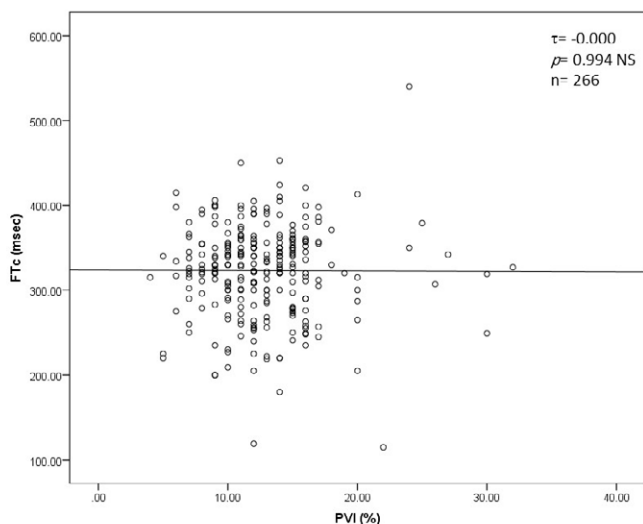
Abdelhafez H.¹, Elsahn F.², Moustafa A.³, Yassen K.⁴
¹Anaesthesia Department, National Liver Institute, Menoufia University - Shebeen Elkom (Egypt), ²Anaesthesia Department, Teaching Hospital, Ministry of Health - Damanhour (Egypt), ³Anaesthesia Department, Faculty of Medicine, Menoufia University - Damanhour (Egypt), ⁴Liver Institute Menoufia University - Shebeen Elkom (Egypt)

Background and Goal of Study: Primary goal is to compare Trans esophageal Doppler (TED) corrected flow time (FTc, msec) vs. Pleth variability index (PVI, %) for guiding intraoperative fluids during liver resection. Secondary to study correlations, agreements, complications, intensive care (ICU) stay and ability to discriminate patients with increased blood loss.

Materials and Methods: PACTR201808140151322 (www.pactr.org). 47 adults, hepatitis C cirrhosis (Child A) scheduled for elective open liver resection, randomized into TED (n=20) or PVI (n=20). PVI blinded to Anesthetist in TED and vice versa. Prior and during dissection crystalloids restricted to keep FTc <330 msec or PVI >14%. Following resection hydroxyethyl starch (HES) infused if FTc <330 msec or PVI >14% despite 6 ml/kg/h crystalloids.

Results and Discussion: Data presented as median [IQ]. Volume of crystalloids, (p=0.3) and colloids (p=0.1) infused were not different, despite negligible correlations and poor agreements between FTc, PVI and CVP, P>0.05. Figure 1. During dissection FTc was 327[320-341] msec and PVI was 13.5 [10.5-15.0] % with fluid restriction, while the CVP (mmHg) in TED group was 9.00 [7.65-11.50] and 10.00 [8.00-11.75] in PVI group. Blood loss: 950[675-1925] vs. 1500[475-2000] ml, p=0.5. FTc and PVI were unable to discriminate patients with increased blood loss (>400 ml). Blood transfusion (Patients' percentage, volume transfused, TED vs. PVI): Packed red blood cells: 6/20(30%), 350[350-350] vs. 8/20(40%), 525[350-700] ml, p=0.2. Fresh frozen plasma: 4/20(20%), 200[200-300] vs. 8/20(40%), 400[200-400] ml, p=0.3. No difference in ICU stay, p=0.1, nausea, p=0.09 and vomiting p=0.5.

Conclusion: Under surgical conditions, the volumes of fluids guided by PVI were not different from that guided by TED, as well as morbidity and ICU stay, despite failure of PVI to reach agreement with TED. Both were unable to discriminate patients with increased blood loss during liver surgery.



6523

Anaesthetic management of lung transplantation and postoperative outcomes: any benefit with sevoflurane or remifentanil?

Costa D.¹, Aguiar F.², Rodrigues J.³
¹SESARAM - Funchal (Portugal), ²Hospital Santa Marta - Lisbon (Portugal), ³Hospital São José - Lisbon (Portugal)

Background and Goal of the Study: Lung transplantation surgery is one of the most complex challenges for the anaesthesiologist. Intraoperative management and choice of anaesthetic drugs varies between institutions and anaesthesiologists. In animal studies, preconditioning with sevoflurane resulted in decreased pulmonary oedema and proinflammatory cytokines, and protective effects against primary graft dysfunction and acute rejection. The pharmacokinetics and pharmacodynamic of remifentanil are well known and its titratability is desired in the perioperative period. Our goal was to evaluate if the use of sevoflurane or remifentanil resulted in different outcomes.

Materials and methods: We conducted a retrospective observational study by consulting anaesthetic charts and other informatic patient information of all lung transplants occurred between 2016 and 2019. Our main outcomes were time of postoperative mechanical ventilation and time until extubation in hours, intensive care unit length of stay in days, and 30-day and 1-year mortality.

Results and Discussion: A total of 126 lung transplants were performed. Sevoflurane at a minimum alveolar concentration >1 has an inhibitory effect on hypoxic pulmonary vasoconstriction. In the institution, sevoflurane is associated with propofol and never as the sole general anaesthetic. In 54% of patients (n=68), sevoflurane was used before the start of one-lung ventilation. In 7.9% (n=10), sevoflurane was used during the whole surgery. The use of sevoflurane had no impact on the measured outcomes. Regarding remifentanil, in 34.9% of patients (n=44) it was used intraoperatively, in 32.5% (n=41) intra and postoperatively and in 83.3% (n=105) postoperatively. In this last group, remifentanil was associated with decreased 1-year mortality with 10% significance (p=0,068), with no significance in ventilation time and time until extubation. Remifentanil popularity in the intensive care unit has grown in the last couple of years and this improvement probably reflects an overall improved perioperative care.

Conclusion: The intraoperative use of sevoflurane or remifentanil had no convincing influence on the measured outcomes. Other studies aimed to specifically evaluate primary graft dysfunction and acute rejection in those treated with sevoflurane are needed to validate the findings reported on animal studies.

6524

30-day and 1-year mortality perioperative predictors in lung transplantation surgery: a single centre retrospective study

Costa D.¹, Aguiar F.², Rodrigues J.³
¹SESARAM - Funchal (Portugal), ²Hospital Santa Marta - Lisbon (Portugal), ³Hospital São José - Lisbon (Portugal)

Background and Goal of the Study: Lung transplantation surgery is one of the most complex challenges for the anaesthesiologist. The perioperative management is delicate, and many factors play a role in determining the outcome of these patients. With this study we intended to retrospectively evaluate the perioperative period and identify factors associated with increased mortality.

Materials and methods: We conducted a retrospective observational study by consulting anaesthetic charts and other informatic patient information of all lung transplants occurred between 2016 and 2019. Information regarding patient and surgery characteristics, hemoderivates, anaesthetic agents, extracorporeal membrane oxygenation (ECMO) usage and postoperative complications were collected. Our main outcomes were time of postoperative mechanical ventilation and time until extubation in hours, intensive care unit length of stay in days, and 30-day and 1-year mortality.

Results and Discussion: A total of 126 lung transplants were performed. Regarding 30-day mortality, the following were significantly associated

with worst outcome: longer usage of intraoperative venoarterial ECMO ($p < 0.05$), higher intraoperative and postoperative red blood cell and fresh frozen plasma transfusion ($p < 0.01$ and $p < 0.05$, respectively) and longer time until extubation ($p < 0.05$). Most cases of survival were associated with extubation and mechanical ventilation under 48 hours ($p < 0.05$). All these patients are presumed to be in a worst preoperative condition, therefore requiring cardiopulmonary assistance and higher hemoderivate demand. Regarding 1-year mortality, younger patients ($p < 0.05$) and patients with longer surgeries ($p < 0.05$) had worst outcomes. The use of tranexamic acid, fibrinogen and intraoperative cell salvage, diagnosis leading to transplantation and postoperative complications like pulmonary embolism, sepsis, need for renal replacement therapy and need for surgical reintervention had no measurable effect on mortality.

Conclusion: These findings improve our knowledge on the perioperative care of these patients and help to outline the best possible strategies to increase the survival of these patients. Preoperative haemoglobin optimization and strategies to allow earlier extubation might be associated with best outcomes.

6549

The Impact of Low BMI on Surgical Outcomes Post Emergency Surgery in a Quaternary Centre in Australia

Ou Yang B.¹, Desmond F.¹, Hacking D.¹

¹Austin Hospital - Heidelberg (Australia)

Background and Goal of Study: The obesity paradox has been well described in the surgical setting, with underweight and those at the extreme morbid obese patient cohort experiencing greater morbidity and mortality post-operatively. Despite this, there is a paucity of literature examining underweight patients undergoing emergency surgery, especially in the Australian healthcare setting. Underweight patients represent a high-risk cohort for surgery and often may be underappreciated of such risk. The aim of this study was to examine the adverse effects in mortality and morbidity for patients of underweight body mass index (BMI) undergoing emergency surgery.

Materials and Methods: A single centre, retrospective cohort study was performed on 485 patients during a 1-month period ending March 31 2019. Patients were divided into two groups: underweight, defined as $BMI < 18.5$ and non-underweight ($BMI \geq 18.5$). Outcomes of 30-day mortality and morbidity were evaluated in this study. Comparisons of outcomes between underweight and non-underweight patients were evaluated using Fischer's exact test.

Results and Discussion: Our results demonstrated that underweight patients requiring emergency surgery did not exhibit increased mortality, but had greater requirement (33% compared to 12%, $p = 0.02$) for admission into intensive care and high dependency units. Robust evidence for peri-operative optimisation of the underweight patient is limited. Aetiology for the underweight surgical patient is complex and includes factors such as malnutrition, sarcopenia, cachexia, end-stage organ dysfunction and malignancy. Nonetheless, delay in surgery given an emergency presentation is not viable. This study suggests the importance in identifying early those who are underweight, to allow adequate planning for emergency surgery, including alerting intensive care for their potential input postoperatively.

Conclusion: We describe the first Australasian report of underweight patients undergoing emergency surgery exhibiting an increased incidence of complications, as was demonstrated by their requirement to be admitted for intensive care unit management. Further studies will be required to establish which co-morbid factors also associated with poor weight gain are associated with post-operative complications. We suggest that being underweight is an important and often overlooked factor associated with peri-operative morbidity.

Acknowledgements: Nil

6590

Whether prophylactic administration of dexamethasone is effective in preventing cognitive decline after cardiac surgery? A randomised controlled trial with 4-year follow-up

Glumac S.¹, Kardum G.², Bulat C.¹, Carev M.¹, Karanovic N.¹

¹University Hospital of Split - Split (Croatia), ²University of Split - Split (Croatia)

Background and Goal of Study: The pathogenesis of postoperative cognitive decline (POCD) is still poorly understood; however, the inflammatory response to surgical procedures seems likely to be involved. Therefore, if inflammation plays a role in POCD development, suppression of the inflammatory response by corticosteroids might reduce the incidence or severity of POCD. We hypothesised that the patients who received dexamethasone would have better long-term cognitive outcomes following surgery than those who received placebo. **Materials and Methods:** The patients were randomised (1 : 1) to receive a single intravenous bolus of 0.1 mg kg^{-1} dexamethasone ($n = 85$) or placebo ($n = 84$) 10 h before elective cardiac surgery. The endpoint in both groups was POCD incidence on the 6th day and four years postoperatively. The validated battery of five neuropsychological tests which included eight main variables was used to assess the participants. POCD in an individual patient was defined as a reliable change index equal to or less than -1.96 or a Z-score equal to or less than -1.96 on at least one test.

Results and Discussion: Compared to the 62 patients in the placebo group, the 54 patients in the dexamethasone group showed a lower incidence of POCD on the 6th day (relative risk (RR), 0.510; 95% confidence interval (CI), 0.241 to 1.079; $P = 0.067$) and four years (RR, 0.459; 95% CI, 0.192 to 1.100; $P = 0.068$) after cardiac surgery. The change in cognitive status between the two postoperative measurements was not significant ($P = 0.010$) among the patients in the dexamethasone group, in contrast to patients in the placebo group ($P = 0.673$). Several other studies did not support our results, but they applied different corticosteroid treatment regimens and had different time points of cognitive evaluation. We believe that the selection of dexamethasone as a potent synthetic glucocorticoid with a long duration of action, the administration of a low dose to avoid toxic effects on neural structures, and well-timed administration to provide anti-inflammatory effects throughout the early perioperative period are vital to prevent cognitive impairment following cardiac surgery.

Conclusion: Although statistical significance was not reached in this study, the prophylactic administration of dexamethasone seems to be useful in the long-term to prevent POCD occurrence after cardiac surgery. However, further large multicenter research is needed to confirm these findings.

6626
Effect of heart rate control with ivabradine on myocardial injury after non-cardiac surgery: a single centre, randomized controlled, double-blind feasibility pilot trial (PROTECTIN Pilot - NCT04436016). An update of implementation.

White M. J.¹, Walder B.¹, Bollen Pinto B.¹
¹Geneva University Hospitals - Geneva (Switzerland)

Background and Goal of Study: Perioperative myocardial injury (PMI) after non-cardiac surgery (NCS) is associated with post-operative mortality. Heart rate (HR) is an independent and modifiable risk factor for PMI. Ivabradine (IVA) is a negative chronotropic agent without significant effects on contractility or vascular tone. Our hypothesis is that compared to placebo, perioperative IVA titrated to the patient's HR decreases PMI. This is a complex intervention requiring important human resources. Hence, we designed this pilot study to assess the feasibility in terms of resources involved to deliver the intervention and adherence to protocol. Secondary objectives are to assess the feasibility of recruitment and enrolment.

Materials and Methods: This is an ongoing single centre, randomized, placebo-controlled, double-blind, parallel group, feasibility pilot trial conducted at the Geneva University Hospitals since October 2020. We include patients over 75 years old or over 45 years old with cardiovascular risk factors, planned for intermediate or high-risk NCS. Patients are randomized to receive IVA or placebo twice daily, from the morning of surgery until post-operative day two, with an individualized regimen adapted to the HR: HR≤70 bpm (placebo in both groups), HR 71-85 bpm (IVA 2.5mg or placebo), HR 86-100 bpm (IVA 5mg or placebo) and HR≥ 101 (IVA 7.5mg or placebo).

Results and Discussion: From 05.10.2020 to 28.05.2021 there were 19 weeks of active recruitment since the study was suspended from 22.10.2020 to 18.01.2021 due to the second COVID-19 surge. We screened 634 patients, identified 298 eligible patients (47% of all screened), and approached 124 patients (42% of all eligible) in our pre-operative anaesthesia assessment clinic. The main reason not to approach an eligible patient (13% of all reasons) was that another study was proposed to the patient. Forty-one patients accepted to participate (14% of all eligible and 33% of those to whom we proposed the study) and 34 patients have been randomized (1.8 patients/week). The study intervention was implemented smoothly without major issues.

Conclusion: We have successfully randomized 34 out of 78 planned patients despite major challenges arising from the COVID-19 pandemic. Results regarding feasibility will be available to present during ESAIC congress in December 2021.

6628
Can machine learning algorithms predict perioperative adverse events and identify patients at risk for hypothermia?

Dibiasi C.¹, Agibetov A.¹, Zeiner S.¹, Kimberger O.¹
¹Medical University of Vienna - Vienna (Austria)

Background and Goal of Study: Inadvertent intraoperative hypothermia is a usually preventable complication during surgery that is associated with increased morbidity and patient discomfort. Predicting which patients will experience hypothermia could be useful to enable targeted use of additional thermal care interventions. We therefore built several machine learning (ML) models to predict the occurrence of intraoperative hypothermia and compared their predictive capabilities.

Materials and Methods: We analysed anaesthesia records of the years 2013-2019 from the General Hospital of Vienna, a tertiary academic medical centre. We included patients when general, neuraxial anaesthesia, or regional anaesthesia and body temperature measurements were available. The feature-set contained data on patient demographics, type of anaesthesia and surgery as well as initial vital signs. We built models for prediction of hypothermia at three thresholds (<35 °C, <35.5 °C and <36 °C) using logistic regression, gaussian Naive Bayes classifier, linear discriminant analysis, K-nearest neighbour, support vector machine,

neural networks, random forest and gradient tree boosting (XGBoost).
Results and Discussion: 44,653 patients were included in the final analysis. 22,642 patients (51%) did not experience hypothermia, hypothermia <36 °C occurred in 22,011 patients (49 %), hypothermia <35.5 °C in 7790 patients (17%) and hypothermia <35 °C in 1802 patients (4%). Ranked by highest area under the receiving operator curve (AUROC), we found best accuracy for prediction of hypothermia <35 °C when using the complete feature including vital signs data: AUROC was 0.753 for XGBoost, 0.733 for random forests, 0.731 for a logistic regression model with elastic net, 0.723 for linear discriminant analysis, 0.686 for naïve Bayes, 0.682 for neural nets, 0.625 for support vector-machine, and 0.572 for k-nearest neighbour.

Predicted temperature	AUROC	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value
< 35 °C	0.753	0.799	0.578	0.273	0.916
< 35.5 °C	0.736	0.68	0.669	0.303	0.908
< 36 °C	0.719	0.651	0.669	0.656	0.663

Conclusion: Using ML for prediction of perioperative hypothermia is feasible. Further studies are needed to evaluate hypothermia prediction as decision support tool in clinical practice.

6630
Postoperative delirium (POD) in patients undergoing cardiac surgery with cardiopulmonary bypass (CPB) is associated with higher perioperative serum levels of neurofilament light (NfL)

Khalifa C.¹, Watremez C.¹, Kahn D.¹, Aphram G.¹, Teunissen C.², Momeni M.¹

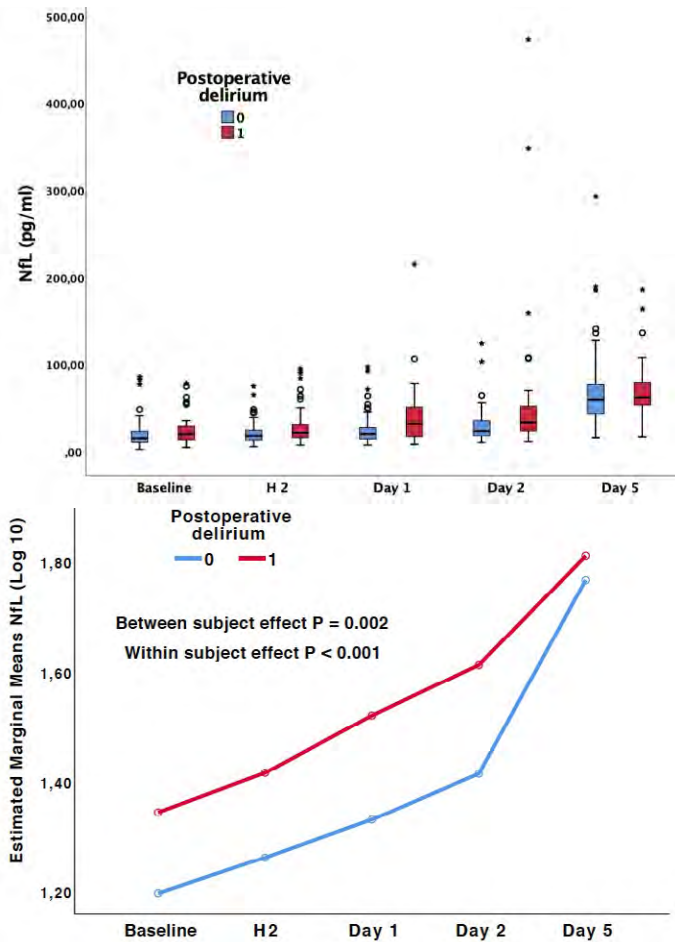
¹UCL - Cliniques Universitaires Saint-Luc - Brussels (Belgium),
²Neurochemistry Lab, VUMC Amsterdam - Amsterdam (Netherlands)

Background-Goal of Study: POD remains an important complication after cardiac surgery. Potential pathophysiological mechanisms might include a perioperative direct insult to the brain. Our aim is to evaluate whether perioperative serum levels of NfL, a marker of neuronal injury, are correlated with the occurrence of POD.

Materials-Methods: In this ongoing research project (NCT03706989), 5 iterative blood samples were collected in 130 patients undergoing elective cardiac surgery with CPB. All patients were screened for POD using CAM-ICU, CAM and a chart review until hospital discharge. The SiMoA technology was used for quantitative measurements of NfL. NfL results were log-transformed to obtain normally distributed data. A Mann-Whitney U test was used to compare patients with/without POD. A linear mixed model was performed to evaluate the impact of age and time on NfL levels. A repeated GLM was used to evaluate NfL levels over time in all patients. A binary multivariate regression analysis was used to predict POD including age and each NfL value that showed a significant difference in univariate analysis.

Results-Discussion: Patients with POD were significantly older (P₅₀ 74y vs 60y, p=0.007). Age has a significant effect on NfL values (p<0.001). For all patients, perioperative NfL levels (Fig 1) increased significantly over time after surgery (p<0.001). Fig 2 (Repeated GLM) shows that over time NfL levels were significantly higher in patients who showed POD. NfL levels at Hour +2 (OR 6.92 (1.34-35-81), p=0.02), D1 (OR 7.56 (1.7-33.6), p=0.008) and D2 (OR 10.08 (2.01-50.63), p=0.005) were significantly associated with POD taking into account age >74y.

Conclusions: These preliminary results confirm that serum NfL values increase with age. They also indicate that higher postoperative raises of NfL independently increase the odds of developing POD after cardiac surgery.



to avoid tachycardia in order to prolong diastole and reduce the risk of myocardial ischemia. Beta-blockers were mandatory in the preoperative preparation.

References:

1. C Luis-García, L Trillo-Urrutia et al. Clevidipine for hypertension treatment in pheochromocytoma surgery. *Rev Esp Anestesiol Reanim* 2018 Apr;65(4):225-228.
2. Luis M. de la Torre Fonseca et al. Myocardial bridging (milking effect) in left anterior descending coronary artery causing acute coronary syndrome *CorSalud* 2017(1):45-49.

Learning points: Beta-blockers are the treatment of first choice in the milking phenomenon. Avoiding tachycardia in patients with milking phenomenon reduces the risk of myocardial ischemia.

6657

The role of adipose tissue in the metabolic regulation of the stress response to major surgery

Tupper-Carey D.¹, Biswas S.², Lee B.³, Dhillon M.³, Tun H. O.⁴, Mcgraw P.⁴. Clinical Research Unit, Ng Teng Fong General Hospital and Singapore Immunology Network Agency for Science Technology and Research, Singapore.
¹James Paget University Hospital - Gorleston, Great Yarmouth (United Kingdom), ²Singapore immunology Network, Agency for Science, Technology and Research - Singapore (Singapore), ³Singapore immunology Network, Agency for Science Technology and Research - Singapore (Singapore), ⁴Ng Teng Fong General Hospital - Singapore (Singapore)

Background and Goal of Study: The aim of this prospective exploratory observational study was to investigate interactions between indices of body adiposity and the stress response to major surgery.

Materials and Methods: 26 subjects were recruited in Ng Teng Fong General Hospital, Singapore from patients undergoing unilateral total knee arthroplasty. A metabolic screening profile including fasting lipids, glucose, HbA1c, Body Mass Index (BMI) and visceral adipose tissue quantification measured by DEXA scanning (DEXA VAT) were performed perioperatively. Plasma metabolic, endocrine and inflammatory stress response mediator concentrations were measured at baseline (A), 24 hours (B), and 72 hours (C) post surgery. Stress response mediator concentrations were correlated with indices of body adiposity to search for associations during the stress response to surgery.

Results and Discussion: Significant correlations were observed between stress response mediators (leptin, insulin and visfatin/NAMPT) and indices of body adiposity at the time points indicated in Table 1. In particular a significant correlation was observed between visfatin/NAMPT and DEXA VAT at time point B (24 hours post surgery, Fig 1).

MEDIATOR	ADIPOSIITY	n	rho	rho ²	p	adjusted p
LEPTIN C	BMI	25	0.694	0.481	0.0001	0.02
INSULIN A	DEXA VAT	25	0.679	0.461	0.0002	0.02
LEPTIN A	BMI	26	0.662	0.438	0.0002	0.03
VISFATIN/NAMPT B	DEXA VAT	25	0.661	0.437	0.0003	0.03
LEPTIN C	DEXA VAT	24	0.649	0.422	0.0006	0.05

Table 1

6644

Milking phenomenon and pheochromocytoma surgery

Serrallonga Castells A.¹, Luis García C.¹, Oviedo Torres D.¹, Pardo Bedia A.¹, Arbonés Aran E.¹, Trillo Urrutia L.¹
¹Hospital Del Mar - Barcelona (Spain)

Background: Pheochromocytoma is a catecholamine-producing tumor that causes symptoms such as high blood pressure and palpitations. Laparoscopic adrenalectomy is the treatment of choice. Preoperative preparation with alpha-blockers or calcium channel blockers is indicated to minimize the effect of massive catecholamine release. After an adequate pre-treatment with alpha-blockers, treatment with beta-blockers is recommended in patients with tachyarrhythmias¹ or other conditions, such as milking phenomenon. The milking phenomenon is the dynamic compression and reduction of coronary flow during systole, when the coronary arteries go deep into the thickness of the heart muscles (instead of having an epicardial pathway). Its incidence is of a 0.6-4% and is generally benign, but it ranges from precordial pain to sudden death. Beta-blockers are the first treatment of choice. Its negative inotropic and chronotropic effect, the prolongation of ventricular diastole and the reduction of arterial compression improve outcomes².

Case Report: A 56-year-old woman with arterial hypertension presented chest pain and hypertensive crisis and was diagnosed with pheochromocytoma. A laparoscopic adrenalectomy was scheduled and she received pre-treatment with doxazosin, nifedipine and bisoprolol. Before surgery, a coronary angiography was performed for new episodes of chest pain. After ruling out coronary lesions, a milking phenomenon was diagnosed, and the beta-blocker was continued. During the laparoscopic adrenalectomy, she presented two episodes of arterial hypotension, that were resolved with goal-guided fluid therapy, and she did not present hypertensive peaks or tachycardia.

Discussion: This is an uncommon case with coexisting pheochromocytoma and milking phenomenon. It was very important

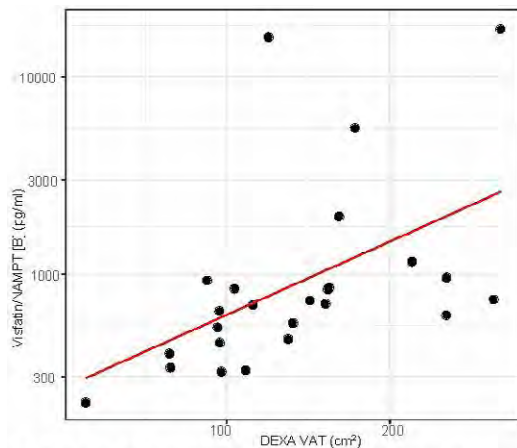


Fig. 1 Scatter Plot visfatin/NAMPT [B] v DEXA VAT ($\rho=0.661$, $p=0.0003$, adj $p=0.03$)

Conclusion: The correlation between visfatin/NAMPT and visceral adiposity indicates a potential role for visceral adipose tissue in the secretion of this adipokine during the stress response to surgery. Further studies are indicated to determine the role of visfatin/NAMPT during the stress response to surgery.

6670

Mortality in Nonagenarian Patients following Hip Fracture Surgery in an Australian single centre cohort study

Weinberg L.¹, Qu Yang B.¹, Klink S.¹, Peter L.¹, Li J.¹, Lee D. K.²
¹Austin Hospital - Heidelberg (Australia), ²Guro Hospital - Seoul (South Korea)

Background and Goal of Study: In an Australian cohort, outcomes for nonagenarian patients (90–99 years) undergoing orthopaedic surgery for a hip fracture are not well described. The primary outcome of this study was to assess perioperative 30-day mortality. Secondary outcomes explored the number and severity of postoperative complications and their association with short and long-term mortality.

Materials and Methods: After Human Research Ethics approval, we performed a single centre retrospective cohort study of nonagenarian patients undergoing hip fracture surgery over a 6-year period. Postoperative complications were graded according to the Clavien-Dindo classification. Correlation analyses were performed to evaluate the relationship between mortality and pre-specified mortality risk predictors. Survival analyses were performed using Cox proportional hazards regression modeling.

Results and Discussion: 537 patients (mean age 93 ± 3 years, 27.2% female) were included. The 30-day mortality rate was 7.4%. The mortality rate over a median follow-up period of 30 months was 18.2%. Postoperative complications were observed in 459 (85.5%) patients. Both the number and severity of complications were related to mortality ($P < 0.001$). Compared to patients who survived, deceased patients were frailer ($P = 0.034$), of higher ASA status ($P = 0.010$) and more likely to have congestive heart failure ($P < 0.001$) preoperatively. Time to surgery from admission, out-of-hours surgery were not significantly associated with mortality. The adjusted hazard ratio of the number of complications was 1.3 (95% CI: 1.1 – 1.5, $P = 0.003$) during the entire observed period. Increasing severity of complication significantly increased mortality until 21 days from admission (adjusted hazard ratio: 3.0 (95% CI: 2.4 – 3.6, $P < 0.001$)). After 21 days, increasing severity of complication was not associated with mortality.

Conclusion: In this nonagenarian cohort undergoing hip fracture surgery, the 30-day mortality was 7.4% and 18.7% of patients died within 30 months of surgery. The development of any postoperative complication was independently associated a higher mortality throughout the entire observation period, however increasing severity of complication only affected mortality until 21 days post-surgery. These findings imply that attention to mitigate risk of any postoperative complication (independent of severity) may improve postoperative survival in this multimorbidity cohort.

6703

Recording of preoperative fasting and evaluating of adherence to preoperative fasting guidelines.

De Grunt M.¹, De Klerk E.¹, Hollmann M.¹, Preckel B.¹, Hermanides J.¹, van Stijn M.¹
¹Amsterdam University Medical Centres, lokation AMC - Amsterdam (Netherlands)

Background and Goal of Study: Preoperative fasting aims at prevention of aspiration during anaesthesia induction. Prolonged fasting deteriorates patient's metabolic state and reduces patient comfort. Although the duration of preoperative fasting is clearly described, adherence to the guidelines seems poor. This study assessed preoperative fasting guideline compliance for electively scheduled surgical patients.

Materials and Methods: In this single centre, prospective, cohort study patients and/or their caregivers, in case of young children, were asked about their preoperative fasting times on their arrival at the theatre complex. Additional information was retrieved from the electronic patient file: patient characteristics, surgical specialism, surgical pathway (clinical- or day case surgery), planned operating time (first or later), scheduled and actual starting time of surgery.

Results and Discussion: Prolonged preoperative fasting (>8 hrs) occurred in 94.8% of the 757 included patients. Median (IQR) preoperative fasting time for all patients was 14.1 hrs (12.2-16.0) for solids, and 9.8 hrs (3.8-13.2) for clear fluids. In 610 adults the preoperative fasting time for solids was 14.2 hrs (12.5-16.2), and 10.5 hrs (4.6-13.5) for clear fluids; in 147 children it was 13.3 hrs (9.0-15.2) for solids, and 3.6 hrs (2.4-10.0) for clear fluids. Preoperative fasting times for solids and clear fluids differed significantly between adults and children. In all patients, risk factors for prolonged fasting included age, scheduled first of the day, and surgical delay; whereas surgical specialism, and surgical pathway had no influence.

Conclusion: This study shows excessive preoperative fasting times in all electively scheduled surgical patients, indicating poor implementation of fasting guidelines in routine clinical practice.

6710

Association of lowest mean arterial pressure maintained for 5 cumulative minutes with postoperative nausea and vomiting: A retrospective database analysis of 38,085 patients.

Maleczek M.¹, Laxar D.¹, Geroldinger A.¹, Kimberger O.¹
¹Medical University of Vienna - Vienna (Austria)

Background: Postoperative Nausea and Vomiting (PONV) are very distressing experiences for patients, with an incidence of 30% in the general population. Known risk factors include female gender, history of PONV and non-smoking patients. In the last years, the association of intraoperative hypotension (IOH) on various perioperative complications like stroke and myocardial injury has been demonstrated. There is only little evidence regarding PONV and intraoperative hypotension, although hypoperfusion of the brainstem and intestinal hypoperfusion are hypothesized as potential mechanisms for PONV promotion.

Methods: Intraoperative blood pressure values, information about PONV and data regarding risk factors for PONV and IOH were extracted from our database. We included all adults with a record of PONV undergoing non-cardiac surgery between 2013/9/1 and 2020/9/1. After artefact removal, the lowest mean arterial pressure for 5 cumulative minutes (MAP5) per patient was calculated and its association with PONV was analyzed in a multivariable logistic regression using a natural cubic spline basis.

Results and Discussion: 38,085 patients were included in the analysis, of which 4708 (12.3%) had PONV. The population consisted of patients with all levels of PONV-risks (68% non-smoking, 55% female, 15% history of PONV, 64% balanced anaesthesia). The association between MAP and PONV estimated in logistic regression was U-shaped indicating elevated PONV risk for patients with decreased or increased MAP (Figure 1). The model was corrected for multiple covariables like age, ASA status, charlson morbidity index, etc.

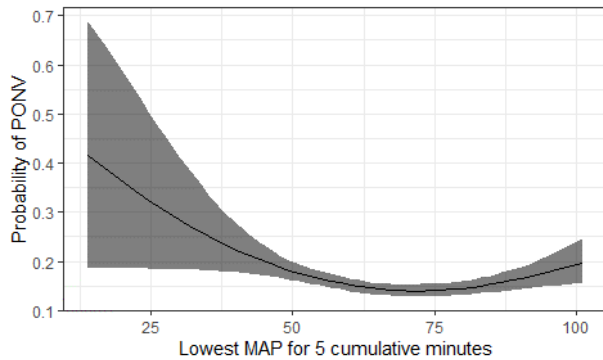


Figure 1. Association between lowest MAP for 5 cumulative minutes and probability of PONV with 95% confidence interval estimated in multivariable logistic regression.

Conclusion: Our results suggest that IOH is associated with PONV. Interestingly, not only hypotension but also hypertension seemed to be associated with an increased risk of PONV. Subsequent prospective studies have to determine if a tight blood pressure control may actually decrease incidence of PONV.

Acknowledgement: Ludwig Boltzmann Institute for Digital Health and Patient Safety

6729

Monday night fever: a case of postoperative unexplained hyperthermia

Pimenta I.¹, Martins T.¹, Varudo R.¹, Lança S.¹, Fernandes A.¹
¹Hospital Garcia de Orta - Almada (Portugal)

Background: Malignant hyperthermia is a rare but life-threatening pharmacogenetic disorder of skeletal muscle that manifests as a hypermetabolic syndrome mainly due to administration of volatile anesthetic agents or succinylcholine. The diagnosis is often made intraoperatively, however, symptoms can arise in the early postoperative period making diagnosis more difficult.¹ We report a case of postoperative fever and muscle rigidity which presented a diagnostic challenge.

Case Report: A 76-year-old woman was admitted to the hospital for worsening dysphagia, malaise and fatigue. Radiological studies showed an infiltrative tumor of the thyroid gland. On day 3, the patient developed dyspnea and stridor due to airway compression and an urgent tracheostomy under balanced anesthesia with desflurane was performed. In the first hour postoperatively, the patient presented with hyperthermia with temperature up to 41°C combined with muscle rigidity, tachypnea and tachycardia. Blood samples revealed elevated creatine kinase, myoglobin, low inflammatory markers and thyroid hormones within the normal range. Suspecting malignant hyperthermia, dantrolene was administered and the patient improved. Because a septic condition could not be excluded, antibiotics were also initiated to a presumed hospital-acquired pneumonia. The patient remained in the intensive care unit for 10 days.

Discussion: Postoperative malignant hyperthermia is rare, occurring in about 1.9% of suspected cases.² Diagnosis is difficult as it can mimic other clinical conditions and so, the assumption of such diagnosis must be careful, considering all possible causes. In our case, the clinical features could have been caused by septic shock or thyroid storm and these hypotheses were addressed. Thyroid storm was excluded by blood analysis and septic shock was considered less probable due to negative inflammatory markers and blood cultures. Although atypical in presentation, malignant hyperthermia was deemed a reasonable hypothesis and treatment with dantrolene was successful. The diagnosis of malignant hyperthermia was clinical and genetic or contracture tests were not performed.

References:

- doi:10.1186/s13023-015-0310-1.
- doi:10.1097/ALN.0b013e31818958e5.

Learning points: Malignant hyperthermia is rare in the postoperative period so its diagnosis must be wisely considered. However, since it is a life-threatening condition if left untreated, specific therapy must be started upon solid clinical suspicion.

6746

An investigation of correlations between plasma metabolic mediators during the stress response to major surgery.

Tupper-Carey D.¹, Biswas S.², Lee B.², Dhillon M.², Tun H. O.³, Mcgraw P.³. Clinical Research Unit, Ng Teng Fong General Hospital & Singapore Immunology Network, Agency for Science Technology and Research (A*Star), Singapore.

¹James Paget University Hospital - Gorleston, Great Yarmouth (United Kingdom), ²Singapore Immunology Network, Agency for Science, Technology and Research - Singapore (Singapore), ³Ng Teng Fong General Hospital - Singapore (Singapore)

Background and Goal of Study: The aim of this study was to investigate relationships between adipokines and stress response mediator concentration profiles following major surgery.

Materials and Methods: A total of 26 subjects were recruited to this prospective exploratory observational study of subjects undergoing unilateral total knee arthroplasty. A metabolic screening profile including measures of body adiposity were performed perioperatively. Plasma concentrations of stress response mediators and adipokines were measured at baseline (A), 24 hours (B), and 72 hours (C) following surgery. Changes in mediator concentrations during the hyperinflammatory (B-A) and hypoinflammatory (C-B) phases of the stress response were calculated during the stress response to major surgery. Correlations were measured between these parameters to search for associations in mediator concentration profiles during the stress response to surgery.

Results and Discussion: A strong inverse correlation was observed between changes in plasma insulin concentrations during the hyper-inflammatory and hypo-inflammatory phases of the stress response to surgery (Table 1). Strong correlations were also observed between plasma insulin concentrations and both the incretin glucose dependent insulinotropic polypeptide (GIP) and the adipokine visfatin/NAMPT during the stress response to surgery (Table 1).

MEDIATOR	MEDIATOR	n	rho	rho ²	p	adjusted p
INSULIN B-A	INSULIN C-B	25	-0.912	0.831	<0.0001	0.0009
INSULIN B-A	GIP B-A	26	0.833	0.693	<0.0001	0.0009
INSULIN B	VISFATIN/ NAMPT B	26	0.748	0.561	<0.0001	0.003
INSULIN C-B	GIP C-B	25	0.735	0.541	<0.0001	0.008

Table 1.

Conclusion: Changes in plasma insulin concentrations are highly regulated during the hyper- and hypo-inflammatory phases of the stress response to surgery. Plasma insulin concentrations were correlated with the incretin GIP and also the adipokine visfatin/NAMPT, indicating potential roles for these two mediators in the regulation of pancreatic insulin secretion following major surgery.

References:

- Revollo JR et al Nampt/PBEF/Visfatin Regulates Insulin Secretion in β Cells as a Systemic NAD Biosynthetic Enzyme. Cell Metabolism 2007; 6: 363–375.

6764

Does Airtest predict pulmonary and systemic complications after laparoscopic surgery?

Delgado Alonso C.¹, Becerra Bolaños Á.¹, Valencia Sola L.¹, Trujillo Morales H.¹, Torres Machi M. L.¹, Rodríguez Pérez A.²

¹Hospital Universitario de Gran Canaria Doctor Negrin - Las Palmas de Gran Canaria (Spain), ²Universidad de Las Palmas de Gran Canaria - Las Palmas de Gran Canaria (Spain)

Background and Goal of Study: Airtest score (measuring SpO₂ with ambient air in the immediate postoperative period) is useful in detecting moderate-severe pulmonary postsurgical complications (PPC) (1). We aim to evaluate the relationship of the Airtest with the appearance of pulmonary and systemic complications after scheduled laparoscopic surgery. We also evaluated the correlation between Airtest and perioperative variables.

Materials and Methods: After approval of the Ethics Committee, we carried out a prospective observational study, including patients undergone elective laparoscopic surgery. Airtest was performed 30min after arriving to the PACU and considered positive when SpO₂ was ≤96%. Following data were recorded: patients' characteristics, ARISCAT score, length of surgery, intraoperative mechanical ventilation parameters, Airtest, PPC, systemic complications, length of stay in PACU and hospital.

Results and Discussion: 143 patients were included (62.2% men), mean age 62±15 years old. Mean preoperative SpO₂ was 97.9±1.4% and ARISCAT score was 30.5±11.9 (intermediate risk). Laparoscopic cholecystectomy was the most frequent surgery (29.4%). The incidence of positive Airtest was 63.6%. Postoperative non-invasive mechanical ventilation was needed in 19.6% and the most frequent complications were atelectasis (30.8%), nausea/vomiting (23.1%) and arrhythmias (5.6%). Airtest was positive in 93% of the patients with atelectasis, being this relationship statistically significant (p<0.001). We did not find a relationship among Airtest and other complications, the need for postoperative mechanical ventilation, length of stay in the PACU or in the hospital. However, we found an association between a lower preoperative SpO₂ and a positive Airtest (p=0.001). Likewise, 70% of patients who had not received intraoperative recruitment maneuvers presented positive Airtest (p=0.012). We found correlation between SpO₂ obtained during Airtest and patient's age (p=0.015), ARISCAT score (p=0.018) and intraoperative compliance (p=0.001).

Conclusions: The Airtest is a simple and non-invasive tool for diagnosing atelectasias, helping in decision-making regarding postoperative respiratory care. Perioperative risk factors for postoperative atelectasis should be detected. The realization of intraoperative respiratory recruitment maneuvers improves compliance and decrease the risk of PPC.

Reference:

1. Ferrando C, et al. *Minerva Anestesiol.* 2020;86(4):404-15

6849

Paroxysmal Nocturnal Hemoglobinuria in the OR: case report

Cardoso T. M.¹, Madeira I.²

¹Centro Hospitalar Universitário do Porto - Porto (Portugal), ²Centro Hospitalar Universitário do Porto - Porto (Portugal)

Background: Paroxysmal Nocturnal Hemoglobinuria (PNH) consists of a permanent state of hemolysis, caused by the failure in the inactivation of the complement system, with paroxysmic periods of exacerbation which can be triggered by inflammation, trauma or surgical stress episodes¹.

Case Report: A 52-year-old caucasian female patient was electively admitted for a flexible ureterorenoscopy for kidney stones. Her past medical history includes a PNH, diabetes mellitus, obesity and recurrent urinary tract infections. Her treatment consisted of corticotherapy, frequent transfusional support, antiaggregation, hypocoagulation and, more recently, eculizumab which has improved and stabilized her clinical status. She had her latest transfusion 6 months ago and her blood work showed a hemoglobin of 9.5 g/dL and platelets of 22x10⁹/L. Acenocumarol had been replaced four days prior by low-molecular weight heparin (LMWH) 40mg id. On the day of the surgery, she was transfused with a pool of platelets and then anesthesia was induced with fentanyl, lidocaine and propofol. A laryngeal mask was placed and sevoflurane was used for anesthesia maintenance. A few minutes after the beginning of surgery a diffuse bladder hemorrhage was verified and the procedure was aborted. After that, she had episodes of epistaxis and rectal hemorrhage and received five units of blood, three pools of platelets and discharged 26 days later.

Discussion: General anesthesia in PNH must eliminate the stress response to surgical stimuli, achieving deep anesthetic and analgesic levels. Moreover, it's also important to avoid or minimize complement activation, hypoxemia, acidosis and dehydration. Thrombosis is the major problem that aggravates the course of the disease. Nevertheless, a low platelet count can worsen the coagulation problems. Prophylaxis with heparin or LMWH should be used during the perioperative period. However, when platelet count is less than 10x10⁹/L, anticoagulation is contraindicated and in patients between 30 and 50x10⁹/L, a reduced dose is probably appropriate. Additionally, surgery should be planned right after the last infusion of eculizumab. We believe that the induction of anesthesia associated with the surgical stress and the low platelet count could have triggered this complication.

References:

1. Roeth A, Duehrsen U: Treatment of paroxysmal nocturnal hemoglobinuria in the era of eculizumab. *Eur J Haematol.* 2011;87:473-479

Learning points: Managing surgical stress as a key factor.

6886 Perioperative anaemia and its consequences in major gynae-oncology surgery

John S.¹, Patel S.¹, Pactat G.¹, Saso S.¹, Thakrar S.¹
¹Hammersmith Hospital, Imperial College NHS TRUST - London (United Kingdom)

Background: Anaemia is an independent risk factor for increased perioperative morbidity and mortality. The pathogenesis of anaemia in cancer includes the effects of chemotherapy, blood loss, nutritional deficiencies and immune-inflammation increasing hepcidin secretion. We audited the diagnosis and management of perioperative anaemia in major gynae-oncology surgery in a large teaching hospital in London (UK) against standards provided by NICE¹.

Materials and Methods: A retrospective review of electronic patient notes (CERNER) between 01/09/19 and 29/02/20. Patients were categorised into Major (laparoscopic and open pelvic surgery) and Major+ surgical groups (extra-pelvic or lymph node resection). Statistical analysis (Paired student T-test) was performed using Microsoft Excel 2019.

Results: 236 patient notes were reviewed: 87 Major and 149 Major+ patients. Results are summarised below:

	Major			Major +		
	Major (Hb >130g/L)	Major (Hb <130g/L)	P value	Major + (Hb >130g/L)	Major + (Hb <130g/L)	P value
Mean age (years)	58.6	56.1		60.7	59.0	
Number of patients	49	38		49	100	
Pre operative haematinics performed (patients)	0	2		3	4	
Pre operative IV iron transfusion	0	0		0	0	
Mean post operative trough haemoglobin (g/L)	116.3	99.2	<0.001	105.4	96.3	<0.001
Number of patients receiving perioperative blood transfusion	0	10		14	66	
Mean perioperative blood transfusion per patient	0	0.47	<0.001	0.59	1.71	<0.001
Estimated cost based on transfusion per patient (£)	0	63		78.47	227.43	
Mean length of stay (days)	2.18	3.37	<0.001	5.10	6.91	0.12
Estimated length of stay cost (£)	906.22	1397.89		2116.50	2867.65	
Number of patients with post-operative complications*	4	4	0.37	8	17	0.45

*Post-operative complications include infection, wound breakdown, ileus, bleeding and VTE

Conclusion: Our audit found that a significant proportion of Gynaecology patients are anaemic pre-operatively. Iron studies are not performed routinely and there is no offer of IV iron therapy. Our data demonstrated a statistically significant difference in post-operative trough haemoglobin and rate of blood transfusion in preoperatively anaemic patients compared to non-anaemic patients (p<0.001). Along with the potential clinical risks associated with blood transfusion, there is also a cost burden of £133/unit. There was a statistically significant difference in mean length of stay for anaemia versus non-anaemia patients undergoing Major surgery (3.37 vs. 2.18 days p<0.001). There was also a difference in the Major+ group, though not statistically significant. There remains a potentially substantial cost saving opportunity of up to £415/day. We are developing a concise perioperative anaemia pathway for gynae-oncology in-line with current NICE guidance, and will aim to re-audit post-implementation.

References:

1. National Institute for Health and Care Excellence (NICE), 2015. Blood Transfusion. pp.6-10. Available at: <<https://www.nice.org.uk/guidance/ng24/resources/blood-transfusion-pdf-1837331897029>>

6912 Association of the admission values of chronic inflammatory biomarkers with postoperative delirium in patients undergoing hip fracture fixation under spinal anaesthesia

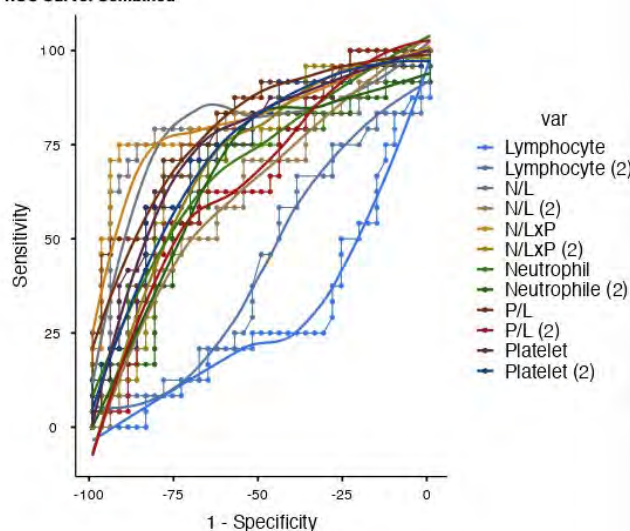
Ntalouka M.¹, Stamoulis K.¹, Bareka M.¹, Papaspyrou D.¹, Brotis A.¹, Arnaoutoglou E.¹
¹University of Thessaly, Faculty of Medicine, Univeristy Hospital of Larissa - Larissa (Greece)

Background and Goal of Study: This prospective study investigated the role of chronic inflammatory biomarkers at admission in predicting postoperative delirium (POD) among patients undergoing surgery for hip fracture fixation under spinal anaesthesia.

Materials and Methods: From January 2021 until April 2021 we included 62 consecutive patients who underwent surgical fixation for hip fracture under spinal anaesthesia. On admission, the values of neutrophils (N), lymphocytes (L), platelets (P) were measured, while the ratios of neutrophil/lymphocyte (NLR), platelet/lymphocyte (PLR), platelet*neutrophil/lymphocyte (N/LxP) were calculated. The diagnosis of POD was based on the CAM and NuDESC screening tools, validated for the Greek population, during the first day after surgery. Potential predictors of POD among the inflammatory biomarkers were evaluated using diagnostic accuracy measures (sensitivity, specificity, PPV, NPV, AUC) based on a univariate model.

Results and Discussion: The median age of the patients was 83 years (IQR 11) and 51 (82.3%) were females. Twenty-four patients (39%) suffered from POD during the first postoperative day. Based on the univariate model, we found that the admission values of N/LxP and PLR were accurate predictors of POD. Specifically, the sensitivity and specificity of the ratio N/LxP at admission (threshold =2049) were as high as 75% and 92%, respectively. Similarly, the sensitivity and specificity of PLR at admission (threshold= 172) were as high as 75% and 74%, respectively.

ROC Curve: Combined



The univariate model did not identify any POD predictors among the admission values of N, L, P, and NLR.

Conclusion: It seems that the calculated chronic inflammatory biomarkers N/LxP and PLR on admission constitute important predictors of POD occurrence after hip fracture fixation under spinal anaesthesia.

References:

1. Ntalouka MP, Bareka M, Brotis AG, Chalkias A, Stamoulis K, Flossos A, Tzimas P, Arnaoutoglou E. Hippokratia. 2020 Jan-Mar;24(1):8-14. PMID: 33364733; PMCID: PMC7733361.

6920 Anaesthesia management for small intestine Neuroendocrine Tumors - case report

Santos O. D.¹, Costa D.², Moita J.³, Tinoco J.³, Eloy A.³
¹Hospital de Santo António - Porto (Portugal), ²Hospital São Bernardo -
setubal - Setubal (Portugal), ³Hospital São Bernardo - setubal - Setubal
(Portugal)

Background: Neuroendocrine neoplasms (NENs) are derived from enterochromaffin cells-mainly present in the gastrointestinal tract. Symptoms depend on the location of the tumor, and whether they are functional or nonfunctional. Clinical symptoms are due to excess hormone secretion and may present with flushing, diarrhea, high blood pressure, fatigue, abdominal pain, unexplained weight gain/loss, wheezing, etc.¹ We present a case of a 71 year-old patient, with unexplained weight loss, flushing, abdominal pain and diarrhea. A colonoscopy was performed and showed a polypoid lesion (25mm) close to the ileocecal valve. Due to an adequate perioperative management the procedure went uneventfully.

Case Report: 71-year-old patient with a personal history of arterial hypertension, ischemic heart disease (coronary bypass in 2006), stroke, obstructive sleep apnea syndrome, HIV diagnosed 1 week before surgery, weight loss (25kg in 6 months), flushing, abdominal pain and diarrhea. The study carried out highlighted a polypoid lesion (25mm) close to the ileocecal valve and the biopsy revealed to be a NEN. Of the biochemical study the measurement of Chromogranin A of 265.6 ng/ml and 5-hydroxyindoleacetic acid (5-HIAA) of 40 mg stands out. The day before the surgery, an octreotide infusion was started at 50mcg/h. For surgery, a TCI of propofol and remifentanyl was performed and the dose of octreotide was increased to 100mcg/h. The procedure was uneventful and the patient was transferred to the intensive care unit where he was for 72h for weaning octreotide and clinical surveillance. The patient was discharged 5 days after the intervention without complications.

Discussion: The incidence of NENs is growing worldwide. The initial approach of these tumours (classification and hormonal production) allows us to initiate appropriate treatment in order to avoid life-threatening crises².

References:

1. Clement, Dominique et al. (2020) Update on Pathophysiology, Treatment, and Complications of Carcinoid Syndrome, *Journal of Oncology*

2. Kaltsas, Gregory et al. (2017) ENETS Consensus Guidelines for the Standards of Care in Neuroendocrine Tumors, *Neuroendocrinology*.

Learning points: Carcinoid syndrome can develop in patients with hormone producing NENs. The multidisciplinary approach (endocrinologists, anesthesiologists and surgeons) allows stratifying risk factors, predicting possible complications, anticipating them and managing patients appropriately for better outcomes.

6921 McKittrick-Wheelock syndrome: not just a fancy name

Lopes C.¹, Portela F.¹, Lopes-Pimentel P.¹
¹Centro Hospitalar de Lisboa Ocidental EP - Lisboa (Portugal)

Background: McKittrick–Wheelock syndrome describes the rare condition of extreme electrolyte and fluid depletion caused by large distal colorectal tumours. Since surgical removal is the definitive treatment, these patients frequently present hypovolemic in the operation room and intensive care unit (1).

Case Report: A 78-year-old female with a history of dyslipidemia presented at the emergency department with watery and mucousy diarrhea lasting 20 days, extreme fatigue, muscle weakness, weight loss and rest tremor. The physical exam revealed discolored and dehydrated skin, a capillary refill time > 5 seconds, hypotension and tachycardia. Blood analysis showed a pre-renal acute renal injury, severe hypokalemia, hyponatremia and low blood osmolarity. After hospitalization and further investigation she was diagnosed with McKittrick-Wheelock syndrome, an electrolyte secretor villous colorectal adenoma, and proposed for laparotomy and adenectomy. Although optimized before surgery the patient evolved with hemodynamic shock during induction and maintenance of anesthesia showing persistent low blood pressure, high lactate (6mmol/L) and metabolic acidosis (pH 7.1). The surgery lasted 5hours and she required a total of 3L of fluid, bicarbonate, noradrenaline and dopamine administration. She was then transferred to the intensive care unit.

Discussion: The electrolyte abnormalities and dehydration are so profound that medical treatment is often suboptimal and surgical treatment is invariably necessary. Extreme dehydration may precipitate hypovolemic shock rendering patients susceptible to cardiocirculatory collapse upon anesthetic induction and maintenance, potassium depletion may lead to severe arrhythmias and hyponatremia may cause agitation, seizures and eventually coma.

References:

1. A systematic review of McKittrick–Wheelock syndrome. MR Orchard, J Hooper, JA Wright and K McCarthy. *Ann R Coll Surg Engl*. Nov 2018
2. Rectal Villous Adenoma with McKittrick-Wheelock Syndrome: Report of a Rare Case. C. Yu-Hung, K. Jung-Cheng, L. Huang-Jen. *Viszeralmedizin*, Feb 2013.

Learning points: The McKittrick-Wheelock syndrome presents with extensive hydro-electrolyte abnormalities potentially leading to profound hypovolemic shock requiring special attention and management which could be a challenge for the anesthesiologist and the critical care physician (2).

6966 Is the STOP-BANG questionnaire a good tool for the obstructive sleep apnoea diagnosis screening on the pre-anesthetic visit?

Juarez-Pomes M.¹, Ricol-Lainez L.¹, Rosas-Lario M.¹, Garcia-Bartolo C.¹, Blasco-Torres L.¹, Garrido-Ondoño S.¹
¹Hospital Parc Tauli - Sabadell (Spain)

Background and Goal of Study: Obstructive sleep apnoea (OSA) is a pathology that has a great influence on the perioperative course of patients. However, it is underdiagnosed during the pre-anesthetic visit since the gold standard for its diagnosis is the polysomnography, which is often inaccessible. Therefore, different screening questionnaires have been created. The objective of our study is to assess the use on the pre-anesthetic visit of the validated STOP-BANG questionnaire (which stratifies patients according to their risk of suffering OSA from 1 to 8) and its diagnostic congruence in order to improve the perioperative management of this pathology.

Materials and Methods: The STOP-BANG questionnaire has been put to all patients in our hospital pending surgery since 2015. In this study, 150 cases with the result of OSA's high-risk (score 5-8) were analyzed. Those patients were referred to pneumology, from where diagnostic nocturnal pulse oximetry was performed to assess the index of desaturations greater than 3% (ID3), a value associated with the severity of OSA and

postoperative complications.

Results and Discussion: A total of 90 of the 150 patients (60%) referred to pneumology were diagnosed with OSA, 36% of which had moderate OSA (ID3 15-29%) and 24% severe OSA (ID3 > 30%). Within the STOP-BANG scale, the score of 7 is the one that had the most consistent percentage of diagnosis, that is, it had the highest diagnostic percentage of OSA (77.7% of patients with this score).

Conclusion: The STOP-BANG questionnaire is a good screening tool for the diagnosis of OSA, hence it allows to better optimize the patient before undergoing surgery and to assess the suitability of initiating preoperative treatment.

7026

Impact of sex on postoperative mortality, admission in ICU and need of ventilation after elective non-cardiac surgery

Andonov D. I.¹, Wissler J.¹, Gucwa N.¹, Ulm B.¹, Jungwirth B.², Kagebauer S.¹

¹Klinikum rechts der Isar, TU Munich - Munich (Germany),

²Universitätsklinikum Ulm - Ulm (Germany)

Background and Goal of Study: Even though some studies show that male sex is a risk factor for adverse outcome and mortality^[1], the role of sex in postoperative complications is not fully investigated by now. In vascular surgery, women have higher mortality than men in some procedures ^[2], but in general critical care, there is no evidence that gender affects mortality ^[3]. The impact of sex on adverse outcomes might vary in different age groups, however data on perioperative non-cardiac surgery patients are insufficient. The aim of our study is to find out the impact of the sex and the age of patients on mortality rate, need of postoperative ventilation and admission to PACU as well as to ICU.

Materials and Methods: After ethical approval (ethics committee number 253/19, ClinicalTrials.gov ID NCT 04092933), we analyzed the data of 107471 patients who underwent elective non-cardiac surgery at the university hospital of the Technical University of Munich. The data was accumulated in our hospital information and patient data management system from January 2014 to March 2020. The average age of the patients was found to be 53.8±20.0 years with the median at 56 years and consisted of 58142 (54.1%) male and 49329 (45.9%) female patients. In order to investigate the statistical significance of the age and sex, we split the patients data into five age groups and performed chi-squared test for each group. A p-value < 0.05 was considered statistically significant.

Results and Discussion: The analyzed data is presented in the table below. First of all, the results reveal no significance of the patient sex for being admitted to PACU in any age group. In the age groups below 40, sex is not significantly associated with admission to ICU, postoperative ventilation need and mortality, whereas it has the highest influence in the age groups of 41-60 and 61-80 years and gets smaller in the age group above 80 years.

Conclusion: This work demonstrates that male patients in the age group between 40 and 80 years are at higher risk for need of postoperative ventilation and ICU admission as well as post-operative death. Furthermore, the influence of sex is less significant in the age group above 80 and not significant in the age group below 40.

References:

1. Moodley, Y. and B.M. Biccand, S Afr Med J, 2015. 105(2): p. 126-9.
2. Grootenboer, N., et al., Eur J Vasc Endovasc Surg, 2011. 42(4): p. 510-6.
3. Zettersten, E., et al., J Crit Care, 2020. 55: p. 22-27

7037

Posterior reversible encephalopathy syndrome - Trastuzumab, cyclophosphamide and methotrexate related?

Oliveira S. M.¹, Santos M. L.², Pereira I.²

¹Centro Hospitalar Universitário Lisboa Norte - Lisboa (Portugal),

²Centro Hospitalar Universitário Lisboa Norte - Lisboa (Portugal)

Background: Posterior reversible encephalopathy syndrome (PRES) is a rare reversible clinico-radiological syndrome that presents with headache, seizures, altered mental status and visual loss, and also with posterior cerebral white matter edema on MRI¹. A variety of medical conditions may be implicated as etiologies of PRES. Common causes are hypertension, renal disease and cytotoxic agents². Among cytotoxic agents, few case reports describe the association between PRES and chemotherapeutic agents². However, no case is trastuzumab with cyclophosphamide and methotrexate related¹.

Case Report: A 36 year-old caucasian woman, diagnosed with stage IV breast cancer, was admitted to the emergency department due to post-renal acute kidney injury, related to retroperitoneal malignant fibrosis. The patient was under chemotherapy with trastuzumab, cyclophosphamide and methotrexate. Emergent bilateral ureteral stenting was performed and the patient was admitted in the post anaesthetic care unit. While at the unit and after partial renal function recovery, the patient presented with refractory hypertension evolving to nausea and vomiting, headache and later generalized tonic-clonic seizures. Brain MRI was consistent with PRES. Other causes namely metastasis and infectious meningitis were excluded. The patient's blood pressure was aggressively controlled, dialysis sessions and phenytoin were started, with neurologic improvement.

Discussion: PRES is usually a self-limited and benign condition that returns to baseline in days or weeks. Nevertheless, there are some cases describing permanent and fatal outcomes with neurological deficits. Pathophysiology of this syndrome is not clear. There is no specific therapeutic strategy available and the treatment is symptomatic. Early management of the underlying disease is essential. This syndrome should be suspected in a patient with seizures under chemotherapy, poorly controlled hypertension and acute renal disease.

References:

1. Abughanimeh O, et al. Trastuzumab-associated Posterior Reversible Encephalopathy Syndrome. Cureus. 2018;2(5)
2. How J, et al. Chemotherapy-associated Posterior Reversible Encephalopathy Syndrome: A Case Report and Review of the Literature. Neurologist. 2016;21(6):112-7

Learning points: Although PRES is usually a rare condition, it is important to raise awareness of acute hypertension control and renal failure management in a patient under chemotherapy regimens.

7057

TLR polymorphisms in patients with liver cirrhosis complicated with bacterial infectionMutagirov V.¹, Kuandykov T.¹¹National Scientific Centre of Surgery - Almaty (Kazakhstan)

Background and Goal of Study: Patients with liver cirrhosis have an increased incidence of infections that increase morbidity and mortality. About 30% of inpatient cases of cirrhotic patients suffer an infection. The aim of this study was to study incidences of bacterial infections in cirrhotic patients of Kazakh population with TLR2 rs4696480/AT, TLR4 rs4986791/CT and TLR4 rs4986790/AG polymorphisms.

Materials and Methods: After the Local Ethic Committee approval, we prospectively studied 120 adult patients of Kazakh population with liver cirrhosis. We studied incidence of bacterial infections, site and etiology of infection, presence of TLR2 rs4696480/AT, TLR4 rs4986791/CT and TLR4 rs4986790/AG polymorphisms.

Results and Discussion: 57 out of 120 studied patients had presented bacterial infections, which is 47.5%. 5 (8.7%) patients were hospitalized with or due to an infectious complication. 52 patients (43.3%) presented in-hospital infections. We revealed pathological genotype in 42 (73.7%) patients with infection complications. The pathological genotype TLR2 rs4696480 we revealed in 85.7%, genotype TLR4 rs4986791 in 30.9% and genotype TLR4 rs4986790 in 23.8%. In some patients we identified combinations of several pathological polymorphisms of TLR2 и TLR4 genes (table 1).

Genotype	Rate
TLR2 AT	25 (59.5%)
TLR4 CT	2 (4.8%)
TLR4 AG	1 (2.4%)
TLR2 AT + TLR4 CT	5 (11.9%)
TLR2 AT + TLR4 AG	3 (7.1%)
TLR4 CT + TLR4 AG	3 (7.1%)
TLR2 AT + TLR4 CT + TLR4 AG	3 (7.1%)
Total	42

Conclusion: In patients with liver cirrhosis, polymorphisms of TLR2 and TLR4 increase risk of bacterial complications and this may influence the tactics of treatment and prevention of complications. Most frequent polymorphism in patients with liver cirrhosis complicated with bacterial infection is TLR 2 rs4696480 (85.7%).

7065

Hemodynamic stability after spinal anaesthesia and correlation with delirium onset in patients undergoing femoral osteosynthesis or hip replacementFalcone E.¹, Tiganò S.², Nicosia T.¹, Lanzafame B.¹, Perna F. A.², Astuto M.¹¹Università degli Studi di Catania - Catania (Italy), ²University Hospital Policlinico "G. Rodolico" - Catania (Italy)

Background: Delirium is an acute alteration of mental status with reduced awareness and attention deficit, a serious postoperative complication in any surgical set. It may start within 5 postoperative days. The reported incidence after orthopaedic surgery is around 8%, and its origin could be multifactorial: patients undergoing orthopaedic surgery often have comorbidities and a higher risk of dementia and orthopaedic surgery is associated with significant pain, an independent risk factor for Postoperative delirium (POD). Also, general hypoperfusion during the surgery may increase cognitive impairment. POD is associated with many short and long-term negative clinical sequels with significant rises in costs and mortality. The aim of this study is to evaluate if a goal directed fluid therapy (GDFT) may reduce the incidence of POD in orthopaedic surgery.

Methods: We prospectively evaluated the incidence of POD in patients

over 64 y.o. undergoing orthopaedic surgery for femur fracture and/or hip replacement. We pre-operatively screened the patients' cognitive function using the IQCODE scale with a cut-off of 3.44. Standard monitoring was performed (HR, RR, NIBP, SpO₂, urine output, T). We implemented a GDFT, with non-invasive hemodynamic monitoring (Edwards ClearSight®). Baseline hemodynamic values (T₀) were recorded after setting an i.v. access and volemic optimization was performed, referencing on two parameters. We treated with ephedrine 3mg any drop in MAP below 30% of the baseline value or an absolute value < 65mmHg. Fluids (aliquots of 200ml of ringer acetate) were administered when SV also decreased of at least 10% from baseline. After the hemodynamic optimization, patients received spinal anaesthesia in lateral decubitus (lying on the healthy limb using a 25G Whitacre needle, in the L3-L4 space), with L-bupivacaine 0.5% (10-11 mg according to height) and fentanyl 20 mcg. No premedication was used. Post-operative pain management was standardized (paracetamol 1g/8hrs and Ketorolac 30mg as rescue analgesia) monitoring pain levels with Numerical Rating Scale. Cognitive function was evaluated using the Confusion Assessment Method test. **Results:** While writing, we observed a mean incidence of POD of 5%, with postoperative incidence of severe pain (NRS>6) of 30% among 20 patients. **Conclusions:** Enrolment of patients isn't over. Despite the small sample size, early results are encouraging compared to the reported incidence in the literature.

7093

Bariatric Surgery for Morbid Obesity: But where's the Morbidity?Oakey M.¹, Amin K.¹, Brookfield L.¹, Margaron M.^{1,w}
¹St Richards Hospital - Chichester (United Kingdom)

Background and Goal of Study: Morbid Obesity is arbitrarily defined as a Body Mass Index (BMI) of >40 kg/m², yet this number tells us little of the patient's physical status, co-morbidities and peri-operative risk. To better understand how levels of obesity relate to comorbidity, we explored the relationship of ASA status with weight and BMI in a cohort of morbidly obese patients undergoing bariatric surgery.

Methods: At our institution pre-operative assessment is performed by a specialist bariatric anaesthetist, who allocates an ASA score based upon co-morbidities alone. Additionally, those patients with a markedly limited cardio-respiratory reserve (unable to climb a single flight of stairs but not fulfilling the NYHA grade of dyspnoea to count as ASA 4), are highlighted as an ASA grade 3+. We performed a retrospective analysis of our anaesthetic database, including only those who underwent primary gastric band, bypass or sleeve gastrectomy. Patients were grouped together by cohort of BMI and by weight ranges, and the strength of correlation assessed.

Results: Results for 3173 patients with BMI and ASA were analysed. The median age was 44 years, 78% were female. Results are shown in figures 1&2 below. We found that in our patient cohort, severe comorbidity (an ASA status >3) was found in only 2.4% of those with a BMI <50.

Conclusions: These results come from a relatively young cohort, but suggest that the incidence of significant co-morbidities rises sharply once BMI exceeds 70 (40% >ASA 3) or when body weight exceeds 200kg (35% >ASA 3). Whilst fat distribution (especially lots of visceral fat) and duration of obesity (decades of metabolic syndrome) should both be 'red flags' of risk, those patients with weights <150kg and BMI <50 have low incidences of severe co-morbidity. These patterns of ASA distribution should probably be familiar to all those working in bariatric anaesthesia.

7104

Complications associated with intraoperative hypothermia: A monocentric observational Cohort Study

Rodríguez Alcalá C.¹, Brogly N.¹, Guasch E.¹, Gredilla E.¹, Tapia B.¹, Gilsanz F.¹

¹Hospital Universitario La Paz - Madrid (Spain)

Background and Goal of Study: Perioperative hypothermia is underdiagnosed and untreated in many centers, even though it is associated with postoperative complications. The aim of this study was to assess its incidence and severity, and to establish whether it is associated with postoperative complications, focusing mainly on the need for transfusion and infection of the surgical wound, in patients operated under general and/or regional anesthesia in a tertiary hospital. The authors hypothesize that active warming (AW) would decrease the incidence of perioperative hypothermia (<36°C).

Materials and Methods: Consenting adult patients undergoing cesarean delivery and plastic surgery intervention, were enrolled in this observational study. Central temperature was measured continuously intraoperatively, and for 1 hour postoperatively. The primary outcome was to measure the incidence of hypothermia (<36°C) on arrival at the PACU. Secondary outcomes were to analyze the impact of postoperative hypothermia (<36°C) on the need for transfusion and the complications of the surgical wound. Continuous variables were compared using a Student "t" test and discrete variables with a Chi-2 test. A p<0.05 was considered significant. Binomial logistic regression was used to identify independent risk factors for hypothermia in this cohort of patients.

Results and Discussion: 257 patients were included with an incidence of hypothermia of 31.9% (40% among obstetrical patients versus 28.2% among plastic surgery patients, p=0.53). The demographic and surgical characteristics didn't show significant difference between normothermic and hypothermic patients. In bivariate analysis, patients in whom an intraoperative convective blanket was used presented a lower risk of hypothermia (OR: 0.19, 95% CI: 0.09-0.38). Hypothermic patients presented a higher risk of infection of the surgical wound (OR: 3.67, 95% CI 1.67-8.06) and blood transfusion (OR: 3.42, 95% CI: 1.03-11.25). Independent factors associated with hypothermia were complications of the surgical wound (OR: 5.16, 95% 1.7-15.66) and the use of AW systems (OR: 0.06, 95% CI 0.02-0.17).

Conclusion: Hypothermia is a significant problem for clinical practice in obstetrics and plastic surgery, which increases the risk of intraoperative and postoperative complications. Its prevention using convective blankets is an affordable and efficient treatment.

7161

Surgical Apgar Score, a good prognostication tool or predictor of intensive care unit admission?

Oliveira S. M.¹, Nave P.¹, Paulino A.¹

¹Centro Hospitalar Universitário Lisboa Norte - Lisboa (Portugal)

Background and goal of study: In Portugal the Surgical Apgar Score (SAS) is required as a standard for the national health authority as a part of the WHO surgical safety checklist. It is based only on intraoperative variables: lowest heart rate, lowest mean arterial pressure and estimated blood loss. Intended to be applied as a prognostication tool and an orientation to allocation care facilities. We hypothesized that SAS is not a useful prognostication tool or an indicator of ICU admission in our hospital. As a secondary goal we hypothesized that SAS was not related to length of stay in PACU and with death in the first 24 hours after surgery.

Materials and Methods:Type of study: Prospective. Inclusion criteria: Patients of all ages admitted to scheduled surgery in a tertiary hospital center (general surgery, orthopedics, vascular, gynecology, urology) and urgent surgery (every surgical specialty except for thoracic, cardiac and obstetric surgeries who work apart) during 8 consecutive days. Exclusion criteria: lack of information. Data: SAS, immediate post operative destination, length of stay in PACU, death ≤ 24 hours. Coefficient of determination (R²), t student test.

Results and Discussion: 178 patients were enrolled, 4 were excluded, minimum SAS was 4. A percentual correlation between SAS and ICU

admission was found in patients SAS ≤ 7 but overall 79,2% of these patients remained in PACU. 3 of the 6 patients with SAS 4 were admitted in PACU. SAS and PACU length of stay R² was 0.03. One patient, SAS 7, admitted in PACU, died 12 hours after surgery.

Conclusion: Despite mandatory SAS calculation it wasn't used as an admission criteria in the ICU. A low SAS wasn't predictive of ICU admission. Death wasn't related to a low SAS. Length of stay in PACU was not correlated with SAS.

7247

Haemodynamic status of preoperative fasting patients in the university teaching hospital: a prospective ultrasound study

Grynovska M.¹, Vakaliuk I.², Protas V.¹

¹Ivano-Frankivsk Regional Clinical Hospital - Ivano-Frankivsk (Ukraine),

²Ivano-Frankivsk National Medical University - Ivano-Frankivsk (Ukraine)

Background and Goal of Study: There is a broad consensus that intravascular hypovolemia should be avoided in the perioperative period(1). While preoperative fasting is traditionally believed to cause hypovolemia (2), the link between the two remains unclear (3). The recent audit of preoperative fasting practices in our institution has shown that recommended guidelines (4) are poorly met and the conventional "nil per os" advice is widely practiced in patients undergoing elective abdominal surgery(5). Respiratory variations of inferior vena cava (IVC) were shown to correlate with blood volume in spontaneously breathing patients (6), so our study sought to investigate the influence of preoperative fasting on hemodynamics according to noninvasive preload indices.

Materials and Methods: Patients (n=70) undergoing abdominal surgery, without bowel preparation were included and divided in 2 groups based on the fasting period duration: <8h and > 8 h respectively. IVC measurements were obtained on the evening before surgery and on the day of surgery after the fasting period, with portable Logic e ultrasound. Statistical comparison of two groups was performed.

Results and Discussion: The mean IVC -CI in the first group was 15.14±9.6 and 14.9 ± 9.5 respectively, in the second group - 15.5± 11.18 and 13.9± 8.6. In the first group we observed no statistically significant difference in the IVC-CI over the fasting period (p>0.05). However, in the second group there was a statistically significant decrease in IVC-CI (p<0.05) implying hypovolemia, possibly due to prolonged fasting period and lack of adherence to recommended practices.

Conclusion: In conclusion, this study has demonstrated that prolonged fasting (>8 hours) alters non-invasive preload indices in patients and has potential to induce perioperative hypovolemia, leading to negative patient outcomes.

References:

1. M. Jacob et al. Best Practice Clinical Anaesthesiology 26 (2012)421–430
2. M. Megan Chacon et al. Part of the Great Fluid Debate. Journal of Cardiothoracic and Vascular Anesth, Vol 33, Issue 9, 2019
3. Muller L. et al.Preoperative fasting does not affect haemodynamic status.Br J Anaesth. 2014; 112: 835
4. Aarts MA et al. ERAS Guideline. SAGES 2014 1-30
5. Grynovska M. et al. Audit of preoperative fasting practices - EBPOM Congress 2021 (in print)
6. Muller L et al. Respiratory variations of IVCdiameter to predict fluid responsiveness in spontaneously breathing patients.Crit Care 2012; 16: R188

7258

Does pre-operative weight loss in patients with a body mass index of forty or greater improve outcomes following elective hip and knee arthroplasty? A 1-year retrospective observational study

Gorey D.¹, O'Connor B.¹, Husarova V.¹¹Cappagh National Orthopaedic Hospital - Dublin (Ireland)

Background and Goal of Study: Obesity is associated with increased risk of postoperative complications and delayed functional recovery.

We investigated if pre-operative weight loss in patients with BMI > 40 undergoing elective hip (THA) and knee (TKA) arthroplasty improved postoperative outcome.

Materials and Methods: The National Orthopaedic Hospital, Cappagh is a tertiary referral centre for elective surgery. We conducted a 1-year retrospective study using computerized records of patients who presented to the pre-assessment clinic during 2019. Patients with BMI > 40 were selected, their charts were reviewed: PAC and admission BMI were noted and patients were divided into 3 groups: those who lost, gained, and maintained their weight. We compared post-operative length of stay, 30 day and 6 month morbidity and mortality between the groups.

Results and Discussion: Ninety-one patients undergoing THA and TKA with a BMI > 40 were identified. Of these, 22 (24%) lost weight; 29 (32%) gained weight and 40 (44%) maintained their weight. The mean BMI on admission were 35.6 ± 3.3; 45.9 ± 4.3; 43 ± 1.8 in patients who lost, gained, and maintained weight respectively. The mean weight loss was 12.6 ± 9.6 kg and mean weight gain was 13.2 ± 9.6 kg. The length of stay was shortest in patients who maintained their weight at 3.8 ± 1.3 days, compared to 4.6 ± 2.4 days in the weight loss group and 3.8 ± 1.5 days in the weight gain group. Respiratory complications were most frequent in the 30 days post-operatively, without difference among the three groups. Patients who remained the same weight had the highest incidence of morbidity in the 6 months post-operatively. Ongoing pain was the most common complaint, experienced by 30 % of all patients.

Conclusion: The most common post-operative morbidity and mortality included respiratory complications and ongoing pain. There were no major differences among the three patient groups.

References:

1. Modig K, Erdefelt A, Melner C et al.: "Obesity paradox" holds true for patients with hip fracture: a registry based cohort study. *J Bone Jt Surg Am* 2019;101:888-95.
2. Chamberlain A., Redman J.: Risk assessment and stratification for obesity. Core topics in anaesthesia and peri-operative care of the morbidly obese surgical patient. Cambridge University Press; 2018:80-6
3. Wynn A., Bouch DC.: Anaesthesia for obese patient. *BJA Education*, 20(11): 388-395 (2020)

7339

Preoperative botulinum toxin in the surgical treatment of patients with loss of domain hernia.

Molero Díez Y. B.¹, Sánchez Tabernero Á.¹, Ruiz Simón F. A.¹, García Castaño M.¹¹Complejo Asistencial de Zamora - Zamora (Spain)

Background: Preoperative assessment and optimization of patients are essential for favorable outcome of surgical interventions. We report a case of preoperative injection of botulinum toxin (BT) type A as preparation for surgical repair of a patient with loss of domain hernia (LODH).

Case Report: A 45-year-old male with a giant ventral hernia secondary to another abdominal surgery. TC scan showed: hernia sac of 228x99x200 mm (2348 cc volume), abdominal cavity of 288x214x364 mm (11665 cc). That means a relationship between hernia and abdominal cavity of 0.2. This measure is slightly under 0.25, which is the limit established as the threshold to deploy preoperative abdominal tissue expanders in order to prepare the repair. That is why a preoperative abdominal cavity expansion is needed.

A month prior to the planned surgery, the patient attended to our hospital in order to be examined by an Anesthesiologist and injected the botulinum toxin. A dilution of 300 IU of BT (Botox®) in 50 ml of 0.9% saline solution. Under ultrasound (US) vision we injected 8 ml at each of the six points (three each side: distributed 3 ml in transversus abdominis, 3 ml in internal oblique and 2 ml in external oblique; resulting in 50 IU at each muscle). Four weeks later, under general and epidural anesthesia, surgical repair was possible. He was 24 hours in the ICU without pain. No respiratory events registered.

Six month after that, surgeons confirmed the successful surgery.

Discussion: Preoperative preparation of LODH is basic to obtain great surgery results. There are two ways to do that: preoperative progressive pneumoperitoneum and abdominal wall muscle relaxation with BT. Several studies have shown the effectiveness in both cases.

References:

1. E.Y. Tanaka, J.H. Yoo, A.J. Rodrigues Jr., E.M. Utiyama, D. Birolini, S. Rasslan. Computerized tomography scan method for calculating the hernia sac and abdominal cavity volume in complex large incisional hernia with loss of domain. *Hernia*, 14 (2010), pp. 63-69
2. C. Sabbagh, F. Dumont, B. Robert, R. Badaoui, P. Verhaeghe, J.M. Regimbeau. Peritoneal volume is predictive of tensionfree fascia closure of large incisional hernias with loss of domain: a prospective study. *Hernia*, 15 (2011), pp. 559-565

Learning points: BT injection in abdominal wall muscles under US vision is a simply technic, ambulatory, undertaken by Anesthesiologist. It is vital to improve not only surgical conditions but also postoperative ones in patients with LODH.

7430

A service evaluation investigating patient experience of pain following elective orthopaedic surgery at Orpington Hospital, UK

Kelly N.¹, Srinivasan R.¹, Lowings M.¹¹Kings College Hospital - London (United Kingdom)

Background: Post-operative pain impacts patients' recovery, mobilisation, and wellbeing. This service evaluation investigates patient experience of pain in the post-anaesthetic recovery department at Orpington Hospital, an elective orthopaedic unit in the UK.

Methods: A prospective audit was carried out over 10 days. Pain was assessed using a visual analogue score (VAS) range 0–10. Further notes review was performed where possible. Data were analysed using RStudio (Version 1.4.1717).

Results and Discussion: Data was collected for 57 cases. 34/57 had general anaesthesia (GA); 8/34 GA only, 15/34 GA plus local anaesthetic infiltration (LAI) and 11/34 GA plus regional block (9 peripheral, 2 spinal). 21 had spinal anaesthesia without GA; of these 8/21 also received LAI. The full range of pain scores between 0–10 was reported. 7/57 reported pain VAS >0 (mean 0.9) on arrival to, and 17/57 at any time, in recovery. For these 17 patients, mean VAS on arrival was 3.0, peak VAS was 6.8 and time to comfort was 27 minutes. All patients reporting pain received

morphine in recovery, 3/17 also received other analgesics (including tramadol, ketorolac and paracetamol).

A two-way ANOVA was performed to look at impact of anaesthetic technique and surgical site on peak pain score. This suggested that the anaesthetic technique did impact the VAS score (F value=4.562, $p=0.002$). Tukey's post-hoc test for pairwise comparisons demonstrated that patients receiving GA with LAI experienced significantly higher pain VAS than those receiving spinal only ($p=0.001$) or spinal with LAI ($p=0.02$). Regarding surgical site, lower pain VAS was demonstrated in those having foot vs ankle surgery ($p=0.02$), no other surgical site comparisons approached significance. Further review of intraoperative analgesia was possible for 8/17 patients experiencing pain in recovery. 7/8 received intraoperative paracetamol (the exception being a patient having spinal), 3/8 received a non-steroidal anti-inflammatory (ketorolac or diclofenac), 4/8 received morphine and one received clonidine. 3 of those 4 not receiving morphine had received regional anaesthetic technique (spinal or block).

Conclusions: This service evaluation found that 26% of patients experienced post-operative pain in recovery. Those patients receiving GA with LAI experienced significantly more pain than those receiving spinal anaesthesia. Investigating the basis of this finding, and excluding confounders, will be the focus of further work.

7445

Alternatives to the anaesthetist-led preoperative evaluation in adults: a scoping review

Jonker P.¹, Van Den Heuvel S.¹, Hoeks S.¹, Heijkoop E.¹, Stolker R. J.¹, Korstanje J. W.¹

¹Erasmus University Medical Center - CA Rotterdam (Netherlands)

Background and Goal of Study: The design of the optimal preoperative evaluation is a much-debated topic, with the anaesthetist-led in-person evaluation being most widely used. This approach might lead to overuse of valuable resources, especially in low-risk patients. The COVID-19 pandemic forced anaesthetists to an ad-hoc temporary transition of the preoperative evaluation from an anaesthetist-led in-person evaluation to a COVID-19 safe preoperative evaluation, when possible, based on scarce evidence. We conducted a scoping review to critically appraise literature investigating alternatives for the anaesthetist-led preoperative evaluation and their impact on outcome, to inform future knowledge translation and ultimately improve perioperative clinical practice.

Materials and Methods: A comprehensive search of multiple databases was performed for studies comparing the anaesthetist-led in-person preoperative evaluation with a non-anaesthetist-led preoperative evaluation or no outpatient evaluation in elective surgery patients. Common outcomes included surgical cancellation and delay, perioperative complications, patient satisfaction, and costs. A quality assessment was performed to obtain an impression of the quality of the studies.

Results and Discussion: Twenty-six studies with a total of 361719 patients were included, reporting on a variety of interventions, i.e.: telephone evaluation, telemedicine evaluation, a questionnaire, surgeon-led evaluation, nurse-led evaluation, other types of evaluation and no evaluation until the day of surgery, all compared to the anaesthetist-led in-person evaluation. Most studies were conducted in the United States and contained patients with low ASA physical scores (1 or 2). Most study types were either pre-post or cross-over studies with only two randomised controlled trials. Outcome measures, healthcare systems in which studies were conducted, and year of publication were highly heterogeneous between the included studies, making generalisable conclusions difficult.

Conclusion: Due to the COVID-19 pandemic a forced ad-hoc temporary transition of the preoperative screening units has taken place globally. To fill the knowledge gap and thereby facilitate a lasting well-structured European transition after the COVID-19 pandemic, high quality RCT's should be initiated within Europe. Outcome measures should be standardized, e.g. same-day cancellation, complications, patient and provider satisfaction, and costs.

7483

Quality of recovery and innate cytokine production capacity in patients undergoing low- versus standard pressure pneumoperitoneum during laparoscopic colorectal surgery (RECOVER): a randomized controlled trial

Albers K.¹, Panhuizen I.², Snoeck M.², Scheffer G. J.³, Keijzer C.³, Warle M.³

¹Radboud UMC - Nijmegen (Netherlands), ²Canisius Wilhelmina Hospital - Nijmegen (Netherlands), ³Radboudumc - Nijmegen (Netherlands)

Background and Goal of Study: There is increasing evidence for the safety and advantages of "low impact laparoscopy": low pressure pneumoperitoneum facilitated by deep neuromuscular blockade. Nonetheless, there is only a weak understanding of the relationship between important clinical outcomes, surgical injury, postoperative immune dysfunction and infectious complications after colorectal surgery. We studied the effects of intra-abdominal pressure related surgical injury on quality of recovery and cytokine production capacity of innate immune cells after laparoscopic colorectal surgery within the enhanced recovery after surgery (ERAS) program.

Materials and Methods: Randomized controlled trial of 178 patients treated at standard pressure pneumoperitoneum (12 mmHg) with moderate neuromuscular blockade (TOF 1-2) or low pressure (8 mmHg) facilitated by deep neuromuscular blockade (PTC 1-2). The primary outcome was quality of recovery on postoperative day 1 (POD1) measured with the Quality of Recovery-40 questionnaire. The primary outcome of the substudy of innate immune function in a subgroup of 100 patients was cytokine production capacity upon ex-vivo endotoxin stimulation on POD1.

Results and Discussion: QoR-40 score on POD1 was significantly higher (167 versus 159, $p=0.005$) and the postoperative decrease in cytokine production capacity was significantly smaller for TNF α and IL-6 ($p=.021$ and $p=.040$) for patients operated at low- compared to standard pressure. Moreover, patients operated at low pressure reported lower pain scores while requiring less opioids, and developed significantly less postoperative infectious complications.

Conclusions: Low impact laparoscopy during colorectal surgery is safe, improves postoperative quality of recovery and innate immune homeostasis, and forms a valuable addition to the ERAS program.

7497

Quality indicators in tertiary centre anaesthesia: index data and the incidence of perioperative hypothermia at Queen Elizabeth Hospital Birmingham.

Davies L.¹, Aldridge K.¹, Hindle E.¹

¹Queen Elizabeth Hospital, Birmingham - Birmingham (United Kingdom)

Background and Goal of Study: Quality indicators in anaesthesia can play an integral role in assuring high standards of care and guiding quality improvement initiatives. QEHB aims to run a fully operational quality indicator monitoring system which will permit individual and interhospital benchmarking. As well as acting as comparators for measuring improvement, index data for such indicators facilitates the detection of fields where there already exists an opportunity for development. This study describes the index data and discusses how perioperative hypothermia has been identified for QI prioritisation.

Materials and Methods: A driver diagram was used to ascertain outcome and process measures, and indicators were subsequently selected through a departmental consultation process. These were integrated into a proforma for contemporaneous data collection within the recovery units to comprise a prospective, observational study. Among others these included the existence of pain, PONV, hypothermia, and selected patient demographics. Data were collected over a 14-day period in May 2021 by recovery staff following a series of explanatory sessions. 20 patients per day were randomly selected by recovery team leaders for inclusion. Data were grouped by surgical speciality and collated electronically.

Results and Discussion: Data were acquired for 211 patients, with a median age of 59 years. 118 cases were non-elective. The existence of adequate prescriptions, formal handover, and named anaesthetists' details were present in ~95% of cases. Incidence of nausea = 6.2%, vomiting = 1.4%, pain (>5/10 on pain scale) = 15%. Hypothermia (<36°C) = 52%. Breast surgery provided the highest incidence of hypothermia (82%) and T&O was the most highly represented population (27). Comparisons with preoperative temperatures suggested a positive correlation. Pain and nausea were more common in those aged <70 years (OR=0.24 [CI95%: 0.08-0.71] and 0.57 [CI95%: 0.15-2.15]). There was no significant difference in hypothermia incidence between these age groups.

Conclusion: This study demonstrates the feasibility of auditing such parameters in our recovery units which will be encompassed by the future of quality indicator monitoring at QEHB and used to inform its integration into daily practise. Whilst some index results were encouraging, hypothermia rates were high. Results has been reported to the department of anaesthesia and a perioperative hypothermia project will now be launched.

7551
Analysis of abnormal ECG findings in low Revised Cardiac Risk Index patients undergone non-cardiac surgeries: A Cross Sectional Study

Sharizal Z.¹, Abdul Mukmin L.¹, Zainal Abidin H.¹, Wan Isa W. Y. H.¹, Ali S.¹, Nik Mohamed N. A.¹

¹University Hospital Sains Malaysia - Kota baru (Malaysia)

Background and Goal of Study: The common occurrence of cardiac complications from non-cardiac surgery makes electrocardiogram (ECG) an essential screening tool. In low cardiac risk patients, the absence of typical angina like symptoms during peri-operative periods leads to delay recognition of major adverse cardiac events (MACE). The methodological approach used in managing patients with acute coronary syndrome may not be practical in the peri-operative use.

Materials and Methods: This is a single centre, cross sectional study involving a total of 406 subjects. The subjects who were more than 40 years old, with American Society of Anaesthesiologists (ASA) I and II and low Revised Cardiac Risk Index were included in the study. Study sample were selected by convenient sampling. Serial ECG assessment was conducted during preoperative period (baseline), after induction of anaesthesia, and one hour post extubation. Meanwhile, intraoperative 5 leads ECG was used to monitor and document any dynamic ECG abnormalities. A dedicated cardiologist reviewed the ECG results referring to the standard international guidelines.

Results and Discussion: A total of 132 patients (32.5%) had abnormal preoperative ECG. 53 patients (40.2%) experienced new or worsening ECG perioperatively. Factors associated with abnormal preoperative ECG were identified as, age (RR=1.02, 95%CI 1.01,1.03, P<0.001), male gender (RR=1.41, 95%CI 1.13,1.77, P<0.05), smokers (RR=1.62, 95%CI 1.04,2.52, P<0.05), and hypertension (RR=1.28, 95%CI 1.01,1.62, P<0.05). The most common ECG findings were Left axis deviation (Preoperative, n=69 (17%), Perioperative, n=71 (17.5%)) and T Wave inversion (Preoperative, n=44 (10.8%), Perioperative, n=53 (13.1%)). After adjusting for covariates, the odds of developing new or worsening perioperative ECG were found to be higher in patients who had abnormal preoperative ECG findings (OR:4.41, 95%CI 2.62,7.39, p<0.001) and lower intraoperative heart rate (OR:2.71, 95%CI 1.55,2.74, p<0.001).

Conclusion: Low Revised Cardiac Risk Index patients with age more than 40 years old, male gender, smokers and hypertensive carried a significant risk of developing abnormal ECG in the peri-operative period. Abnormal preoperative ECG is an indicator of potentially developing abnormal ECG in the peri-operative period.

7571
Risk Factors of Acute Kidney Injury After Major Elective Non-Cardiac Surgery : A Prospective Observational Study

Büyük D.¹, Altınöz Sönmez E.¹, Altun Bingöl D.¹, Özkan Seyhan T.¹, Orhan Sungur M.¹

¹Istanbul University Faculty of Medicine, - Istanbul (Turkey)

Background: Although the relationship between intraoperative blood pressure and the incidence of acute kidney injury (AKI) has been demonstrated, it hasn't been studied extensively prospectively¹. The purpose of this prospective observational study is to examine the risk factors that cause AKI after major non-cardiac surgery including pressure monitoring.

Materials and Methods: Adult ASA-I-III patients, undergoing major elective abdominal surgery under general anesthesia, were included in the study after obtaining ethics approval and patient consent. Demographic data and patient characteristics, intraoperative hemodynamics, fluid, blood/ blood product transfusion, perioperative laboratory, and postoperative follow-up data were recorded. Patients were divided into Group AKI+ and Group AKI- within the first 48 hours postoperatively according to 2012 KDIGO criteria for primary outcome.

Results: The incidence of AKI was 12% in 425 patients. Age, BMI, ASA, functional capacity were higher and hypertension, diabetes mellitus, presence of chronic kidney failure, beta-blocker use, ascites and anemia were more common in Group AKI+ patients preoperatively, whereas smoking was more common in Group AKI-. In the intraoperative period, the use of colloids, blood products, and vasopressors were higher in Group AKI+, and the amount of intraoperative bleeding was increased. The distribution of the lowest intraoperative mean arterial pressure (MAP) according to the groups is given in Figure 1. In the postoperative period, the need for intensive care follow-up and the use of blood products, vasopressors and diuretics were more frequent in patients who developed AKI.

Conclusion: The most important risk factors for the development of postoperative AKI were found to be postoperative vasopressor need, the lowest intraoperative mean arterial pressure below 50 mmHg, intraoperative colloid use, and high body mass index in descending order. Prevention of AKI would rely on modifying risk factors if possible, including close blood pressure monitorization.

References:

1. Sun et al Anesthesiology 2015: 515-23

	Group AKI+ (n=49)	Group AKI- (n=376)	p
MAP<70mmHg n(%)	45 (%91,8)	308 (%81,9)	0,082 ¹
MAP<60mmHg n(%)	31 (%63,3)	148 (%39,4)	0,001 ¹
MAP<50mmHg n(%)	12 (%24,5)	26 (%6,9)	<0,001 ⁴

Group AKI+ and Group AKI- comparisons was performed with ¹: Pearson chi-square; ⁴: Fisher's exact test, respectively. Values are given as n (%).

7599

Intra-operative ketamine administration is unassociated with an increase in the incidence of emergence delirium in laparoscopic surgeries: an observational study.

Graça M. I.¹, Fonseca D.¹, Salgueirinho C.¹, Pereira H.², Abelha F.¹
¹Centro Hospitalar Universitário São João - Porto (Portugal),
²Departamento de Cirurgia e Fisiologia - Faculdade de Medicina da Universidade do Porto - Porto (Portugal)

Background and Goal of Study: Emergence delirium (ED) is an important condition in the immediate postoperative period, with an incidence around 5-10%, reaching 20% in specific subgroups, such as pediatric age and the elderly. The implications of ketamine use during anesthesia on consciousness and altered mental state after surgery is unclear and studies concerning the incidence of ED in the presence of intraoperative ketamine are controversial. The present study aimed to evaluate whether the intraoperative use of ketamine influences the incidence of ED.

Materials and Methods: A prospective observational study was carried out at the Anesthesiology Department of Centro Hospitalar Universitário de São João (Porto, Portugal), between July 2018 and January 2019, evaluating patients who underwent laparoscopic surgery for cholecystectomy, oophorectomy or salpingectomy. The decision to administer ketamine was responsibility of the anesthesiologist in charge: in these cases, a total of 0.5mg/kg of ketamine (considering the patient's ideal body weight) was administered during anesthesia induction (after propofol administration). At admission to the PACU, patients with a score ≥ 1 on the Richmond Assessment Sedation Scale (RASS) or ≥ 2 on the Nursing Delirium Screening Scale (Nu-DESC) scale were considered to have emergence delirium. T-test, Chi-square test or Fisher's exact tests were used for comparisons.

Results and Discussion: 112 patients were included after laparoscopic surgery, 8 of which were excluded, due to intraoperative events. Within the 104 patients left, 17 (16.3%) developed emergence delirium. The incidence of ED in patients given ketamine was not different from that of other patients (70.6% versus 50.6%, $p=0.130$), which is in agreement with several authors.

Conclusion: The incidence of ED in the present study was 16% and its occurrence was not associated with the use of ketamine.

7607

The effect of breathing exercise in the post-anaesthesia care unit on preventing atelectasis in the early period after open upper abdominal surgery: a randomised controlled trial

Xiao Y.¹, Huang C.¹, Luo W.¹, Chen Y.¹, Wang X.¹, Huang W.¹
¹The First Affiliated Hospital Sun Yat-Sen University - Guangzhou (China)

Background and Goal of Study: Atelectasis after general anaesthesia occurred frequently, and persistent atelectasis is associated with postoperative pulmonary complications (PPCs). Respiratory muscle dysfunction represents a contributing factor. Anaesthetics, opioids and neuromuscular blocking agents (NMBAs) can impair involuntary control of breathing by depressing the magnitude of wakefulness and reducing chemoreflex to hypoxia. It has yet to be established that whether this involuntary depression can be voluntarily overridden—that is, whether the patient can consciously increase respiratory muscle strength to reduce the incidence of postoperative atelectasis. We aimed to evaluate the effect of coached breathing exercise immediately after extubation on atelectasis and oxygenation among high-risk patients. We hypothesized that breathing exercise in PACU reduces postoperative atelectasis.

Materials and Methods: In this randomized, assessor-blinded study, patients aged ≥ 50 years scheduled open upper abdominal surgery ($>3h$) under total intravenous anaesthesia combined with thoracic epidural analgesia were allocated to the exercise and control groups. Patients in the exercise group were instructed immediately after extubation to perform coached breathing exercises, while the control group received

standard care. Lung ultrasound scores (LUS) at 16 quadrants were evaluated and arterial blood gas analysis was performed when breathing air at baseline and 1 h after extubation in PACU. The primary outcome was LUS in PACU. The secondary outcomes included the difference in arterial partial pressure of the oxygen (PaO_2) between baseline and 1 h postextubation.

Results and Discussion: Sixty-one patients were analysed. Baseline characteristics were well balanced between groups. The exercise group ($n=30$) had significantly lower LUS than the control group ($n=31$): mean \pm SD, 4.6 ± 3.7 vs 10.7 ± 4.5 ; difference, 6.0 (95% CI, 3.9 to 8.2); $P<0.001$; indicating better lung aeration. Patients in the exercise group had a smaller reduction in PaO_2 than those in the control group (5.6 ± 11 vs 19 ± 13 mmHg; mean difference, 13 mmHg (95% CI, 6.8 to 19); $P<0.001$).

Conclusion: Breathing exercise in PACU significantly improves postoperative lung aeration and oxygenation in patients undergoing upper laparotomy. The long-term effects of breathing exercises performing in the immediate period on clinical outcomes would be the subject of future trials of our research team.

Patient Safety

6466

Development of a smartphone application for preoperative patient assessment

Urwiler A.¹, Fiedler U.², Girard T.¹
¹University Hospital Basel - Basel (Switzerland), ²Bern University of Applied Sciences - Biel/Bienne (Switzerland)

Background and Goal of Study: Many guidelines support routine preoperative assessment using questionnaires prior to patients arrival in the anaesthetic room.¹ Data collection may be performed self-administered by patients using mobile apps or alternative methods. At present, there is not enough evidence to make clear recommendations about the impact of apps on questionnaire responses.² We conjecture that the ongoing widespread use of smartphones in private and business contexts strengthens patients' capability for self-administered data collection using their own devices. The aim of this work was therefore to develop a functional smartphone app for preoperative patient assessment, fulfilling requests setup by an expert group.

Materials and Methods: After searching the literature for preoperative anaesthesia questionnaires and a workshop with experienced anaesthesiologists the scope of the questionnaire and functional expectations were defined. The first version of an app was developed by the IT team in German, the second version was improved according to feedbacks and inclusion of all four Swiss national languages (German, French, Italian, Rhaeto-Romanic) and English using agile software development according to Scrum.³ Further improvements were achieved conducting field tests and collecting user feedback. The completion of the study was defined as achievement of full functionality of the app which can be downloaded free of charge from Google Play and the Apple App Store.

Results and Discussion: An app for smartphones and tablets was successfully developed and may now be used with five different and selectable languages. Completeness of the questionnaire is supported by forcing the users for complete data entry in all data fields. Data are solely stored on the own device. Upon request, the completed questionnaire as PDF can be transferred by email.

Conclusion: A fully functioning app has been developed using Scrum with an interdisciplinary team. Further research will be needed to clarify whether this app improves the communication among patients and anaesthesiologists and to what extent the approach is useful during the current pandemic.

References:

1. Goodhart IM et al. Eur J Anaesthesiol 2017; 34:221.
2. Marcano Belisario JS et al. The Cochrane Database of Systematic Reviews 2015.
3. Rubin KS. Essential Scrum. Addison-Wesley 2013

6557

Perioperative heat retention in prone spine surgery by covering with polyethylene garbage bags

Sakai N.¹, Sugano N.¹, Miyake R.¹, Umemura C.¹
¹*Daiyukai General Hospital - Ichinomiya, Aichi (Japan)*

Background and Goal of Study: Spinal surgery in the prone position under general anesthesia requires appropriate intraoperative temperature control due to the large body surface exposure area. The purpose was to compare and verify whether covering the extremities and trunk with polyethylene garbage bags can improve the body temperature maintenance effect.

Materials and Methods: We obtained the information retrospectively from medical records for 165 patients who underwent thoracolumbar spine surgery from October 2018 to November 2020. Surgery was performed under general anesthesia and prone position. We maintained the room temperature at 20 degrees and administered 300 mL of branched-chain amino acid preparation intraoperatively. The control group (Group C) was kept warm with towels on the extremities and heated blankets on the lower limbs. In the intervention group (Group I), we additionally covered the extremities, lateral thorax, and abdomen with polyethylene bags. We recorded the body temperature every 15 minutes during the operation. We adopted the propensity score matching using age, gender, BMI, operative time, and blood loss as confounding factors. The primary outcome was whether the body temperature at the end of surgery was higher than at the beginning and was analyzed using Fisher's exact test. In addition, we applied a Student t-test for the comparison of the actual difference in body temperature. $P < 0.05$ was considered a significant difference.

Results and Discussion: Each group matched 53 subjects from the original population. The difference between the beginning and end of surgery was $-0.2 \pm 0.5^{\circ}\text{C}$ in Group C and $0.1 \pm 0.5^{\circ}\text{C}$ in Group I ($p=0.002$). The number of patients whose body temperature was higher at the end than at the beginning was 19 in Group C and 32 in Group I ($p=0.02$). We believe that the moisture-impermeable polyethylene coating causes insensible excretion from the skin surface to be stored inside the polyethylene covers. The water vapor maintains the temperature, resulting in a greenhouse effect. Furthermore, polyethylene bags can be obtained inexpensively and are helpful for waste disposal as garbage bags after surgery, which is an operational advantage.

Conclusion: Our results indicated that polyethylene covering contributed to the maintenance of body temperature in prone spine surgery.

6601

Auditing team briefing in elective vs. emergency cases in a district general hospital

Doherty J.¹, Sotiriou A.¹, Wilcox H.¹, Manohar R.¹
¹*North Lincolnshire & Goole NHS Trust - Scunthorpe (United Kingdom)*

Background and Goal of Study: Team briefing ensures safety, by providing an opportunity to identify potential issues that are relevant for the whole theatre team prior to starting a case. The National Safety Standards for Invasive Procedures developed by NHS England state that it is mandatory before any theatre case [1]. Therefore, our aim should be to have a team brief before 100% of cases.

Materials and Methods: We audited team briefing between 26/10/20 – 21/11/20, recording the urgency of each case, if the case was done on the emergency list, and if the case was carried out on a weekend. We did this by going to theatre at different times each day, and asking a member of the anaesthetic team for this information for their current case.

Results and Discussion: We audited 86 theatre cases in total, and found 12 cases (8 urgent, 3 expedited and 1 elective) where a team brief was not done. 11 of these came from the emergency list. On the emergency list, 25% of cases done on a weekday, and 46% done on a weekend did not have a team brief. Overall, only 86% of cases had a team brief. We presented our findings at the departmental audit meeting, and based on the feedback we received, made several interventions. We discussed our findings with theatre management, the leads for emergency theatre and the clinical leads from various departments; made a poster summarising our findings and put this in the theatre communication book and on the staff noticeboard; and made posters encouraging the team to do a team

brief and displayed these outside the anaesthetic rooms and theatre changing rooms. We re-audited between 14/4/21 – 21/5/21, looking at 50 cases in total. All cases had a team brief prior to surgery.

Conclusion: In our initial audit only 86% of theatre cases had a team brief before surgery. Cases were more likely to not have a team brief if they were on the emergency list, done on the weekend or NCEPOD category 'urgent' or 'expedited'. After undertaking interventions to make staff aware of our findings, we are now reaching our target of 100% of audited cases having a team brief.

References:

1. NHS England, National Safety Standards for Invasive Procedures (NatSSIPs). 2015. Available from: <https://www.england.nhs.uk/wp-content/uploads/2015/09/natssips-safety-standards.pdf> [Accessed 23rd May 2021].

6682

From the ambulatory care unit to the ICU: post-operative complications of functional endoscopic sinus surgery

Guimarães D.¹, Maia J.², Windels A.³, Chumela T.³
¹*Hospital Espírito Santo EPE, Évora - Évora (Portugal)*, ²*Hospital Espírito Santo EPE, Évora - Évora (Portugal)*, ³*Hospital Espírito Santo EPE, Évora - Évora (Portugal)*

Background: NSAID-exacerbated respiratory disease (NERD) refers to the combination of asthma, chronic rhinosinusitis with nasal polyposis and respiratory tract reactions to COX-1-inhibiting nonsteroidal anti-inflammatory drugs (NSAIDs). Functional endoscopic sinus surgery (FESS) is currently the primary approach for the surgical treatment of chronic sinusitis. Revision FESS is considered to have an increased risk of complications.

Case Report: A 44-year-old man, ASA III, with severe NERD proposed to start biological therapy was scheduled for bilateral FESS in an outpatient setting. This was his 6th intervention due to recurrent polyposis. General anesthesia was conducted with a multimodal analgesia strategy, without NSAIDs. After 3 hours of surgery, awake extubation was successful but after bed transfer there was an abrupt drop in SpO₂ with respiratory impairment. Direct laryngoscopy showed active bleeding in the nasopharynx, oropharynx and cavum. Intubation and aspiration of the pharynx and trachea were performed. A nasogastric tube was also inserted showing the presence of blood in the digestive tract. Suspecting of pulmonary aspiration, a fiberoptic bronchoscopy was conducted. No blood was found in the tracheobronchial tree, but the presence of severe bronchospasm. Bronchodilator treatment was started. To prevent further posterior epistaxis, nasal packing was reviewed by the ENT specialist. Extubation was postponed and the patient was transferred to the ICU for further management of severe asthma exacerbation. Successful extubation was carried out after 3 days, once nasal packing was removed.

Discussion: FESS is a broadly accepted procedure but not yet risk-free. Hemorrhage in the recent postoperative period is one of the most frequent complications and patients with extensive polypoid disease may be at risk for substantial blood loss, considering the rich nasal mucosa vascular supply. In this patient, considering the history of exuberant nasal polyposis, severe asthma and number of interventions, postponing extubation may be a viable option in future nasal surgeries.

References:

1. Anaesthesia. 2012; 67:3

Learning points: Occult post-operative bleeding may impose the risk of airway compromise and pulmonary aspiration. In the PACU, continued monitoring for possible delayed manifestation of complications is essential. The identification of high-risk patients allows the decision to postpone extubation until the risk of airway compromise decreases.

6691

Persistent wrist and forearm pain after admission to the Intensive Care Unit for SARS-CoV-2 pneumonia. What could be the cause?

Francisco Iglesias C.¹, Veiras Del Río S.¹, Vazquez Tojo S.¹, Regueira Cuiña J.¹, Rodríguez Lago M.¹, Taboada Muñiz M.¹

¹Hospital Clínico Universitario de Santiago de Compostela - Santiago de Compostela (Spain)

Background: Many patients who have survived intensive care unit (ICU) admission for SARS-CoV-2 pneumonia report subsequent sequelae. Among them, one that has been described is the presence of muscle pain. Disuse atrophy, corticosteroids, and prone position are possible causes. However, other, more unexpected, and infrequent causes can lead to persistent muscle pain in patients discharged from an ICU.

Case report: a 59-year-old man was admitted to the ICU for respiratory failure due to severe SARS-CoV-2 pneumonia. Treatment was started with dexamethasone and ventilatory support with high-flow oxygen therapy. He also underwent periods of prone decubitus (6-8 hours each period) with sedation with dexmedetomidine. The patient was monitored with ECG, SpO₂, and invasive blood pressure, with arterial blood gas monitoring every 6 hours. The patient's evolution was very favourable. After 7 days he was discharged from ICU and transferred to the hospital ward. During his admission to the ward, he reported persistent pain in the right forearm and wrist, which did not subside with analgesia with NSAIDs, and worsened with movement. On the tenth day on the ward, it was decided to carry out a radiological control, showing the presence of a metallic guide in the territory of the right radial artery. The patient underwent surgery for urgent removal. The procedure was performed under local anaesthesia and sedation, with good results. The patient evolved favourably without any incidents.



Discussion: invasive blood pressure monitoring is an increasingly common procedure in the ICU. The radial artery is the most frequently used and cannulation is performed using the Seldinger technique. It is a simple procedure, but not without complications. The exact number of iatrogenic events that occur is not possible to determine, as some events are minimal and do not cause problems and others are not documented.

Learning points: work overload in Critical Care Units during the SARS-CoV-2 pandemic situation, as well as the use of personal protective equipment, could increase the incidence of iatrogenic events.

6718

Management of accidental high-dose epidural morphine administration in a deaf-mute patient

Guimarães D.¹, Windels A.², Maia J.², Chumela T.²

¹Hospital Espírito Santo EPE, Évora - Évora (Portugal), ²Hospital do Espírito Santo de Évora - Evora (Portugal)

Background: Epidural morphine is an effective method to control postoperative pain. Usual doses range from 2 to 10 mg. Larger doses may increase the risk of side effects.¹ Reports of drug administration errors are helpful to improve clinical practice and explore the relationship between single dose epidural opioids and respiratory depression risk.

Case Report: 72 year old woman, ASA II, proposed for radical nephrectomy. Medical history of hypertension, congenital deafness and mutism. The anesthetic plan was to perform an epidural block with 2mg of morphine for postoperative analgesia before the induction of a balanced general anesthesia. 2mL of the morphine solution were used. Surgery went without complications. While reviewing the anesthetic records, it was found that the formulation of the morphine ampoule was 10mg/mL instead of the intended 1mg/mL, which revealed the unintentional administration of 20mg of morphine in the epidural space. The patient was safely extubated and the team decided to keep her in the PACU for at least 12h, then transfer to a level II care unit for close monitoring. Naloxone was put in stand-by. Post-operative capnography was added to standard ASA monitoring. The patient was drowsy, but easily aroused. Vital signs were stable, the lowest respiratory rate was 11 breaths/min and no supplemental oxygen or naloxone were needed. No nausea, vomiting or pruritus were reported. Analgesia lasted for about 30 hours.

Discussion: Due to the possibility of late respiratory depression, it was considered to start a naloxone infusion after the patient's extubation. Communication difficulties would increase the risk of not detecting this complication. However, reversing opioids' analgesic effect after a surgery with high noxious stimulus would be a disadvantage and the risk of developing respiratory depression after a single epidural dose is still unclear. Other cases of epidural morphine overdose without the need of naloxone have been described.²

References:

1. Anesthesia and analgesia, 66:475-7; 2The Pain Clinic, 16(3), 359-362

Learning points: Epidural morphine is associated with the risk of late respiratory depression. Management include vigilance and naloxone infusion. Drug concentrations should be standardized to avoid medication errors. Alternative methods of communication such written communication, gestures or facial expressions and objective assessment of pain or discomfort are key to a successful outcome in deaf-mute patients.

6893

Management of predictable difficult airway in a Tricho-rhino-phalangeal syndrome (TRPS): The importance of always having a plan.

de la Varga Martinez O.¹, Aracil Escoda N.¹, Martínez Hurtado E. D.¹, Sanz Gonzalez R.¹, Lucena De Pablo E.¹, Abad-Gurumeta A.¹
¹Hospital Universitario Infanta Leonor - Madrid (Spain)

Background: We present a case of an expected difficult airway procedure during emergency surgery in a patient with Trichorhinophalangeal syndrome (TRPS) type I. It was managed by an awake-intubation procedure with fiberoptic bronchoscopy, encountering difficulties with insertion of the orotracheal tube. Difficulties were overcome by having in-depth knowledge of the indications of different materials and their ready availability.

Case Report: A 52-year-old woman with type I TRPS and a history of difficult airway presented with post-mastectomy bleeding requiring emergency surgery. Subsequently, a plan for awake fiberoptic intubation with a flexible tube warmed up in a saline solution was established. Fiberoptic bronchoscopic access to the airway was carried out without difficulty. However, it was impossible to pass flexible tubes of 7, 6.5 and 6 despite several attempts and counterclockwise rotation. The passage of a 6.5 conical TTE for use with the laryngeal intubation mask (LMA) was then achieved after minimal rotation and no further incidents were noted. Extubation procedure was uneventful.

Discussion: TRPS type I is an extremely rare autosomal dominant disorder caused by mutations in gene 1 of the GATA transcriptional repressor junction (TRPS1), located in the 8q24.1 region. Individuals possess characteristic skeletal and facial features and normal cognitive function. Its anaesthetic management with routine devices is described in the literature 1, 2. Our case was a predicted difficult airway managed with an awake tracheal intubation plan. Difficulties passing the tube were not resolved using routine solutions. They were resolved by using a tapered-tip ETT. This is a strategy well known to professionals experienced in airway management, although little literature documentation exists.

References:

1. Anaesthetic management of a patient with tricho-rhino-phalangealsíndrome. European Society of Anaesthesiology, Eur. J. Anaesthesiol. 22: 392–402.
2. Urgent Airway Management and Postoperative Complications in a Patient with Trichorhinophalangeal Syndrome Sarvie Esmailzadeh. Ryan S. et al. Case Reports in Anesthesiology Volume 2020, Art ID 8835533.
3. Difficult Airway Society guidelines for awake tracheal intubation (ATI) in adults. I. Ahmad, et al. Anaesthesia, 2020; 75: 442-6.

Learning points: Awake tracheal intubation in TRPS may present difficulties. It is essential to have a plan and access to adequate equipment.

6898

Simulation Training Results in Performance Retention of the Management of Operating Room Fires

Zbiede A.¹, Pozin-Eidelman I.¹, Friedman Z.², Ivry M.³, Yahav D.³, Berkenstadt H.³
¹Sheba Medical Center - Ramat Gan (Israel), ²Sinai Health System - Toronto (Canada), ³Sheba Medical Center - Ramat- Gan (Israel)

Background and Goal of Study: Given the severity of the consequences of operating room fire, it was recommended that every anesthesiologist should have knowledge of fire safety protocols, and periodically participate in operating room fire drills. Since skill retention is a major concern, the present study aimed to evaluate participants' performance one year after initial airway fire training.

Material and Methods: Following IRB approval anesthesia residents participated in an educational program targeting airway fire safety. The program included a one-hour problem-based learning session, simulation-based airway fire drill in pairs of a junior and senior resident, debriefing immediately after the scenario as well as group discussion one month later. One year after the initial training, the residents were reassessed using the same scenario. The scenario involved an unexpected airway fire that occurs during a tracheostomy in a ventilated patient with an FIO₂ of 0.6. Performance was assessed in real-time by a single observer.

Results and Discussion: Thirty-eight anesthesiology residents (19 junior and 19 senior residents) participated as pairs in the initial training. From these residents thirty-six participated in the second evaluation a year later. As demonstrated in the table (data are presented in the table as n/N (%) for yes / no parameters or median [p25-p75] for time to for task performance), performance during simulation-based training after one year was better than performance during initial training. The improvement was demonstrated in a higher incidence of performance of crucial action items as well as the time to perform these actions. These results are similar to previous studies that demonstrated retention of knowledge and skills up to one year after simulation-based training for cricothyroidotomy skills, post-partum hemorrhage, and difficult airway management. **Conclusion:** the study demonstrated that a short training scheme can be maintained on a yearly basis after a high-fidelity simulation practice and feedback. Future research should focus on the optimal repetition interval between simulation trainings.

		Initial training	One-year after initial training	p-value
Surgeon declares that he/she is ready for dissecting through the trachea				
Reduce oxygen	yes/no	13/19 (68.4%)	15/18 (83.3%)	0.447
Airway fire				
	yes/no	18/19 (94.7%)	18/18 (100%)	1
Remove tracheal tube	Time	23.5 [18.5-52.5]	7 [4-12.8]	<0.001
	yes/no	13/19 (68.4%)	18/18 (100%)	0.02
Stop airway gases	Time	8 [2-16]	1.5 [1-3.8]	0.014
	yes/no	10/19 (52.6%)	18/18 (100%)	0.001
Remove sponge	Time	19.5 [14.8-53]	8.5 [5-16.5]	0.057
	yes/no	14/19 (73.7%)	18/18 (100%)	0.046
Pour saline	Time	30.5 [10.5-51.2]	4.5 [3-8.5]	<0.001
Fire out				
Reestablish ventilation	yes/no	10/19 (52.6%)	13/18 (72.2%)	0.313
	Time	54 [36.2-69.8]	18 [11-29]	0.001
Consider bronchoscopy	yes/no	14/19 (73.7%)	18/18 (100%)	0.046

n/N (%), Median [p25-p75]

6917

Obstruction of an endotracheal tube placed in an emergency situation and Murphy's law: a case report.

Regueira Cuiña J.¹, Eiras Mariño M. D. M.¹, Francisco Iglesias C.¹, Vázquez Tojo S.¹, Rodríguez Lago M. M.¹, Selas Cobos S.¹

¹Complejo Hospitalario Universitario de Santiago de Compostela - Santiago de Compostela (Spain)

Background: Upper gastrointestinal bleeding is an urgent condition occasionally requiring endotracheal intubation (EI) to correctly isolate the airway. Patients with this condition commonly develop ventilation disorders during their stay in the intensive care unit (ICU).

Case Report: We present the case of a 68-year-old male, with a known history of liver cirrhosis and esophageal varices, who was admitted to our ICU after experiencing an episode of hematemesis with associated hemodynamic and respiratory instability. He required emergency EI and the placement of a Sengstaken-Blakemore tube in the Emergency Room. In the days following his admission to the ICU, he presented with significant respiratory deterioration, resulting in a need to increase the fraction of inspired oxygen up to 70% (PAFI 114mmHg). Peak pressure values were high and an X-ray revealed signs of lung atelectasis. A fibrobronchoscopy was performed due to the suspected presence of clots and secretions obstructing the lumen of the endotracheal tube (ETT). This examination revealed a plastic piece occluding the lumen of the ETT. Because an initial attempt to remove it with forceps was unsuccessful, extubation and subsequent reintubation was carried out. Further examination of the retrieved ETT revealed an imperforated Murphy's eye, with the plastic piece bent toward the tube's lumen.



Discussion: Endotracheal tube obstruction in a patient under mechanical ventilation is frequently caused by the presence of secretions, mucus plugs, or clots. As per our standard clinical practice, prior to intubating a patient, we roughly examine the tube and check that the endotracheal tube cuff is not punctured. However, adequate perforation of the Murphy's eye, which was the cause of the ventilatory difficulties in this patient, is not routinely checked.

Learning points: Ensuring patient safety both during the surgical process and in ICUs is one of the key roles of anesthesiologists. In addition to properly verifying the integrity of the endotracheal tube cuff prior to intubation, we should confirm that the Murphy's eye is perforated and that the plastic piece is not obstructing the lumen of the ETT.

7032

Improving safety with capnography in moderate-deep sedation for gastrointestinal endoscopic procedures.

Valbuena I.¹, Sancho A.¹, Alsina E.¹, Brogly N.¹, Gilsanz F.¹

¹Hospital Universitario La Paz - Madrid (Spain)

Background and Goal of Study: The aim of this study was to determine if the use of capnography reduced the incidence of respiratory and cardiovascular adverse events during gastrointestinal endoscopy procedures (GEP) provided by anesthesiologists.

Materials and Methods: A prospective cohort study was performed including patients presenting for GEP under moderate-deep sedation provided by experienced anesthesiologists. Patients were divided in two groups: one with pulse-oximetry monitorization and other using capnography with Capnostream™ monitor plus pulse-oximetry. Interventions carried out to resolve desaturation, obstruction or apnea were recorded. Age, comorbidity, ASA Classification, sedative drugs, respiratory and cardiovascular adverse events, recovery Aldrete Escala value and satisfaction were recorded. Parametric and non-parametric test were used.

Results and Discussion: 1146 patients were included, 538 with only pulse-oximetry monitorization and 608 with pulse-oximetry plus capnography. Diagnostic colonoscopy was the most frequent (49,7%), followed by diagnostic gastroscopy (22,5%) and therapeutic colonoscopy (22,2%). Apnoea was detected only in patients where capnography was used (33,4% vs 0%, p 0,000). The use of capnography significantly decreased the incidence of moderate desaturation, 3% vs. 6,5%, p 0,005, and severe desaturation, 2,6% vs. 4,6%, p 0,079. Moreover, capnography significantly decreased cardiovascular events: tachycardia (0,5% vs. 1,9%, p 0,026) and bradycardia (2% vs. 4,1%, p 0,037). Respiratory adverse events like desaturation and airway obstruction increased with highest age and ASA classification. Prolonged apnoea and intubation were extremely rare (0,2% and 0,08% respectively). Capnography was associated with a significant increase in mandibular traction manoeuvres (9,9% vs. 3%, p 0,000), reducing the need for other interventions. No differences were founded in Aldrete scale for recovery. Satisfaction at discharge was highest when capnography was used (p 0,000).

Conclusion: Moderate-deep sedation for gastrointestinal endoscopy procedures performed by experienced anaesthesiologists plus capnography, increases safety, with extremely infrequent complications. Capnography monitoring allowed to identify apnea and/or airway obstruction and solve it, avoiding desaturation and cardiovascular adverse events.

7040

Local Anesthetic Systemic Toxicity (LAST): A retrospective two-year analysis in our institution.

Aponte-Gatica J. F.¹, Cicconi E.¹, Sommer Alias D'abate M. J.¹, Waldhorn M.¹, Salgado S. S.¹, Stinga J. L.¹

¹Hospital Italiano de Buenos Aires - Ciudad Autónoma de Buenos Aires (Argentina)

Background and Goal of Study: Local Anesthetic Systemic Toxicity (LAST) can occur in any situation where local anesthetic is used. The incidence of severe systemic toxicity varies, from 1:500 to 1:10000. As a safety and quality indicator, we aim to describe the incidence of LAST in our institution's surgical areas.

Materials and Methods: Retrospective analysis of 2018-2019. We included all regional anesthetic techniques found in the anesthesia clinical records. We obtained the ID from patients who received lipid infusion as treatment from the pharmacy records. Then, review of those clinical records confirmed the LAST event associated with regional anesthesia. We calculated the general incidence of LAST in 2018 and 2019, and according to regional anesthetic technique.

Results and Discussion: A total of 11140 regional anesthetics were performed; 5110 spinal, 1942 epidural, 4044 peripheral nerve blocks. Ten patients required lipid infusion; 5 cases of LAST were associated with regional anesthesia. General incidence was 0.44 /1000. Incidence

per regional anesthesia was: 0.5 /1000 per epidural anesthesia; 1/1000 per peripheral nerve block; no cases associated with spinal anesthesia were reported. We conclude that our incidence of LAST is in accordance with previous reports. (Table 1) We observe a decrease in the incidence of LAST between 2018 and 2019. However, we also reported 3 cases associated with local infiltration of the surgical team, awakening concern for local anesthetic use by non anesthesiologists.

Conclusion: LAST incidence is a good quality and safety indicator in tertiary medical centers. We conclude that our incidence of LAST is in accordance with previous reports, and that we must raise awareness of the risk of using this drug, especially in non-anesthesiologists.

7048

Should we avoid giving tranexamic acid for postcovid patients? Stroke in a postcovid patient undergoing major surgery

Yildirim Guclu C.¹, Meco B. C.¹, Gulsen B.¹, Uysal D.¹

¹Ankara University Faculty of Medicine Department of Anesthesiology and ICU - ANKARA (Turkey)

Background: It is obvious that the COVID 19 outbreak can cause severe neurological problems(1). This case is about a patient having stroke during radical cystectomy who had Covid-19 infection 3 months ago.

Case Report: A 77-year-old male patient scheduled for cystectomy and ileal loop due to bladder malignancy was admitted to hospital. During his preoperative evaluation; he had diabetes mellitus, his laboratory results and physical examination were normal. It was learned that he had a history of hospitalization after COVID-19 positivity 3 months ago. During the hospitalization period, it was learned that the patient received favipiravir, anticoagulant and oxygen inhalation therapy. After the 8-hour uneventful operation and extubation, it was noticed that the patient with sufficient respiratory effort and muscle strength was agitated and did not move his left arm and leg. After the neurological examination, with the preliminary diagnosis of stroke, the patient was transferred to intensive care unit. As a result of diffusion magnetic resonance imaging taken at the 1st postoperative hour: Ischemic areas showing cortical and subcortical diffusion restriction were observed. Anticoagulant therapy was initiated in consultation with neurology. On the 9th day, CT scan of the patient was reported as shift and ventricular compression findings. Emergency decompression surgery was performed. The patient who did not respond to the treatments died due to septic shock on the 19th day.

Discussion: Following days we will have more patients who had Covid disease and still there are many unknown issues about the disease. Tranexamic acid was given to this patient in order to lessen the bleeding which is a routine for our cystectomy patients. It may be the trigger for thrombosis because this patient had Covid disease. But should we think twice about the bleeding if the patient had Covid disease? Or is it time dependent, what will be the ideal time to plan surgery after Covid disease?

References:

1. Taylor, Laura D.,Ameen, Ozayr Saleh,Zaharie, Stefan-Dan Complete Clinicopathological Case Report of a Young Patient Dying of COVID-19–Related Stroke, The American Journal of Forensic Medicine and Pathology: June2021-Volume42-Issue2- p 160-163

Learning points: Experiencing Covid disease would be new co-morbidity for surgical patients. Besides respiratory effects, changes in coagulation system after Covid disease should be kept in mind.

7072

Responding to power failure in the operating room with an anaesthetised patient undergoing major abdominal surgery: a case report

Westwood J.¹, Townsend R.¹, Caesar H.¹

¹Princess of Wales Hospital - Bridgend (United Kingdom)

Background: Environmental emergencies such as power failure are rare events that significantly compromise the safety of an anaesthetised patient and pose unfamiliar challenges for the anaesthetist. We present a case detailing response to failure of electrical supply during a major operation and subsequent patient outcomes.

Case Report: A 74 year old, ASA II, sigmoid colon cancer patient, scheduled for a curative laparoscopic anterior resection under general anaesthetic (GA) with additional spinal analgesia. The induction was uneventful with successful intubation. Prior to first incision a brief loss in electrical power of unknown cause resulted in failure of surgical lights, patient monitoring, diathermy and laparoscopic stack systems. The anaesthetic machine switched to back-up battery. Initial management included temporary suspension of surgery, obtaining adequate light sources and patient monitoring. The laparoscopic approach was abandoned due to further risk of power failures impacting overall patient safety. Due to the urgency of the procedure, the operation was converted to a laparotomy. Six further intermittent power outages occurred, and as such, emergency equipment and IV anaesthesia in readiness for transfer and maintenance of anaesthesia were prepared in case of the event of total power failure. Factoring in patient stability and reliability of power supply, the senior theatre MDT discussed contingency plans including abandonment of surgery. No further power failures occurred and the decision was made to continue with the operation. There were no further complications and the patient was managed post-operatively in ITU.

Discussion: Established protocols and effective team communication are crucial for the management of electrical power outage. Following the event, a lack of emergency guidance was recognised leading to implementation of structured power failure protocols. Knowledge of power supply to operating departments, surgical and anaesthetic equipment and length of battery backups (if applicable) is essential to guide complex decision making in the event of a crisis. Uninterruptable power supply to the operating room would have been invaluable in this instance.

Learning points: Operating room power failure is a rare event, infrequently reported in medical literature, with potentially disastrous consequences for patients. Prevention and preparation for power failure is essential to aid decision-making and situation management in crisis.

7187

Use of Perioperative Patient Audio Feedback to Improve Staff Morale

Hill M.¹, Falkingham E.², Ibeanusi I.², Chandler H.², Mitchell B.², Eldho B.²

¹Plymouth General Hospital - PLymouth (United Kingdom), ²University of Plymouth Medical School - Plymouth (United Kingdom)

Background and Goal of Study: Job satisfaction, connection to purpose and meaning in work are closely linked with patient outcomes and experience. Positive feedback is essential as a means to understand the great work that teams perform, and to counter to staff burnout. Our local method has been written feedback collected by the Friends and Family Test (FFT) and delivered to staff as written text. It has been hypothesised that (audio) storytelling is a form of feedback which provides an emotional narrative of a patients' healthcare experience and relates to theatre staff's connection to purpose which encourages safer and higher quality care.

Materials and Methods: Patients were randomly selected from those who had stated in the FFT that they would be happy to be contacted. An initial patient volunteered to participate and test the process. After an initial conversation with the patient she consented to take part in the interview, editing and playing back to staff. An interview spine was designed and used to gather a patients' perioperative experience. The interview was conducted over Zoom and the audio recorded. Audacity® was then used to edit a 40-minute patient story into a 7-minute clip to be shared with staff. Feedback on the effectiveness of audio storytelling was

obtained using a questionnaire sent to staff.

Results and Discussion: Data from 17 members of Plastic Surgery theatre staff (scrub nurses, ODPs, Anesthetists, Surgeons) showed 88% (15) preferred audio storytelling to written FFT. 76% (13) would like more audio feedback. 10 positive themes and 2 negative themes were identified from the feedback. The positive themes included improved understanding of patient feelings, meaning, and journey (8); intimacy (6); empathy with patient (4); range of patient emotional expression (3); staff engagement (3); detail (2); feedback volume (2); patient recollection (1); patient engagement (1); and patient perception of staff feedback engagement (1). Negative themes included the length of the feedback (2), and its relevance (1).

Conclusion: We have demonstrated the feasibility of collecting audio feedback about a patient's perioperative experience. This is preferred by staff and has a greater impact on them than standard written feedback. Further exploration of the impact that this has on team safety climate and culture would support the benefit of the audio feedback

7395

Improving patient safety standards for central venous catheter insertion in theatres at Royal Albert Edward Infirmary, Greater Manchester, UK

Derry J.¹, Wilburn C.¹, Hulgur M.¹

¹Wrightington, Wigan and Leigh Teaching Hospitals NHS Foundation Trust - Greater Manchester (United Kingdom)

Background: In late 2019, a guidewire was left in-situ post central venous catheter (CVC) insertion, a National Health Service (NHS) defined never event. Upon review, the trust introduced a safety checklist to demonstrate adherence to local safety standards for invasive procedures [1] (LocSSIP) for CVCs inserted in theatres. The aim was to achieve 90% checklist compliance within 6 months.

Materials and Methods: An initial audit of checklist completion was captured from paper and electronic notes of patients with a CVC in-situ on intensive care from theatre. After review of drivers for change, 3 interventions were implemented. Training sessions were conducted, a poster was created by trainees and the local WHO (World Health Organisation) surgical safety checklist modified to include invasive lines inserted intraoperatively. Adherence was re-audited with patient capture from the WHO checklist, and a random sample had paper notes reviewed.

Results and Discussion: From November 2020–February 2021, 1/16 (6.3%) patients had evidence of LocSSIP compliance and 0/16 had evidence of checklist completion. Contributing factors included checklist availability, the clinical environment of central line insertion, and lack of engagement. The WHO checklist is mandatory for all operations in NHS England, and local modification, our key intervention, benefits from existing engagement and familiarity. From June–August 2021, 34 patients had invasive lines inserted, 13 were CVCs. 3/13 (23.0%) had digital confirmation of LocSSIP compliance. A sample of 5 patients' paper notes were retrieved and 5/5 (100%) had a complete safety checklist.

Conclusions: These interventions demonstrate improvement, but full measurable impact is restricted by sample size and record accessibility and our aim was not entirely achieved. The WHO checklist modification reduces risk of never event recurrence and improves patient safety for CVCs and other invasive lines, with the added benefit of improving audit standards through efficient patient capture. The methodological drawback of possible selection bias, where data is only captured from completed WHO checklists, requires research to prove accurate capture of CVC procedures. We are in the process of integrating safety documentation for all invasive lines within the hospital into a digital line management system.

References:

1. National Institute for Clinical Excellence. National Safety Standards for Invasive Procedures. London: NHS England; 2018.

7532

Intraoperative anaphylaxis to gelatin - a difficult but life-saving diagnosis

Ladeira A.¹, Leal B.², Albuquerque D.¹, Monteiro T.¹

¹Centro Hospitalar Universitário Lisboa Norte, EPE - Lisboa (Portugal),

²Instituto Portugues de Oncologia Lisboa Francisco Gentil, EPE - Lisboa (Portugal)

Background: Perioperative anaphylaxis is a rare, life-threatening multisystemic syndrome that requires immediate diagnosis¹. The large number of drugs administered in the perioperative setting and the possible absence of specific signs make the diagnosis often unrecognized. Gelatins are a known cause of anaphylaxis despite its overall rarity, with an estimated incidence of 6,2 per 100.000 administrations².

Case report: A 70-year-old male presented for substitution of bilateral femoral arterial prostheses in the emergency operating room. No allergies were reported. We performed a general anesthesia with orotracheal intubation, monitoring invasive arterial pressure. During surgery, a continuous hypotensive profile required noradrenaline infusion. Due to a lack of responsiveness to crystalloids based on a goal-directed fluid therapy, we started a Gelofusine® infusion. An episode of sudden hypotension (MAP 30 mmHg) happened after four minutes. There were no changes to the ventilatory pattern and no cutaneous signs. A presumptive diagnosis of anaphylaxis to Gelofusine® was established. The infusion was immediately stopped and we administered 0,5 mg of intramuscular adrenaline. The hypotension rapidly reverted. The patient was forwarded to the outpatient allergy clinic after two months, where an intradermal skin test was positive to gelatins, confirming the diagnosis.

Discussion: Perioperative anaphylaxis tends to be severe and has a higher mortality rate compared to other settings³. Cardiovascular collapse is the first manifestation in up to half of cases³. This case highlights the importance of considering this diagnosis towards an unexplained hypotension, even in a patient requiring inotropic infusion and in the absence of other classical signs.

References:

1. Dewatcjer, P et al (2019). Perioperative anaphylaxis: pathophysiology, clinical presentation and management. *British Journal of Anaesthesia*.

2. Harper, N. et al (2018). Anaesthesia, surgery, and life-threatening allergic reactions: epidemiology and clinical features of perioperative anaphylaxis in the 6th National Audit Project (NAP6). *British Journal of Anaesthesia*.

3. Perioperative anaphylaxis. Uptodate 2021.

Learning points: Perioperative anaphylaxis is an often fatal syndrome that requires a high degree of suspicion during an isolated hypotension, to allow effective treatment. A detailed description of the event and referral to an allergy specialist lead to a potential life-saving investigation.

7567

Building a culture of patient safety: changes in opinions about appropriateness of the items of the WHO Safe Surgery Checklist among Belgian OR professionals between 2016 and 2021

Vallé A.¹, Huyghe L.¹, Van Biesen S.², Swinnen W.²

¹University Hospital Ghent - Ghent (Belgium), ²AZ Sint-Blasius - Dendermonde (Belgium)

Introduction: The WHO Surgical Safety Checklist (SSC) has widely been adopted in ORs to improve patient safety in the complex OR environment. Our 2016 study showed that not all items of the original WHO checklist were deemed useful by Belgian OR professionals. Since 2016, OR teams have been trained, motivated and obliged by professional organizations, regulatory authorities and hospital accreditation organizations to use the SSC on a daily base. In this follow-up study we aim to investigate whether the opinions towards the SSC changed over the past five years. **Methods:** An online survey was open to Belgian hospitals between Feb 15 and Mar 31, 2021, exploring opinions about appropriateness of the items of the original WHO SSC. Subgroup analysis: professional group, OR experience and hospital size. Opinions were compared to the 2016 Survey. Statistical analysis: Chi-square and Fisher's exact tests. Statistical significance: p<0.05. The study approval by the Committee for Medical Ethics of az Sint-Blasius, Dendermonde, Belgium (n° B0122021000001). **Results:** In 2021, participation increased from 1419 to 2166 OR professionals (p<0.0001), with less anaesthesiologists and more nurses (p=0.001), more participants with >5y and less with >10y exp (p<0.0001), and more participants from hospitals with >1000 beds and less from hospitals with <200 and < 500 beds (p<0.0001). Ten of the 22 items are more supported in 2021 (Fig 1). Time Out improved more than Sign In or Sign Out. 6 items were deemed appropriate by > 90% of the participants. Although considered significantly more appropriate, team member introduction remains the least supported item. Subgroup analysis showed differences between 2016 and 2021. Improvement was more important in hospitals with <1000 & >1000 beds, and in OR staff with >1y and > 5y exp. Although not statistically significant, 5 items are less supported in 2021. This was confirmed in subgroup analysis. **Conclusion:** Opinions of Belgian OR professionals about appropriateness of the items of the WHO SSC improved between 2016 and 2021. Nevertheless, not all items are supported to the same extent, explaining why the SSC often locally has been adapted.

Fig 1	SSC item	% appropriate 2016 (n=1419)	% appropriate 2021 (n=2166)	Professional groups						OR experience				Hospital size		
				ANA	RN	SA	SA/SA	SA/SA	SA/SA	<1y	>1y	>5y	>10y	<200 beds	<500 beds	>1000 beds
SIGN IN	Anticipated blood loss	63.8	66.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	Anticipated blood loss >500ml	61.7	57.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	Anticipated blood loss >1000ml	59.1	58.4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	Verify anaesthesia machine	78.4	79.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	Verify anaesthesia medication	72.4	74.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	Apply pulse oximeter	74.5	72.5	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	Prepare for difficult intubation	83.9	85.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	Time out	91.1	91.1	p<0.001	p<0.001	p<0.036	p<0.018	NS	p<0.001	NS	p<0.002	p<0.028	NS	p<0.016	p<0.013	NS
	Verify C/urocaustic list	94.9	96.3	p<0.001	p<0.001	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	Antibiotics 40 min before incision	79.3	88.4	p<0.001	p<0.001	p<0.001	p<0.001	NS	p<0.001	NS	p<0.001	p<0.001	NS	p<0.001	p<0.001	p<0.001
Anticipated operating time	53	58.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
Anticipated blood loss	72.3	76.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
Anticipated problems for surgeon and anaesthesiologist	82	88.2	p<0.001	p<0.002	p<0.004	p<0.004	NS	p<0.002	p<0.002	p<0.001	NS	NS	p<0.001	NS	NS	
Stability confirmed	79.6	77.3	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
Equipment issues	84.3	82.6	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
Medical imaging is displayed	70.6	82.6	p<0.001	p<0.001	p<0.001	p<0.001	NS	NS	p<0.004	p<0.04	p<0.02	NS	NS	NS	NS	
SIGN OUT	Name of the procedure	74.3	72	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
	Impaired haemodynamic curve	95.6	96.4	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
	SpO2 monitoring	91	94.1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
	Postoperative equipment	80.9	79.7	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	
Postoperative care concerns	77.1	75.2	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS		

7589

Dr. Google, Anaesthesiologist?

Ferreira L.¹, Rodrigues A.¹, Pedreira J.¹, Aires J.¹, Fidalgo A.¹, Bernardino A.¹

¹Centro Hospitalar e Universitário de Coimbra - Coimbra (Portugal)

Background and Goal of Study: Internet as a source of information is a reality with a significant health impact.¹ Internet usage in surgical patients was analysed with respect to their own surgical intervention, knowledge of the responsibility of the anaesthesiologist and importance of an anaesthesiology website.

Materials and Methods: Prospective, descriptive and analytical study, October-December 2020. Adult patients for elective surgery answered a survey containing sociodemographic data, clinical data, internet usage regarding the clinical situation and importance attributed to the existence of an anaesthesiology website. Statistical analysis: SPSS 24.0®. Statistical significance p<0.05

Results and Discussion: 77 participants, 51.9% women, mean age of 48.6, mostly married, with elementary education, employed, rural residents, with chronic illness and on medication. 73.5% use the Internet, 55.7% use health-related sites and 58.2% searched for their clinical situation including surgery. Most didn't assess the quality of the sites but consider the quality of the information to be useful and trustworthy. 66.7% have greater confidence in the doctor's information. 83.8% did not search for any anaesthesiology site, while 63.2% considers an anaesthesiology site to be important to ask questions and communicate with the anaesthesiologists. 75.3% were evaluated by the anaesthesiologists and found the information provided to be clarifying. 11.7% did not know who is responsible for the anaesthesia. Regarding intraoperative monitoring of vital signs: 23.4% responds nurse, 24.7% surgeon, 1.7% health technician. Women, young patients and the most educated were the ones who researched their health issue and the anaesthesia, with statistically significant differences. No significant associations were found in other variables.

Conclusion: Use of the Internet as an information tool is more directed towards the surgical procedure than to the anaesthesia. A large percentage does not consider the quality of sites, needing a triage of the information. Women, young patients and the most educated are the ones using it the most. The possibility of an anaesthesiology site was considered important, suggesting a greater need to contact the anaesthesiologist. A considerable percentage of patients are not aware of the role of the anaesthesiologist, revealing insufficient literacy.

References:

1. Patient Education and Counseling. 2006; 63: 24-28

7673

How to avoid Malignant Hyperthermia: a case report

Gonçalves A. R.¹, Cardoso T. M.², Duarte S. M.¹

¹CHUP - Centro Hospitalar Universitário do Porto - Porto (Portugal),

²CHUP - Centro Hospitalar e Universitário do Porto - Porto (Portugal)

Background: A detailed preanesthetic investigation that contemplates the analysis of the previous and current history of patients has become more important in the anesthesiology practice. We present the case of a patient whose pathological background investigation, as well as the preoperative visit, showed that he had been diagnosed with a RYR1 gene mutation in a neuromuscular outpatient clinic.

Case Report: Male, 55 years old, ASA II, with a past medical history of metabolic syndrome and autosomic recessive congenital myopathy (RYR1 gene mutation) with manifestations of childhood hypotony and progressive muscular weakness, mostly proximal, mainly affecting the lower extremities. He presented difficulty in walking and climbing stairs. Magnetic resonance showed involvement of the anterior and posterior muscular compartments. He presented a grade 4 global force (on a 5 grade scale) on both extremities. He was admitted in the ER with a trauma on the right ankle. The x-ray confirmed a trimalleolar fracture which required surgery. After a previous conversation with the patient, the strategy adopted consisted in a spinal block with levobupivacaine 0.5% (9mg) and sufentanyl 0.005 mg/ml (2.5 µg). There were no anesthetic or surgical complications. The recovery period was uneventful with a full recovery of his previous sensitive and motor functions. The follow-up

consult showed an articular mobility limitation on the right foot due to the surgery.

Discussion: Currently, there are described more than 300 ryanodine receptor mutations. Although it isn't fully clarified which of these can trigger Malignant Hyperthermia, 70% of the cases were related to the RYR1, CACNA1S or STAC3 gene mutations. Certain drugs, such as volatile anesthetics and depolarizing muscular relaxants must be avoided for potentially triggering this clinical syndrome. Both general and regional anesthesia are eligible options for the approach on patients with a known mutation of the ryanodine receptor. An exhaustive documentation of the pre and post-operative neurologic state must be assured in order to acknowledge a possible aggravation by the usage of regional anesthesia considering his previous neurological lesion. The final decision of the anesthetic strategy must involve the patient through an effective communication so as to clarify the benefits and risks of the various techniques.

Learning points: The importance of a preanesthetic evaluation and an effective communication with the patient.

Geriatric Anaesthesiology

6475

Impact of operative delay on postoperative outcome in hip fracture patients treated with direct oral anticoagulants

Marchandise C.¹, Pirson A.², Van Der Linden P.³

¹Cliniques universitaires Saint-Luc - Brussels (Belgium), ²Grand hôpital de Charleroi - Charleroi (Belgium), ³CHU Brugmann - Brussels (Belgium)

Background and Goal of Study: Management of hip fracture patients taking direct oral anticoagulants (DOAC) represents a major challenge. Guidelines recommend, on the one hand, to proceed surgery as soon as possible to improve patient's outcome¹, and on the other hand, to postpone surgery for 48 to 96 hours whenever possible to reduce haemorrhagic complications². The aim of this retrospective study was to assess the impact of operative delay on postoperative outcome in this high-risk patient's population.

Materials and Methods: We reviewed the medical chart of all patients treated with DOAC who underwent hip fracture surgery in our hospital between January 2018 and December 2019 (N=78). Our primary objective was incidence of adverse outcome which included 30-day mortality and/or severe postoperative complications (haemorrhagic, thrombotic, cardiac, pulmonary or renal). Perioperative data of patients developing adverse outcome (C+ group) were compared to those having had an uneventful surgery (C- group) using a Mann Whitney U-test or a Chi square test. A logistic regression, including the operative delay and the surgical procedure (dynamic hip screw (S) or prosthesis (P)) was performed to assess the impact of these variables on patient's postoperative outcome. Data are presented as median (interquartile ranges) or percentages. A $p < 0.05$ was considered statistically significant.

Results and Discussion: Adverse outcome was observed in 38 patients (48.7%). There was no difference between the 2 groups of patients in any of the collected variable, except for age. (Table)

	C+ group (N=38)	C- group (N=40)	P value
Age (years)	88 [84-90]	84 [78-88]	0.001
BMI (kg/m ²)	23 [22-28]	24 [22-29]	0.810
ASA 2/3	9/29	16/23	0.104
Operative delay (h)	44 [27-63]	45 [27-48]	0.478
Surgery S/P*	30/10	24/14	0.257
Surgery time (min)	46 [38-81]	60 [42-74]	0.335
Transfusion (%)	61	55	0.621
Hospital LOS (days)	20 [10-30]	15 [6-25]	0.187

S : dynamic screw ; P : prosthesis ; LOS: length of stay

Logistic regression reveals that operative delay and surgery procedure were not significantly associated with our primary objective ($p=0.783$ and 0.797 respectively). There was also no interaction effect between both variables ($p=0.635$).

Conclusion: In the conditions of our study, surgical delay does not impact significantly postoperative outcome of our elderly population, even when taking into account the complexity of surgery. Interestingly, median time to surgery was below 48 hours in our study population.

References:

1. Simunovic N et al. CMAJ 2010; 2. Leitch J, van Vlymen J. Can J Anaesth 2017.

6551

Ideal body weight based Remimazolam infusion is sufficient in senile mildly-obese patients.

SAKAMOTO H.¹

¹Shin-Sapporo Orthopaedic Hospital - Sapporo (Japan)

Background and Goal of Study: A long-awaited ultra-short acting benzodiazepine, Remimazolam (RZ), is available in Japan since last August. Its recommended maintenance dose is 0.6 mg/kg/h in senile patients based on total body weight (TBW). In most anesthetics, dosing for obese patients should not be based on their TBW. The effect of RZ in senile obese patients based on ideal body weight (IBW) was compared with that based on TBW. The goal of this study is to investigate the influence of the size descriptors on RZ effect in senile obese patients.

Materials and Methods: After obtaining IRB and patients' informed consent, 20 patients undergoing scheduled orthopedic surgery with body mass index (BMI) > 25 and older than 75 years old were enrolled in this study. Patients were randomly divided into 2 groups. In group oTBW, RZ maintenance dose, 0.6 mg/kg/h, is calculated based on TBW. In group oIBW, it is calculated based on IBW. $IBW = 45.4 + 0.98(\text{height}(\text{cm}) - 152.4)$ and if male add 4.5. General anesthesia was maintained with RZ and remifentanyl 0.1 $\mu\text{g}/\text{IBW}/\text{min}$ and nerve blocks were performed. We employed a Root[®] monitor and a SedLine[®] sensor (Masimo, Irvine, CA, USA). Patient state index (PSI) was recorded every 2 seconds during RZ infusion. Patients' demographic data were compared using unpaired t-test and PSI was compared using Mann - Whitney's U-test. A p -value < 0.05 was considered statistically significant.

Results and Discussion: Results are shown in tables and a box-and-whisker plot. Heights, BMI and PSI showed significant difference. PSI was significantly different but the first quartiles of PSI was 24 and the third quartiles was 30 in group oIBW and 24 and 37 in group oTBW. That means anesthesia was neither insufficient nor too deep in both groups. BMI of group oIBW ranges from 25.1 to 29.2 and that of group oTBW ranges from 26.9 to 37.6. The number of severely obese patients (WHO definition class II and III obesity, BMI 35) enrolled in this study is very small. Further study on such patients is needed.

Conclusion: Anesthesia with Remimazolam maintenance dose based on ideal body weight (0.6 mg/IBW/h) is sufficient in senile mildly-obese patients.

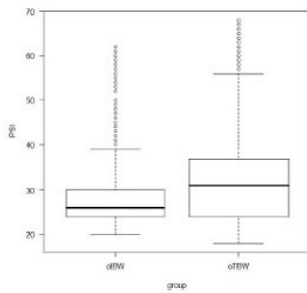
Table 1. Results (mean \pm S.D. [range])

group	Demographic data				
	M/F	age (y.o.)	height (cm)	TBW (kg)	BMI (kg/m ²)
oIBW	7 / 4	79.5 \pm 3.8 [76.3 - 86.7]	163.5 \pm 10.0 [146 - 180]	70.6 \pm 7.7 [58.2 - 81.3]	26.4 \pm 1.4 [25.1 - 29.2] 11 / 0 / 0 / 0
oTBW	1 / 8	83.1 \pm 4.6 [75.5 - 89.1]	149.1 \pm 5.7 [138 - 154]	65.4 \pm 10.2 [53.2 - 88]	29.3 \pm 3.2 [26.9 - 37.6] 8 / 0 / 1 / 0
p		0.068	0.001	0.215	0.015

Pre-obese/II/III: WHO definition pre-obese and class I, II and III obesity

Table 2. Results (mean \pm S.D. [range])

group	Demographic data			PSI during Remimazolam Infusion (25% - 75%)
	Duration of Anesthesia (minute)	Duration of Surgery (minute)	Duration of Remimazolam Infusion (minute)	
oIBW	115 \pm 50 [48 - 236]	69 \pm 46 [12 - 179]	80.7 \pm 49.8 [27 - 196]	27.6 \pm 5.3 [20 - 62] (24 - 30)
oTBW	176 \pm 88 [34 - 362]	128 \pm 81 [11 - 312]	147.6 \pm 81.8 [16 - 323]	32.4 \pm 10.8 [18 - 68] (24 - 37)
p	0.067	0.058	0.037	0.000



6635

Development of an international postoperative delirium risk assessment model

Schmutz Gelsomino N.¹, Sadeghirad B.², Mbuagbaw L.², Pleijhuis R.³, Falco L.⁴, Dodsworth B.⁴

¹PIPRA AG - Zuerich (Switzerland), ²McMaster University - Hamilton (Canada), ³University Medical Center Groningen - Groningen (Netherlands), ⁴PIPRA AG - Zürich (Switzerland)

Background and Goal of Study: Postoperative delirium (POD) is recognized as the most frequent postoperative complication in the elderly, occurring in 10 to 50% of older patients after major surgical procedures. It is associated with postoperative cognitive decline and long-term dementia, poor functional recovery, prolonged hospitalization, increased nursing home admission, and increased mortality. Early identification of patients at risk for delirium is paramount, because adequate well-timed interventions could reduce the occurrence of POD and the related detrimental outcome. We have developed a preoperative stratification tool aiming at predicting the risk of a patient developing POD based on individual patient data, such as medical history, lab values and information about the planned surgery.

Materials and Methods: The test is based on patient data from eight independent clinical studies conducted in eight different hospitals using systematic assessment of POD. The dataset contained data from 2250 patients (1806 no POD, 444 with POD). The tool is based on statistical methods that aim at avoiding an overly optimistic estimation of the model performance. It is based only on data that is easily available in clinical practice and clinicians have been consulted to assure the usability of the test. The test contained nine variables; age, BMI, ASA status, history of delirium, cognitive decline, medications, C-reactive protein, surgical risk and whether the operation is a laparotomy or a thoracotomy. The surgical risk estimation is based on a surgical risk assessment for cardiac events in non-cardiac surgery from the European Society of Cardiology and European Society of Anaesthesiology joint guidelines.

Results and Discussion: The results on the training data was an AUC of 0.8255 with a 95% CI: 0.7969-0.854, with a cross-validation score AUC of 0.81. The test was then externally validated on data from a ninth hospital on 293 patients (232 no POD, 61 POD). The validation data were missing two of the nine variables that were imputed. With imputation the performance on the external validation was an AUC of 0.75.

Conclusion: We have shown that it is possible to use data from several different studies in different hospitals to create a robust test for predicting POD and apply it to data from yet another hospital with good results.

6673

Routine Delirium Screening in PACU - A Cohort Study of over 1400 Elective Elderly Surgical Patients

Weiss Y.¹, Zac L.¹, Refaeli E.¹, Ben-Yishai S.¹, Cohen B.¹, Matot I.¹

¹Tel Aviv Sourasky Medical Center - Tel Aviv (Israel)

Background and Goal of Study: The ESA recommends screening elderly surgical patients for postoperative delirium in the post-anesthesia care unit (PACU). The 4A's test (4AT) is a simple and validated delirium screening tool, and is routinely administered postoperatively to elderly surgical patients in the Tel-Aviv Medical Center. We aimed to evaluate the incidence of postoperative delirium and to estimate the association between PACU-delirium and adverse outcomes.

Materials and Methods: A retrospective single-center cohort study between January and December 2020. All elective non-cardiac/cranial surgical patients ≥ 70 years without pre-existing dementia were included. Postoperative delirium was assessed with the 4AT in PACU and on the mornings of the initial 2 postoperative days, with a score ≥ 4 considered positive for delirium. Preoperative cognitive decline was routinely assessed defined as a MiniCog score ≤ 2 . Adverse outcomes were extracted from patients' medical records. Multivariate regression was used to compare patients with and without delirium.

Results and Discussion: Out of 1518 eligible patients, 1420 (93.5%) were evaluated for delirium during their PACU stay at average (SD) 55 (32) minutes since PACU admission, age 77 (5.6) years, median [IQR] American Society of Anesthesiologists' Physical Status score 3 [2,3]. In total, 134 patients (9.4%) screened positive for PACU-delirium. Compared to patients without postoperative delirium, they had more preoperative cognitive decline (39% vs 19%, adjusted OR (95%CI) 2.7 (1.8-4.0), $p < 0.0001$), underwent more major surgeries (53% vs 27%, OR 3.0 (2.1-4.4), $p < 0.0001$), more general anesthesia (98% vs 86%, OR 6.90 (2.1-22), $p < 0.0001$) and longer anesthesia duration (208 (100) vs 145 (86) minutes, OR 1.006 (1.005-1.008) $p < 0.0001$). Patients who experienced delirium in PACU were at greater risk for further delirium events during their hospitalization (28% vs 6%, OR 6.2 (4-9.7), $p < 0.0001$), longer hospitalization (12 (12) vs 8 (8) days, aOR 1.04 (1.02-1.06), $p < 0.0001$), greater risk of falls (5% vs 2%, OR 2.6 (1.1-6.2), $p = 0.02$) and increased 1-year mortality (5% vs 2%, OR 2.9 (1.2-6.8), $p = 0.01$).

Conclusion:

Nearly 10% of elderly elective surgical patients had postoperative delirium during PACU stay, which was associated with delirium throughout hospitalization, as well as with worse outcomes. Routine use of the 4AT in PACU is feasible and allows early detection of at-risk patients.

6936

Clinical frailty scale: inter-rater reliability of retrospective scoring in emergency abdominal surgery.

Fornaess K. M.¹, Nome P. L.¹, Hegvik T. A.¹, Kismul Aakre E.¹, Jammer I.¹

¹Haukeland Universitetsjukehus, Bergen, Norway - Bergen (Norway)

Background and Goal of Study: Frailty is a complex syndrome shown to be an independent predictor of morbidity and mortality after surgery in elderly patients. Frailty scoring may therefore be important e.g. for pre-operative risk assessment and prognosis estimation. The Clinical Frailty Scale (CFS) has been developed to help operationalize the frailty of the individual patient. However, the inter-rater reliability of retrospective CFS scoring through patient records by health care personnel is currently unknown in patients over 80 years of age undergoing emergency abdominal surgery.

Materials and Methods: Retrospective review of electronic patient journal of 112 patients over 80 years of age undergoing emergency abdominal surgery between 2015 and 2016. Three researchers individually assigned each patient a CFS score. The inter-rater reliability was assessed using Cohen's weighted kappa for comparison of pairs of assessors, as well as Kendall's coefficient of concordance for comparison of all three raters simultaneously.

Results and Discussion: The agreement across raters was strong, with Cohen's kappa values ranging between 0.74 and 0.85 and a Kendall's coefficient of concordance of 0.86.

Conclusion: The inter-rater reliability of assigned CFS from patient journals seems acceptable. This could permit retrospective research utilizing CFS measures from several raters, and across centers.

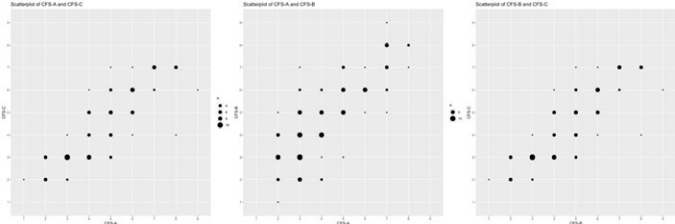


Figure 1: Scatterplots (1A, 1B and 1C) visualizing the agreement between CFS* scores set by pairs of raters; CFS-A, CFS-B and CFS-C. The intersection between the x- and y-axis represents the number of times both researchers scored a particular CFS score. The size of the circle represents the number of times this combination occurred. N is a reference for interpreting the size of each circle. *CFS: Clinical Frail Scale.

7043

Are frailty scores superior to the ASA score in predicting complications, in-hospital stay, readmissions and mortality in total knee replacement? A comparative study between octogenarian and septuagenarian patients

Castro Lalin A.¹, García-Mansilla A.¹, Holc F.¹, Vildoza S.¹, Carbo L.¹, Costantini J.¹

¹Hospital Italiano de Buenos Aires - CABA (Argentina)

Background and Goal of Study: Due to the increase in life expectancy and quality of life, the number of total knee replacements (TKR's) in elderly patients is expected to increase exponentially in the coming decades. Anesthesiologists pay close attention to the ASA score in the presurgical evaluation and we take it as a predictor of complications. The use of frailty scores is widely spread among geriatrics; however, they have not been standardized for anesthetic presurgical evaluation. The latter could be very useful in predicting perioperative complications in elderly patients. The aim of this study was to evaluate the ASA score and frailty scores efficacy in predicting complications comparing a group of octogenarians against a group of septuagenarian patients who underwent an elective TKR.

Materials and Methods: We retrospectively studied 448 patients who underwent TKR due to osteoarthritis at our institution between 2016 and 2019. Patients were divided in two groups: Group A (185 patients >80 years-old) and Group B (263 patients >70 years-old). All patients were classified by ASA score, Charlson Comorbidity Index (CCI) and Simple Frail Scale (SFS). We compared the length of postoperative stay, blood transfusions, unplanned readmissions, complications during the hospital stay and complications during the first 90 days after surgery.

Results and Discussion: CCI was higher in Group A (mean 5,3 vs 4,1; $p < 0.01$) as well as SFS (mean 1,0 vs 0,9; $p = 0.007$). The ASA score did not have a significant difference between both groups (mean 2,3 vs 2,3; $p = 0.4$). There were no significant differences in the postoperative unplanned readmissions between both groups (A:25% vs B:29; $p = 0.41$). We found significant differences in the in-hospital stay (A: 4,1 SD \pm 2.2 ; B: 2,6 SD \pm 2.2 $p < 0.001$). After carrying out a logistic regression analysis, we found that CCI was statistical significant predicting complications (OR 1,2 ; CI: 1,05-1,37) and mortality (OR 1,6 ; CI: 1,1-2,3), in addition, the increase of 1 point of CCI was related to an increase of 0,37 days of in-hospital stay. SFS was associated with an increased risk of readmission (OR 1,6; CI: 1,2-2,3) and mortality (OR 2,5; CI: 1,1-6,1). No score was a good predictor of blood loss and complication severity.

Conclusions: CCI and SFS significantly predicted the risk of complications, in-hospital stay, readmissions and mortality in octogenarian patients who underwent elective TKR, contrary to the ASA score which did not.

7074

4 at: a new tool for the assessment of post operative delirium in patients undergoing orthopedic surgery treated for femur fracture and hip replacement

Di Paola A.¹, Falcone E.¹, Merola F.¹, Tigano S.¹, Perna F. A.², Astuto M.¹
¹University Hospital Policlinico "G. Rodolico" - Catania (Italy), ²University Hospital Policlinico "G. Rodolico" - Catania (Italy)

Background: Post-operative delirium is a form of delirium which occurs in patients undergoing surgery. There are three phenotypes of delirium: hyperactive, hypoactive and mixed. The risk is defined around 8% for elderly patients undergoing orthopedic surgery, because of relative frailty and comorbidities. Delirium can increase the morbidity and mortality (up to 10-65%) for approximately 2 millions patients; also, healthcare costs are increased (up to 8 billion dollars annually) due to prolonged hospital stay and institutionalization. It is misdiagnosed between 32-87% of cases. **Methods:** We prospectively evaluated the incidence of long-term delirium (up to 30 days after hospital discharge) in patients ≥ 65 years-old with a 2-4 ASA Score undergoing orthopedic surgery for femur fracture and/or hip replacement. Patients were excluded if they had history of uncontrolled diabetes, PD, chronic cerebral vasculopathy, severe dementia, psychiatric disorders, alcohol or drugs abuse, hearing and visual impairment. Patients pre-operatively received a neuro-cognitive screening using the IQCODE (The Informant Questionnaire on Cognitive Decline in the Elderly): those with a score above 3.44 were excluded. Patients, from 6 to 24 hours after surgery, received the CAM test (Confusion Assessment Method) to assess any fluctuant alterations of mental status with attention deficit, which is predictive of delirium. Patients received the 4AT Test (Assessment Test for Delirium & Cognitive Impairment) up to 30 days after hospital discharge. We administered 4AT through a telephonic interview to reduce the risk of Covid-19 infection. **Conclusions:** We collected data from 20 patients, finding congruence between the results of CAM test and 4AT Test: in particular, for 2 patients (10% of the total) CAM score was predictive for risk of delirium and this result was confirmed by 4AT. For one patient (5% of the total) 4AT score showed a higher risk of delirium if compared to CAM score. We are continuing the enrolment of patients. Despite the small sample size, our preliminary results are encouraging if compared to the reported incidence in the literature.

7083

Acidosis and lactatemia are predictive of 90-day mortality after surgical correction of hip fractures in elderly patients

Refaeli - awin E.¹, Herut M.², Rabkin V.¹, Lior Y.¹, Cohen B.¹, Matot I.¹
¹Tel Aviv Sourasky Medical Center - Tel Aviv (Israel), ²Tel Aviv university - Tel Aviv (Israel)

Background: Hip fractures are common among the elderly and are associated with significant morbidity and mortality. A delay of more than 48 hours between hospital admission and surgery is associated with all-cause 30-day and 1-year mortality. Metabolic indices such as abnormal lactate level or pH predict perioperative morbidity and mortality. Yet, data regarding the metabolic state of patients with hip fractures presenting for surgery are scarce. We therefore aimed to assess the prevalence of preoperative metabolic disturbances in patients having surgical hip fracture repair. Specifically, we tested whether abnormal preoperative pH or lactate levels are associated with 90-day all-cause mortality.

Methods: Single-center retrospective cohort study. Medical records of patient's ≥ 65 years that underwent a surgical repair of hip fractures in the Tel-Aviv Medical Center (Tel-Aviv, Israel) between April 2018 and February 2020 were reviewed. All patients had invasive blood pressure monitoring and arterial blood gas analysis. Data are presented as mean (SD) unless specified otherwise. The association between the time from hospital admission to surgery and patients' metabolic status was assessed using both Spearman and Pearson correlations. $P < 0.05$ was considered significant

Results: A total of 872 patients were included (mean (SD) age 83 (8) years; 68% females; median [interquartile range, IQR] ASA physical score 3 [2, 3]). Median [IQR] time from hospitalization until arrival to the

operating room was 29 [21, 44] hours. In-hospital and 90-day mortality were 4.2% (n=37) and 8.2% (n=72), respectively. In total, 30% of patients presented to surgery with some degree of acidosis (pH<7.35), and lactate level was increased (>1.2 mmol/L) in 55% of patients. Preoperative acidosis, lactate levels, and base excess were worse among non-survivors. In a multivariate model, pH <7.35 and lactate >1.2 mmol/L remained independent predictors of 90-day mortality (OR 2.1 (p=0.008) and 3.4 (p<0.001), respectively). Time from hospitalization to surgery was not independently associated with mortality, after adjustment for metabolic indices, aOR (95%CI) 1 (1, 1.01).

Conclusion: Preoperative acidosis and lactatemia are not common among patients ≥ 65 years having urgent repair of hip fractures. They, however, are independently associated with 90-day mortality. Time between hospital admission and surgery is not an independent risk factor, once risk is adjusted for acidosis and lactatemia.

7500

External validation of the revised cardiac risk index (RCRI) and the geriatric-sensitive perioperative cardiac risk index (GSCRI) in patients more than 80 years old following surgery under spinal anaesthesia

Fayed N.¹, Elkhadry S.², Ellerkmann R.¹

¹Klinikum Dortmund - Dortmund (Germany), ²Menoufia University - Shebin-Elkheih (Egypt)

Background and Goal of Study: In Germany, the share of the elderly population who are ≥ 80 years (yrs) old is expected to be 8.3% in 2030. In this age group, the prevalence of major cardiovascular diseases is about 45%. Spinal anaesthesia (SPA) seems, in many aspects, to be a well-accepted option to minimize perioperative side effects in geriatric patients (pts.). RCRI and GSCRI were designed to predict postoperative major cardiac events (MCE) without considering the type of anaesthesia or this high age group. Aim: external validation of these two indices for pts. ≥80 yrs. following SPA.

Materials and Methods: Of 1042 candidates, from January 2016 to September 2019, in a single tertiary care centre, 836 pts. could be included. The predictive performance of both indices was tested in terms of the occurrence of postoperative MCE defined as in-hospital myocardial infarction, cardiogenic pulmonary edema, or cardiac arrest.

Results and Discussion: The median age was 85 (80-105) yrs., and 438/836 (52.4%) subjects were female. The incidence of MCE was 7.5 % (63 cases). Pts. were grouped into four predicted risk classes according to RCRI. Incidence of MCE in risk classes 1, 2, 3, and 4 were 4.5%, 7.4%, 13.0%, and 13.8%, respectively being significantly higher than expected according to RCRI (0.4%, 0.9%, 6.6%, 11% respectively) (X² test p = 0.0001). Furthermore, a significant difference between observed and expected MCE was found for the GSCRI, indicating the GSCRI predicted risk % lack of fit (Hosmer and Lemeshow test, p = 0.003). The c-statistic was 0.63 (95% CI, 0.56, 0.70) for the RCRI and 0.65 (95% CI, 0.59, 0.71) for the GSCRI indicating their poor discrimination ability. These results might be attributed to the presence of other underestimated risk factors. Of interest is that 55.6% (35/63) of pts. who experienced MCE had pre-existing atrial fibrillation. The limitations were the retrospective and single-center design and the limited number of patients who had MCE to less than 100. The strengths were that it was the first study to address the type of anaesthesia in a high aged group of pts. to in-hospital MCE following the prediction of RCRI and GSCRI.

Conclusion: The RCRI and the GSCRI indices had limited predictive and discriminative performance in this age group under SPA. An updated version of both indices including other risk factors such as atrial fibrillation may be more reliable.

Acknowledgements: Thanks Dr A. Garling for your enormous support.

7524

Surgical futility in elderly and super elderly patients - A retrospective cohort study

Zarour S.¹, Rabkin V.¹, Matot I.¹, Cohen B.¹, Refaeli Awini E.¹

¹Tel Aviv Sourasky Medical Center - Tel Aviv-Yafo (Israel)

Background and Goal of Study: As the general population ages, more elderly patients present to surgery. Age is an independent risk factor for postoperative morbidity and mortality. Often, perioperative physicians face moral and ethical dilemmas regarding the benefit or harm a surgery will bring to old, comorbid patients. The decision to withhold a surgery for potential "futility" is never simple, involving considerations such as basic surgical risk, patient comorbidities, patient/family will, but hardly any scientific evidence. We aimed to evaluate the rate of futile surgical procedures among elderly and super-elderly patients in a single tertiary medical center, and to identify risk factors associated with surgical futility.

Materials and Methods: A retrospective cohort analysis of all patients ≥65 years of age presenting to surgery between January 2017 and December 2020. Demographic, baseline medical, surgical, and anesthetic variables were compared between futile surgical cases, defined as mortality or non-discharge within 90 postoperative days, and controls. Analysis was stratified according to age (65-79 years vs. ≥80 years).

Results: A total of 55814 unique surgical cases were included. Overall, 8.7% were considered futile. The rate of futile cases was significantly greater in the super elderly vs. the elderly (14.3% vs. 6.6%, p<0.05). Independent risk factors for futility included age, malignancy, atrial fibrillation, previous cerebrovascular attack, surgical urgency, American Society of Anesthesiologists physical status score, peripheral vascular disease, hypertension, dementia, and chronic use of insulin or steroids.

Discussion: Elderly patients have a non-trivial rate of futile surgical procedures. Age, baseline comorbidities, and surgical/anesthetic factors are associated with even greater risk. Future research should aim to better identify independent risk factors and hopefully to create a risk-stratification tool for better prediction of futility, to help perioperative caregivers advise patients and families regarding potential benefits and harms of surgical procedures.

7555

Peri-operative systemic and cerebral anti-inflammatory properties of TRAM34, a KCa3.1 channel blocker, in an aging murine model of perioperative neurocognitive disorders.

Cuttaia H.¹, Saxena S.¹, Nuyens V.¹, Boogaerts J.¹, Kruijs V.², Vamecq J.³

¹CHU de Charleroi - Charleroi (Belgium), ²Université Libre de Bruxelles - Brussels (Belgium), ³Inserm, CHU Lille & University of Lille, France - Lille (France)

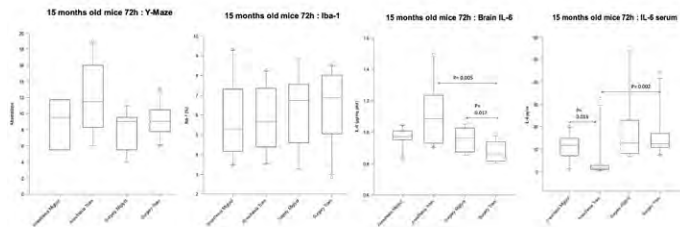
Background and Goal of Study: The elderly are more prone to perioperative neurocognitive disorders (PND) prompted by the non-resolution of an inflammatory cascade activating microglia and disrupting long-term potentiation. The activation of microglia depends on K channels (Kv1.3; KCa3.1). Therein, the influence of the KCa3.1 blocker TRAM34 on the activation of microglia, (neuro)-inflammation and the development of PND was investigated in a vulnerable, aging murine population.

Materials and Methods: Animals: 15 months old, C57BL/6 mice. Cognitive testing: Spatial Memory assessed by 5 minutes Y-maze testing (alternations and total arms entries) 72 hours post-surgery/sham (reduction of alternations indicated spatial memory failure). Surgical Intervention: Internal fixation of a tibia fracture under isoflurane anesthesia and buprenorphine analgesia. Sham: isoflurane anesthesia and buprenorphine analgesia. Inflammatory Response to Surgical Intervention: Circulating and brain interleukin 6 (IL-6) assessed by ELISA and microglial proliferation by brain Iba-1 staining. Preventative Intervention: TRAM34 or its diluent (miglyol) administration prior to surgery.

Results and Discussion: At 72 hours post-operatively, neurocognitive decline (assessed by Y-maze testing) was induced in neither control (miglyol) nor TRAM-treated conditions (Figure 1). The two conditions did not differ in brain microglial presence (Iba-1 staining). However, they

differed in terms of both peripheral and central inflammations. TRAM34 vs miglyol significantly decreased serum IL-6 in anesthetized ($p=0.016$) but not surgical anesthetized animals and, induced a significant surgery-dependent (surgical anesthetized vs anesthetized animals) drop in brain IL-6 ($p=0.005$) and rise in serum IL-6 ($p=0.002$) (Figure 1).

Conclusion: PND was not present 72 h postoperatively in this study. Under anesthesia, anti-inflammatory properties of TRAM34 (vs miglyol) were observed in systemic but not cerebral compartments. Added surgery cancelled and induced anti-inflammatory effects of TRAM34 in systemic and cerebral compartment respectively. Underlying mechanisms still remain to be clarified.



7566

Effect of low-flow anaesthesia on postoperative cognitive function in elderly patients

Polat C.¹, Okur O.¹, Turgut N.¹

¹PROF DR CEMIL TASCIOGLU CITY HOSPITAL - ISTANBUL (Turkey)

Background and Goal of Study: This study aims to evaluate the effect of the routinely performed low-flow anesthesia on postoperative cognitive functions in patients 65 years and older.

Materials and Methods: Following the approval of the Ethics Committee, this prospective observational study enrolled 230 patients aged 65 years and older who were scheduled for elective surgery under general anesthesia. Mini Mental Test (MMT) was performed and recorded 1 day before the operation. All intraoperative drugs were recorded. MMT scores are recorded the postoperative 6th hour, 1st day, 3rd day and 7th day. Visual Analogue Scale (VAS) was recorded every 6 hours for the first 3 days, and every 12 hours for the 4th, 5th, 6th and 7th days, postoperatively. Recorded data were compared between patients who underwent surgery with low-flow anesthesia 0.5 L / min (N = 115) and normal flow 2-4 L / min (N = 115). Statistically ($p < 0.05$) was considered significant.

Results and Discussion: There was no difference between the demographic data of the patients (age, gender, and American Society of Anesthesiologists (ASA) scores) according to the flow methods. There were no statistically significant difference between the VAS scores of the patients on the 1st day, 3rd day and 7th day ($p > 0.05$). Postoperative cognitive dysfunction developed in the normal flow group at the postoperative 6th hour, while no postoperative cognitive dysfunction developed in the low flow group at the postoperative 6th hour. Preoperative, 6th hour, 1st day, 3rd day and 7th day MMT scores were not statistically significant difference in both flow groups. In the low flow group, the change in MMT scores of the patients from preoperative level to the 6th hour, 1st day, 3rd day and 7th day levels were found to be significantly higher.

Conclusion: We believe that low-flow anesthesia technique is superior to normal flow technique with respect to protection of the postoperative cognitive functions due to decreased exposure to the inhalational anesthetics.

7629

The Relationship of Postoperative Cognitive Dysfunction and Brain Injury Biomarkers in Geriatric Urologic Oncologic Surgery

Senturk E.¹, Sungur Z.¹, Şentürk Çiftçi H.¹, Savran Oğuz F.¹, Şentürk M.¹, Savran Karadeniz M.¹

¹Istanbul University Istanbul Medical Faculty - Istanbul (Turkey)

Background and Goal of Study: We aimed to evaluate the relationship between proinflammatory and neuronal damage biomarkers in geriatric patients, with postoperative cognitive dysfunction (POCD) and postoperative delirium (POD) in major urologic oncologic surgeries.

Materials and Methods: Patients over 60 years of age who were scheduled for major urologic oncologic surgery were included in this prospective observational study. Addenbrooke Cognitive Examination (ACE-R) was performed on the preoperative 1st day, postoperative 1st week, and 3rd month for the diagnosis of POCD. Patients with $z > 1.96$ were diagnosed with POCD by subtracting the learning effect of a control group from the changes in the postoperative test scores compared to the preoperative test. Confusion Evaluation Method (CAM) was used in the diagnosis of POD. Blood samples were taken from the patients to determine the preoperative and postoperative serum levels of S-100 β , NSE, IL-6 and HMGB1 by ELISA method.

Results and Discussion: Of the patients included in the study, 7 (13%) were female and 47 (87%) were male. The mean age of the patients was 73.7 ± 7.1 years. POCD was observed in 17 (31.5%) patients after postoperative first week and in 12 (22%) patients three months after the operation. POD was observed in 12 (22%) patients. Preoperative IL-6 ($p < 0.01$), preoperative S-100 β ($p < 0.01$), postoperative IL-6 ($p = 0.01$), and postoperative S-100 β ($p = 0.03$) serum levels were found to be significantly higher in POCD1 patients than non-POCD1 patients. Preoperative IL-6 ($p = 0.01$) and preoperative S-100 β ($p = 0.03$) serum levels were found to be significantly higher in POCD3 patients than non-POCD3. Preoperative NSE ($p = 0.04$) serum levels were found to be significantly higher in POD patients than non-POD.

Conclusion: In geriatric major urological oncological surgeries, IL-6, which is an indicator of proinflammatory activity, and S-100, which is a neuronal damage biomarker, are associated with short- and long-term POCD; NSE, one of the neuronal damage biomarkers, was found to be associated with POD. These results support the idea that surgical trauma causes systemic inflammation which then causes a functional disruption in neural activity, leading to POCD and POD.

Leadership, Self-Development and Education

6505

Hybrid high-fidelity simulation of emergency cricothyroidotomy using a 3D-printed larynx and a simulated patient

Nabecker S.¹, Sophie H.¹, Corson N.¹, Balmer Y.¹, Schweizer T.¹, Greif R.¹
¹*Inselspital, Bern University Hospital - Bern (Switzerland)*

Background and Goal of Study: In case of a rare acute airway-related oxygenation failure, immediate performance of emergency front-of-neck access is the last lifesaving rescue procedure. Failure rates of this critical procedure are high because of insufficiently trained physicians. Training of the technical skills and the human factors is necessary to work successfully through such an airway emergency. We report the pilot of a hybrid high-fidelity simulation using an inexpensive 3D-printed larynx model and a simulated patient to train these technical and non-technical skills during emergency front-of-neck access.

Materials and Methods: The 3D-printed larynx model was based on a previously published design but was improved to enhance realism. The 3D-printed larynx was placed on the anterior neck of a simulated patient and covered with pig skin of variable thickness to create different anatomical and clinical challenges. The simulated patient was protected against stab and cut injuries by a flexible neck protector and an aluminum sheet. An artificial lung connected to the larynx model was placed underneath the simulated patient's shirt to allow simulation of respiratory excursions. Three airway teams piloted this hybrid high-fidelity simulation during a simulated severe allergic reaction requiring emergency front-of-neck access. The scenario started with the simulated patient being in respiratory distress with rapidly deteriorating vital signs. Artificial blood was injected upon cutting of the skin to further enhance realism.

Results and Discussion: All participants confirmed that this hybrid high-fidelity simulation was suitable to train technical skills of emergency front-of-neck access. Additionally, it created a realistic and stressful environment to train human factors in crises. The simulated patient felt safe and comfortable during the simulation and was able to provide feedback on participants' performance, which was perceived as very helpful. Performance of emergency front-of-neck access was rated as rather easy; success rate was not affected by the injection of artificial blood.

Conclusion: This hybrid-high fidelity simulation was rated as highly realistic and safe to train emergency front-of-neck access. It allows training of human factors during airway crises. The inexpensive 3D-printed larynx model was suitable to train the technical skills.

6536

Teaching medical students iv cannulation: A rater-blinded randomized controlled trial comparing written instructions, hands-on exercises and mental imagery

Berger-Estilita J.¹, Blülle R.¹, Stricker D.², Balmer M.³, Greif R.¹, Berendonk C.²

¹*Inselspital Bern - Bern (Switzerland)*, ²*Institute for Medical Education - Bern (Switzerland)*, ³*Institute of Primary Health Care - Bern (Switzerland)*

Background and Goal of Study: Mental imagery has long been used to successfully improve top athletes' performance during e.g. the Olympics. More recently, this educational strategy has also been used to learn surgical skills. Only a few studies describe the use of mental imagery in anesthesia and in undergraduate medical education. This study investigates the effectiveness of mental imagery compared to written instructions and to hands-on training in part-task trainers in maintaining the skills of intravenous cannulation on a part task trainer in first-year medical students.

Materials and Methods: We performed a single-center, rater-blinded randomized controlled trial. Students attended a compulsory 4h-instructor-led intravenous cannulation course six months before the trial. First-year medical students were randomly assigned to one of three different six-minute tutorials on intravenous cannulation six months after the i.v. cannulation course. Each group consisted either of self-learning tutorial based on written instructions, a hands-on i.v. cannulation tutorial on a manikin, or a tutorial with a mental imagery audioguide session. The student's performance was assessed with the use of a 15-item standardized checklist in a six-minute Objective Structured Clinical Examination station for intravenous cannulation. Assuming an alpha error of 0.01, and an effect size of a Cohen's *f* of 0.305 with an aimed power of 0.80, our sample size resulted in a minimum of 156 students. We performed descriptive analysis of the data and a one-way ANOVA. An a priori probability of less than 0.05 was considered to be statistically significant. All data were analysed using SPSS v.27.

Results and Discussion: In the 309 students participating, we did not find differences in the performance between the three groups and the pass mark for the OSCE station. The internal consistency of station items was 0.691. The mental imagery group was as successful as both other groups. With the same outcome, mental imagery and written instruction have the better effort-return ratio compared to resource intensive hands-on training in part-task trainers.

Conclusion: Simple and short interventions with mental imagery and written instructions have been shown equal effective as hands-on exercises for refreshing a simple but important procedural skill in medical students.

References:

1. Br J Anaesth. 2016;116(3):315
2. Am J Obstet Gynecol. 2004;191(5):1811

6542

Exploring learning strategies for the experienced trainee in specialist training. Are they able to use what they have learned?

Ekelund K.¹, Tolsgaard M. G.², Jakobsen R. V. B.³, Østergaard D.³, Bader K. S.²

¹Rigshospitalet - Copenhagen (Denmark), ²Copenhagen Academy for Medical Education and Simulation (CAMES), Rigshospitalet, University of Copenhagen, Denmark - Copenhagen (Denmark), ³Copenhagen Academy for Medical Education and Simulation (CAMES), Herlev Hospital, University of Copenhagen, Denmark - Copenhagen (Denmark)

Background: Based on an established theoretical model for self-regulated learning, we investigated how experienced trainees actively navigate using what they have learned in speciality-specific clinical courses. We believe the potential struggle when returning with new knowledge to their clinical position can be regarded as equivalent to returning from a conference. This is important, since the latter may be a significant part of the specialists' lifelong learning activity. To obtain a better understanding of how trainees discern and choose learning opportunities, we asked: How do experienced trainees prepare for courses and how do they plan, monitor and adapt their learning processed afterwards?

Material and Method: We conducted semi-structured interviews with twenty anaesthesiologist trainees. We used thematic analysis with a deductive and a latent approach to analyse the interview transcripts.

Results: Seven female and thirteen male trainees participated, aged 31-44 years, from first to last year in the specialist training in four group- and five 1:1-interviews. Based on the transcribed interviews, 24 codes were determined and subsequently grouped into four themes: "Be ready to learn", "Take the "take-home-messages" home", "Create your own opportunities", "Face it, it's not entirely up to you".

Discussion: Our data suggest that the experienced trainees face several barriers in order to transfer what they have learned in specific sub-speciality courses. Although the trainees carry a personal responsibility to be best prepared for the courses and create opportunities for themselves afterwards, they are very much depending on course-providers/teachers and the workplace environment where the transfer must take place. The trainees cannot lift this task by themselves. Understanding these challenges regarding the transfer from courses to the clinic everyday life is an important lesson to improve the path for the trainees to become specialist and potentially life-long learners.

Conclusion: Our study provides insights, informed by anaesthetic trainees, about the facilitators and barriers there exists when returning to the clinic from a course. We are limiting successful transfer from courses by erroneously assuming that solutions should target individuals and factors influencing trainees' engagement in their medical education and not the organization's surrounding them. The trainees may create their own opportunities, but it's not entirely up to them.

6616

How do coping styles differ according to teamwork levels of medical branches? Anesthesiologists vs. Dermatologists

Tümer M.¹, Bayrak F.²

¹Hacettepe University School of Medicine - Ankara (Turkey), ²Baskent University Department of Psychology - Ankara (Turkey)

Background and Goal of Study: The relationship between teamwork and the psychological state of physicians has not been adequately studied in the literature. Previous studies suggested that there are different coping styles, and social support levels may influence which one to choose. This study investigates the association between perceived social support levels and coping styles against stress in physicians who have different teamwork levels (anesthesiologists and dermatologists).

Materials and Methods: We conducted two online surveys. In the first study, we test our prediction about the teamwork levels of anesthesiologists and dermatologists on medical faculty graduates (n = 266). In the second study with a new sample, we examined the relationship between social support and coping styles against stress in dermatology (n = 91) and anesthesiology residents (n = 107).

Results and Discussion: Consistent with our hypothesis, first study showed that physicians in surgical science divisions had higher teamwork levels than medical science divisions ($t(265) = 6.981, p < .001$), and anesthesiologists had higher teamwork levels than dermatologists ($t(265) = 18, p < .001$). The second study indicated that dermatologists (low teamwork group) use the submissive approach, which is one of the ways to cope with stress, more than anesthesiologists (high teamwork group) ($t(195) = 2.831, p = .005$). However, there was no significant difference in perceived social support levels of the two groups ($t(195) = .212, p = .832$). **Conclusion:** The submissive approach of coping style is a passive and emotion-focused strategy. Passive coping strategies aim to protect from negative emotions caused by stressful events rather than solving the problem. Anesthesiologists working in high-stress areas such as operating theaters and intensive care units may be more actively coping with stress than dermatologists due to their high teamwork levels.

6662

Variability in Exposure to Intrathoracic Transplant Procedures During Anesthesiology Residency: A Review of Argentine Residency Programs during 2015-2019.

Aponte-Gatica J. F.¹, Sommer M. J.¹, Cicconi E.¹, Waldhorn M.¹, Dominguez M. X.¹, Tejjido C. A.¹

¹Hospital Italiano de Buenos Aires - Ciudad Autónoma de Buenos Aires (Argentina)

Background and Goal of Study: Transplantation is a complex procedure performed on critically ill patients with multiple comorbidities, especially in heart and lung transplants. Currently transplant training is not required for accreditation or certification in anesthesiology, and not all anesthesia residency programs are associated with transplant centers. The purpose of this study was to analyze intrathoracic transplant exposure in residencies in Argentina during the 2015-2019 lustrum.

Materials and Methods: We analyzed all intrathoracic (Heart and Lung) transplantations performed in Argentina Transplant Centers in between years 2015-2019. We analyzed the distribution of this procedures national wide, defined which institutions made more than 100 transplants during this period, and established which Centers with a high volume of transplants had Residency Programs.

Results and Discussion: A total of 803 intrathoracic transplants were performed in 20 Centers in this period. This were performed in 7 states with a strong tendency to centralization. (Figure 1). Two institutions (only one with residency program) performed over 100 transplants. This two, both present in CABA were also responsible of the 62% of the procedures (a total of 496).

Conclusion: There is only 1 center with anesthesiology residency programs that performed an adequate number of intrathoracic transplants that allows for the training of anesthesiologists in all aspects of transplant perioperative care. Therefore, we need to contemplate the possibility of creating educational and training programs transplant oriented for anesthesiologists.

6702

Evaluation of the impact of the COVID-19 pandemic on the training activity in anaesthesiology trainees using a computerized record

López Gil V.¹, Ferrero Coloma C.¹, González Jiménez L.¹, González Fernández J.¹, Martínez Vela J.¹, Gómez Salinas L.¹

¹Hospital General Universitario de Alicante (HGUA) - Alicante (Spain)

Background and Goal of Study: the COVID-19 pandemic has seriously affected the activity in hospitals and, therefore the formation of trainees worldwide. It is likely that trainees related to the surgical environment have been the most affected by the suspension of elective surgeries, among which anaesthesiology ones are especially implicated due to their involvement also in the management of COVID-19 critical patients.

Materials and Methods: in our anaesthesiology service trainees fill in a record of the surgeries and techniques they attend using a custom designed platform. We have compared the activity registered in the last year (March 2020 - February 2021) with the average of the three previous years (March 2017 - February 2020).

Results and Discussion: the total number of records were 18,393 from March 2017 to February 2020 and 4009 from March 2020 to February 2021. During the COVID-19 pandemic, the number of procedures in operating rooms (OR) where patients require subsequent admission to an Intensive Care Unit (ICU) was lower (e.g., in cardiac surgery 46 procedures registered during the first year of pandemic compared to 121 per year on average prior to COVID), compared to procedures performed in those OR where patients normally require admission to the hospital ward (e.g., in urology 202 vs. 210). This could be related to the need to reduce interventions requiring ICU beds due to the occupation of these by patients with COVID-19 pneumonia. A decrease is also observed in some techniques such as endotracheal intubations (1752 vs. 2302), canalized femoral arteries (58 vs. 135) or inserted pulmonary artery catheters (27 vs. 69) during the pandemic compared to before the pandemic. On the other hand, there is no decrease locoregional blocks, or in epidurals in pregnant women. Regarding techniques related to the treatment of pain, we found a decrease in their registration during the pandemic (140 vs. 355).

Conclusion: during the COVID-19 pandemic, there has been a decrease in the activity carried out in OR where patients require immediate subsequent admission to an ICU compared to the activity registered by trainees in previous years. The use of computerized records of procedures and techniques is useful in the assessment and adjustment of training in ordinary periods, but it can be a tool of extraordinary value in periods of crisis and in our case, it will allow us to refocus the objectives of our trainees.

6714

Predatory Journals: An analysis of emails regarding time patterns, contentual aspects and the selection criteria used to contact scientists

Ailinger A.¹, Hinkelbein J.¹, Lueers J. C.¹, Adler C.¹, Annecke T.², Krschek B.³

¹University Hospital Cologne - Cologne (Germany), ²University of Witten/Herdecke - Cologne (Germany), ³Hôpitaux Robert Schuman - Luxembourg (Luxembourg)

Background and Goal of Study: Over the past few years predatory journals have increasingly abused "open access publishing" as their business model. Predatory journals impose article processing charges on the authors and claim to conduct peer review, but do not adhere to the scientific standards in the publication process. By publishing unscientific articles, they damage the reputation of the scientific community. Predatory journals usually contact scientists by email (1). In this study, emails from predatory journals were analysed to explore their methods of author acquisition and to facilitate the identification of potential predatory journals in the future.

Materials and Methods: Over a three-month period, five practicing doctors, who are also scientifically active, collected n=1643 emails from potential predatory journals. The frequency and time of delivery of the emails were statistically analysed. Content-related aspects (e.g. offers

and conditions) and quality criteria (e.g. peer review) were assessed. The number of emails received by each participant was correlated with parameters of their scientific activity.

Results and Discussion: Nearly 60% (n=948) of the emails were received during usual working hours (8am - 4pm). Significantly more emails were sent on working days compared to the weekend (Mann-Whitney-U=0, n1=5, n2=2, p<0.05 one-tailed). Offers for publication made up almost 70% (n=1130) of the emails. Most of the journals (n=1364; 83,02%) did not match the medical field of the contacted researcher. The mean deadline for publication (24 days) and duration of the peer review (26 days) were short compared to established journals. The publication activity index of each doctor, defined as the number of publications per month, correlated positively with the number of received emails.

Conclusion: This study demonstrates that emails from potential predatory journals show formal and contentual characteristics that could be used to improve spam filters in the future. The results support the thesis that the frequency of contacts by predatory journals is linked to the publication activity of the corresponding doctor and the ongoing duration of his scientific career.

References:

1. Shamseer et al. Potential predatory and legitimate biomedical journals: can you tell the difference? A cross-sectional comparison. BMC Medicine 2017; 15: 28.

6776

Escape Room as part of medical students education in anesthesiology and intensive care – Preliminary experience

Yahav-Shafir D.¹, Epstein I.¹, Zbede A.¹, Ivry M.¹, Friedman M.¹, Berkenstadt H.¹

¹Chaim Sheba Medical Center - Tel Hashome - Ramat Gan (Israel)

Background and Goal of Study: Escape Room (ER) is a team game in which players cooperatively discover clues and solve puzzles in order to progress and accomplish a specific goal in a limited amount of time. Over the last years ERs have gained popularity as an educational tool in different fields including the health system. The aim of the present study was to get students perspectives on the use of ERs as part of their training during anesthesiology and intensive care clinical rotation.

Materials and Methods: Four groups of five medical students each, completed two different ER scenarios. The scenarios were run at the end of the first and second weeks of their 2 weeks rotation. The ERs were based on the knowledge and skills taught during the rotation and incorporated also patient safety and team work components. Feedback questionnaires were filled in after each of the ERs. (Answers on a Likert scale of 1 - strongly disagree to 5 - strongly agree).

Results and Discussion: For both ERs, all the participants gave maximal scores of 5 on general satisfaction and the statement that the ER provided an appropriate format for practicing and better understanding of both theoretical knowledge and clinical skills. The average responders' score for the ERs as a tool for assessing their knowledge was 4.3 and 4.5 out of 5 for the 1st and the 2nd ERs respectively. The contribution of the ERs on practicing team work and communication skills was scored as 4.7 and 4.7 out of 5 for the 1st and 2nd ER respectively. After the 1st ER 76% of participants gave a maximal score for the question - whether the ER has allowed each member of the team to practice manual skills - with an average score of 4.8, and only 40% of the participants gave the 5/5 score for the same question after the 2nd ER with an average score of 4.1 out of 5. This lower score can be attributed to the task of line insertion presented in the 2nd ER, a tasks that did not allow the participation of all team members.

Conclusion: The ER educational modality was perceived by students as a positive and novel experience. The ER provided a safe framework for enhancing performance of newly acquired perioperative knowledge and skills.

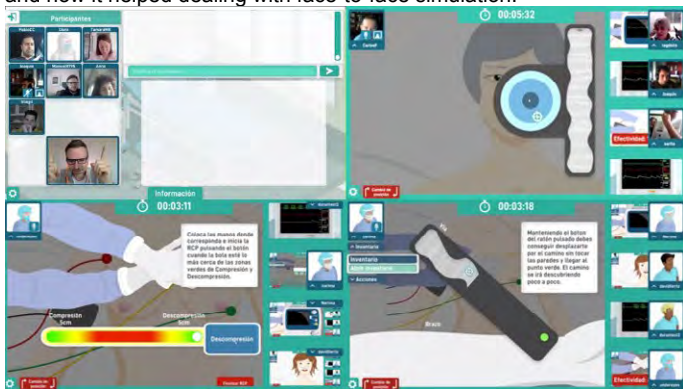
6818 Using gamification to improve the learning experience of CPR algorithms: The Simgame Project.

González Fernández J.¹, Navarro Martínez J.², Toral Toral Ú.¹, Ferrero Coloma C.¹, Galiana Ivars M.¹, Cuesta Montero P.³

¹Hospital General Universitario Alicante - Alicante (Spain), ²Clinical Simulation Group, ISABIAL - Alicante (Spain), ³Complejo Hospital Universitario de Albacete - Albacete (Spain)

Background and Goal of Study: Face-to-face simulation is a tool that effectively improves crisis management. Recently, due to COVID-19 restrictions, there has been challenges to keep training in closed environments. To effectively overcome this issue, we developed an online simulation tool. The Simgame Project.

Materials and Methods: Simgame is a tool developed by software developers and anaesthesiologists (www.medicalsimgame.com). It allows up to 5 participants to take part in simulated scenarios where every position from airway management, chest compressions to drug management must be fulfilled. Plenty of scenarios can be emulated including advance life support and difficult airway management. Taking advantage of the new ERC CPR guidelines, we performed a Simgame session followed by a conventional simulation. After, we conducted a survey to evaluate and report feedback. Surveyed participants were asked about their experience, ability to manage an emergency before and after the training session, overall satisfaction, Simgame experience and how it helped dealing with face-to-face simulation.



Results and Discussion: 12 Participants and 3 instructors submitted results. Our survey found that participants had an increase in their ability to manage a CPR situation from 1.83 to 3.25 (mean value on a scale of 1 to 5). 91.7% of participants found Simgame to be useful or very useful to learn Advance Life Support. The ability to memorize algorithms, team communication and task distribution were the skills that participants found to have improved the most during training. Instructors also reported an increase of the ability of participants to manage these situations from 2 to 4. These results show that online simulation based on sequential performances with increasing difficulty may help in improving conventional simulation training, particularly during a pandemic outbreak. Whether online simulation could be helpful for different scenarios remains unclear.

Conclusion: An online clinical simulation tool focused on gamification, decision making and team communication may be useful to improve the learning experience of new CPR algorithms.

6967 Why Anesthesia? A national survey of the 1st year Anesthesiology trainees at Portugal – preliminary data.

Correia A. R.¹, Granja C.², Mendes-Castro A.²

¹Centro Hospitalar Universitário de São João - Porto (Portugal), ²Centro Hospitalar Universitário de São João; Faculdade de Medicina da Universidade do Porto; CINTESIS, Center for Health Technology and Services Research, Faculdade de Medicina da Universidade do Porto - Porto (Portugal)

Background and Goal of Study: Medical career choice is a complex process associated to several factors. Over the last few years, we have seen a growing interest in the career of Anesthesiology in Portugal¹. However, the factors associated are unknown. To shed light, we aim to identify and explore the motivational factors involved in anesthetic trainees' career decision making.

Materials and Methods: We developed an electronic survey about demographics and motivation to choose Anesthesiology. The motivational dimensions emerged from the available literature and adjustments from the pretest. Motivation was measured using a Likert scale where reasons to choose Anesthesiology were classified between "nothing preponderant" and "extremely preponderant". The survey was applied by email to all the anesthesiology trainees attending the first internship year in Portugal during 2021 (a total of 80 individuals). It was carried out during the first 6 months of the internship. Demographics and motivational trends were analyzed using descriptive statistics and χ^2 statistical analysis.

Results and Discussion: The response rate was 75% (60/80). 63% were female and median (min-max) age was 26 (25-36) years old. Forty-eight trainees (80%) had previous contact with Anesthesiology during pre-graduate education and was the first option from 52 (87%) of residents. Regarding satisfaction with specialty, virtually all (98%) would choose the same option again. When considering the most preponderant motivational factors to choose Anesthesiology, the following dimensions were classified as "very and extremely preponderant" by more than 50% of respondents: technical-scientific factors ["hands on" (83%), "transversality" (90%), "physiology and pharmacology" (68%), "emergency & critical care" (70%), "low ward workload" (53%)]; personal factors ["adaptation to personal characteristics" (83%), "work/life balance" (78%), "perceived job satisfaction" (80%)]; and socio-economic factors ["future financial perspectives" (70%) and "career perspectives" (52%), "employability" (78%)]. We didn't find statistical significance between demographic and motivational variables.

Conclusion: This study shed light to the motivational factors associated with Anesthesiology trainees' career decision making in Portugal during 2021, namely aggregated in technical-scientific, personal and socio-economic factors.

Reference:

1. Mendes-Castro *et al.* *RSPA*;2019:28 (4).

7035

Candidate perception on comfort and perceived stress post major trauma simulation teaching- A post simulation scenario survey.

Schembri Agius V.¹, Esposito T.¹, Sciberra S.¹, Sammut F.²
¹Mater Dei Hospital Malta - L-Imnsida (Malta), ²University of Malta - L-Imnsida (Malta)

Background and Goal of Study: The aim of this study is to evaluate the relation between rank and previous simulation experience with candidates' comfort, perceived stress, coping with stress and crisis resource management (CRM) learning effectiveness using simulated scenarios.

Materials and Methods: 34 anaesthetists and 41 anaesthetic nurses participated in a post scenario survey after 3 major trauma simulation scenarios which included: 1) Penetrating trauma to the chest, 2) Traumatic brain injury 3) Penetrating neck injury. The survey included questions about the level of comfort, perceived stress, CRM learning effectiveness, usefulness of the debriefs, stress management in real life cases.

Results and Discussion: Candidates reported the following stress levels: very comfortable (38.66%), moderately comfortable (32.42%), somewhat stressed (34.66%), moderately stressed 39.56% and very stressed (11.5%). CRM learning effectiveness during the scenarios was respectively recorded as very useful and extremely useful in 44% and 48.9% respectively. 42.7% and 49.3% found the simulation scenarios helpful to cope with stress in real life as very useful and extremely useful respectively. A p-value of 0.015 showed an association between the usefulness of debrief in learning CRM versus rank (the majority of junior anaesthetists and nurses finding the debrief as very useful or extremely useful). A p-value of 0.017 showed an association with coping with stress in real life versus rank (similar to the findings in the previous association of debrief versus rank). A p-value of 0.001 showed an association for CRM learning effectiveness versus rank only for scenario 3. There is no association with rank/previous simulation and comfort/perceived stress during the 3 simulations (p-values all >0.05).

Conclusion: Although most candidates felt comfortable, stress in a simulation setting is unavoidable. Simulation teaching with debrief is a useful tool to improve stress management and to develop CRM in real life scenarios. Further studies on the effect of stress during simulation teaching is warranted.

References:

1. Learning Crisis resource management: Practicing versus an observational role in simulation training-a randomized control trial: A. Lai *et al.* Anaesthesia critical care pain medicine 2016.
2. Crisis resource management training for anaesthesia faculty: a new approach to continuing education: R. Blum *et al.* Medical education 2004.

7055

To study subjective sleep quality in soldiers deployed at high altitude during acclimatization using Groningen sleep evaluation questionnaire.

Adya A. K.¹, Chauhan A.², Singh G.¹
¹Command Hospital, Chandimandir - Panchkula (India), ²INHS Kalyani - Visakhapatnam (India)

Background and Goal of Study: Combatants inducted to high altitude report sleep disturbances resulting in an overall unrefreshed experience, tired perception of self and subjective sub optimal performance. The study aims at studying subjective sleep quality during acclimatization employing an easily administered questionnaire.

Materials and Methods: A total of 300 volunteers without previous high altitude exposure, with no comorbidities, non-smokers and those who did not consume alcohol (during the study period) were evaluated using the Groningen Sleep Evaluation Questionnaire each morning at 0800 Hours during the six days of acclimatization phase. The daily unit routine followed however afternoon naps and consumption of caffeinated drinks post-1700 hours were curtailed. Those seeking medical attention, initiated on medication or admitted were excluded. The acclimatization facility was located at 3000 meters.

Results and Discussion:

Day	Most frequent complaint	Least frequent Complaint	Percentage of volunteers with score >6	Percentage of volunteers with score <2	Mean score
1	Taking >30 min to fall asleep(Q3)	Sleeping only few hours(Q9)	48.2	23.7	6.28
2	Felt tired after waking up(Q5)	Sleeping only few hours(Q9)	27.6	50.5	4.65
3	Taking >30 min to fall asleep(Q3)	Felt that slept poorly last night(Q2)	18.8	61.2	3.21
4	Got up in the middle of the night(Q7)	Felt that slept poorly last night(Q2)	15.6	72.2	2.1
5	Got up in the middle of the night(Q7)	Did not get enough sleep last night(Q6)	8.8	78.6	1.0
6	Got up in the middle of the night (Q7)	Did not get enough sleep last night(Q6)	2.4	88.2	0.5

A total 286 volunteers managed to complete the study and all were males and mean age was 28.69 years. The average score day wise, most frequent complaints are depicted in table above. More than half reported poor sleep on Day 1 (50.52% followed by 22.5% and 19.2% on Day 2 and 3 respectively). Most took more than 30 min to fall asleep on Day 1 (64.91% followed by 43.1% and 42.8% on Day 2 and 3 respectively).

Conclusion: Sleep disturbances are frequent in high altitude in first 48 hours.

7145

Anaesthesia gas capture system pilot program - implementation and first impressions

Rebelo P.¹, Fernandes T.¹, Quelhas M. J.¹, Castro A. I.¹, Aguiar A. R.¹, Barbosa C.¹
¹Hospital Pedro Hispano - Matosinhos (Portugal)

Background and Goal of Study: The climate change is the biggest healthcare challenge of the 21st century. Recent data shows that the health care system is responsible for 4.5 to 10% of all CO2 emissions, and the anesthetic gases are responsible for 5% of these emissions.

This pilot program tested an innovative gas capture system and introduced in the hospital the concept of "Circular economy", specifically in the Anesthesia care setting. With this we aim to reduce, nearly eliminating, direct greenhouse gas emissions from anaesthetic practice.

Materials and Methods: This project began in September 2020 in the form of partnership with Baxter @-Zeosys Medical@. We proceeded to the installation of special canisters with adsorbent agent (CONTRAFIuran@) with accompanying sensors (SENSOFIuran@) to the exhaust gas system of 4 of the 14 anaesthesia machines in the Central OR of Hospital Pedro Hispano. These canisters prevent exhaust anaesthetic gas from escaping into the atmosphere (~99% efficiency). When full, they are collected and sent to an industrial unit where the captured gas is extracted from the adsorbent, the anaesthetic is purified and could be used as active pharmaceutical ingredient for new product. With this change, we are creating a closed circular economy. To startup the project, we organized staff meetings to inform the health workers and raise awareness to the impact of anaesthetic gases in our environment. To assess the safety of the capture system we conducted an ambient air quality assessment pre-installation of the canisters, at the 3rd week and 3rd month after installation.

Results and Discussion: Staff were enthusiastic to learn more about the project. The installation was achieved with ease without interference with usual workflow. After the installation, the follow-up was smooth with minimal workload to those involved. All OR ambient air evaluations and reports were normal. There were also some minor issues reported, like the sensors alarming inadvertently (due to sensing alcoholic disinfecting products on manipulation) and also the fact that in the anaesthesia machines with this system, N2O can't be used.

Conclusion: We showed that with this system, and with minimal interference with usual workflow, we can significantly reduce anesthesia care emissions. The "Circular Economy" concept applied to pharmaceutical products could be a paradigm shift in terms of how we view and manage the environmental impact of anaesthesia.

7171

Targeted simulation training improves TEE performance of young residents in intensive care.

OULEHRI W.¹, Cristinar M.¹, Vidailhet P.¹, Koessler S.¹, Collange O.¹, Mertes P. M.¹

¹Hopitaux Universitaires Strasbourg - Strasbourg (France)

Background and Goal of Study: Transoesophageal echocardiography (TEE) has become essential for the evaluation of cardiac function in preoperative medicine. Few programs target TEE training during residency in anaesthesiology, critical care and perioperative medicine (ACPM). Simulation training is known to enhance the quality of medical acts. The aim of our study was to evaluate the impact of simulation in TEE skills acquisition.

Materials and Methods: In this prospective monocentric study we compared post graduate year 1 (group I) and year 2 residents (group II) in ACPM. During one year of training, all residents benefited from classical theoretical TEE training (7 hours) and only group 2 had 12 additional hours of simulation training. Then each participant performed 11 predetermined TEE views on patients hospitalised in intensive care unit after cardiac surgery. Primary study endpoint was the duration to complete these 11 TEE views. Secondary study endpoints were the quality of images, the number of correctional interventions by an instructor, and the perceived stress.

Results and Discussion: Between August and October 2019, twenty two residents without prior practical TEE experience were enrolled. Mean time spent performing the 11 TEE views was significantly reduced in group II : 1010 s 95% CI (920, 1520) vs 1227 s 95% CI (654, 1363), $p < 0.01$. Median TEE quality score did not differ: 80; 95% CI (66, 91) vs 77; 95% CI (62, 89), $p = 0.37$ in group I and II respectively. The number interventions by the associated investigator necessary was significantly reduced in group II compared to group I: 4; 95% CI (1, 6) vs 9; 95% (3, 13), $p < 0.001$ respectively (Student t-test). Concerning stress evaluation no criteria used showed significant differences among groups. This study demonstrates that simulation-used learning allows reducing acquisition time in performing TEE views in high quality among young residents. Simulation may enhance better self-sufficiency to perform TEE with less external assistance. A major strength of this study was the transferability of a simulation-based learning program to a clinical situation. Simulation didn't reduce stress perceived during the experiment despite all criteria used.

Conclusion: Simulation based TEE training reduces acquisition time of TEE views on patients and enhances self-sufficiency in performing TEE among young residents. Our results encourage including simulation in TEE training programs on a regular base.

7181

Morbidity and Mortality meetings: a strategic tool in improving safe surgery in resource limited settings

Kalipinde F.¹, Mumphansha H.², Mumbwe M.³

¹University Teaching Hospital, Lusaka - Lusaka (Zambia), ²University Teaching Hospital - Lusaka (Zambia), ³Ndola Teaching Hospital - Ndola (Zambia)

Background and Goal of Study: There is evidence to suggest regular Morbidity & Mortality meetings (M&M) can be a valuable tool for quality and safety improvement as well as a means of intra-professional learning [1]. The COVID pandemic in Zambia has further demonstrated the importance for regular intra-professional discussion amongst anaesthetic consultants and trainees. Therefore, we initiated a pilot series of national M&M meetings to assess the engagement and feasibility of conducting these on a regular basis. It is our vision that these meetings cut across all surgical disciplines including hospital management staff with anaesthetists at the center of it all.

Materials and Methods: These meetings were designed to take a semi-formal format with emphasis on quality improvement (QI) and mutual learning. All anaesthetic trainees and consultants from Zambia's two teaching hospitals were invited to attend a virtual M&M meeting. A trainee with supervision from a consultant, was assigned to present a challenging case, with time put aside at the end of the presentation to discuss the important points raised amongst the attendees. Key areas

in need of improvement were identified as potential QI projects (QIP) for trainees to undertake.

Results and Discussion: Results are displayed below (Table 1). Both pilot sessions were well attended by consultants & trainees.

Date	Topic Discussed	Anaesthetic consultants from both hospitals attended	Anaesthetic trainees from both hospitals attended	Suggested QI outcomes
10/5/21	Intra-operative cardiac arrest	yes	yes	1.Prevent pyrexia in post cardiac arrest management. 2.Targeted temperature to be <37°C
24/5/21	Aspiration of foreign body	yes	yes	1.Pre-operative assessment forms to include a section on dentures

Conclusion: This pilot exercise has demonstrated that our modified approach to M&M meetings can work effectively in our clinical setting. It enables us to identify areas in need of improvement thus guiding QIPs & enhancing the level of perioperative care we deliver. We intend to continue these sessions on a regular basis & invite all anaesthetists practicing in Zambia to attend.

Reference:

1.Higginson J, Walters R & Fulop N. Mortality and morbidity meetings: an untapped resource from improving the governance of patient safety? *BMJ Quality & Safety*;Vol 21,pp576-585, 2012

7266

Anaesthesia education project: preparedness for anaesthesia rotation survey

Bishop B.¹

¹Austin Health, Department of Anaesthesia - Heidelberg (Australia)

Background and Goal of Study: This audit aimed to determine if past junior doctors felt adequately prepared prior to commencing their anaesthetic rotation at Austin Health, and to assess what they did to prepare. Completing an anaesthetic rotation can provide valuable learning opportunities, however research on the clinical education experiences of unaccredited anaesthetic doctors in Australia is relatively lacking. Austin Health is a major tertiary health service in Melbourne that is accredited for anaesthesia training.

Materials and Methods: After gaining ethics approval, a list of past junior anaesthetic doctors from 2017 to 2020 inclusive was obtained, and an online survey was created with the Kirkpatrick educational research framework(1) in mind. Doctors were questioned on their learning objective(s), pre-rotation preparation and level of confidence in a range of skills, and the usefulness of educational resources. At the conclusion of the survey, optional online focus group participation was offered.

Results and Discussion: Nearly half of the 69 eligible doctors (47.8%) completed the survey, and five participated in the focus group. Most had had no previous anaesthetic exposure (27.3%) or less than one month's worth (39.4%), and the majority desired to gain general experience necessary to pursue a career in anaesthesia (63.6%). To prepare, nearly all respondents talked to people who have done the rotation before (97.0%), while the majority read handover documents and department handbooks (81.8%), attended department orientation (72.7%), and read textbooks (69.7%). The proportion of participants who felt confident or strongly confident was in the minority for each anaesthetic skill assessed. Resources agreed to be useful by the majority included educational lectures or tutorials as part of orientation (87.9%), attending a course (66.7%), and viewing an online video series (63.6%).

Conclusion: Junior doctors do not feel prepared prior to commencing their anaesthetic rotation, despite undertaking various traditional methods of preparation. Some educational resources might be more useful than others, which could be implemented and assessed in a repeat audit cycle.

Reference:

1. Boet S, Sharma S, Goldman J, Reeves S. Review article: Medical education research: an overview of methods. *Can J Anesth Can Anesth*. 2012 Feb 1;59(2):159-70.

7452

Self-perception of work performance and the obstacles to performance quality: the vision of Portuguese Anesthesiologists

Ferreira L.¹, Rodrigues A.¹, Pedreira J.¹, Aires J.¹, Bernardino A.¹
¹Centro Hospitalar e Universitário de Coimbra - Coimbra (Portugal)

Background and Goal of Study: The self-perception and the satisfaction of one's own performance are important factors in an efficient management model. This study has as its main objective the analysis of self-perception of work performance. The identification of some obstacles to performance quality were also analyzed.

Materials and Methods: Observational, descriptive and analytic study, conducted between May and December of 2020. Residents and attending Anesthesiologists were asked to submit an inquire which included sociodemographic and work-related variables as well as a self-assessment of work performance: 16 questions distributed by assessment of work performance, productivity, quality and satisfaction (Likert 0-4); obstacles to performance (0-5), responsibility in outcomes, performance under stress, team motivation (0-4), and self-recommendation of the department (0-“do not recommend” to 3- “highly recommend”). The statistical analysis was performed through SPSS 24.0, with a level of significance of 5 %.

Results and Discussion: 109 responses were obtained. 56,9% of responders self-assessed their performance at the maximal level. The median of the self-perception of their productivity was 3. A weak positive correlation with statistical significance was encountered between self-perception of performance and quality and safety. The lack of time, of incentives and of recognition were the most reported obstacles to the quality of performance, although attendings highlighted more frequently aspects related to lack of a culture of quality within their department. There was no significant statistical difference of the studied variables in between genders: descriptively men promote motivation less frequently. Younger responders have less ability to manage under stress, although not statistically significant. Responders with a over 40-hour schedule have a greater ability to manage under stress ($p=0.036$). Most responders recommend their department, although a weak negative correlation with statistical significance was encountered between the former variable and the lack of incentives.

Conclusion: The self-evaluation of work performance, as well as the self-perception of productivity, quality of performance and degree of satisfaction had good results in this samples. The main obstacles found were the lack of time, of incentives and the non-existence of a culture of quality which led to negative aspects in the recommendation of the department.

7575

An introduction to ultrasound guided peripheral vascular access for foundation programme doctors.

Mounce A.¹, Davies S.¹, Morgan S.¹, Prince B.¹, Vaghela A.¹, Beckett S.¹
¹Aneurin Bevan Health Board - Newport (United Kingdom)

Background and Goal of Study: Peripheral intravenous access and arterial puncture play an important role in the management of hospitalised patients. Sometimes these skills can be challenging due to a number of patient factors including body habitus, dehydration and previous intravenous drug use. Recent evidence suggests that the use of ultrasound guidance in these circumstances can improve first attempt success rate, shorten procedural time and improve patient pain scores. In a survey of Foundation Programme Doctors within Aneurin Bevan University Health Board (ABUHB), only 39.4% of respondents had received any training in ultrasound guided peripheral intravenous access and 97% of respondents felt that attending a training course would be beneficial. A free basic ultrasound guided access course was conducted in the aim of improving Foundation Doctors' understanding of basic ultrasound principles and to enable them to confidently apply this skill when required.

Materials and Methods: Two local pilot courses were held for ABUHB Foundation Programme Doctors only. Pre and post course surveys were reviewed and the recommendations addressed. Following this,

all Foundation Programme Doctors in Wales were invited to apply for this course. Four regional courses were held. Each course included a thirty-minute presentation followed by an hour of supervised practise on phantom models. The same pre and post course surveys were completed by each attendee.

Results and Discussion: In the regional courses the number of attendees who felt confident in obtaining ultrasound guided peripheral intravenous access increased from 8.3% (n=2) to 100% (n=24). For ultrasound guided arterial puncture confidence increased from 8.3% (n=2) to 95.8% (n=23). In the regional courses only 20.8% (n=5) of attendees felt that they had an understanding of the basics of ultrasound physics before the course compared to 95.8% (n=23) afterwards.

Conclusion: This project has demonstrated that an introductory ultrasound course for Foundation Programme Doctors can improve understanding of basic ultrasound principles and confidence in ultrasound guided peripheral intravenous access. Based on our analysis we recommend that basic and procedural ultrasound training be considered for inclusion in the core teaching of Foundation Programme Doctors. We also recommend that further courses be offered to all grades of doctors and members of the multidisciplinary team who perform these skills routinely.

7597

E-learning perceptions and satisfaction among anaesthesia residents during COVID-19 pandemic.

Ng R.¹, Che Omar S.¹, Zainal Abidin H.¹, Phang Y. Y.², Ibrahim K.³, Hassan S. K.¹

¹University Hospital Sains Malaysia - Kota Bharu (Malaysia), ²Hospital Tunku Azizah - Kuala Lumpur (Malaysia), ³University Hospital Sains Malaysia - Kota Bharu (Malaysia)

Background and Goal of Study: Adoption of severe measures to counteract the spread of infection during COVID-19 pandemic has impacted education system as a whole. Internet has taken the major role in supporting e-teaching, remote working, online collaboration and etc. The transition from conventional (face to face) learning to online learning had given rise to both, positive and negative effects to the students. We conducted a descriptive cross-sectional study to assess the perceptions and satisfaction of e-learning among anaesthesia residents in Universiti Sains of Malaysia which is a tertiary teaching hospital.

Materials and Methods: This study was conducted from May to June 2021. A total of 80 anaesthesia residents were recruited in this study and was given a study code. Validated Questionnaires was distributed in google forms via telecommunication messages after obtaining informed consent. 69 collected samples were further grouped into younger (35 respondents) and older group (34 respondents) according to below or above mean age. The level of satisfaction and student online readiness measurement were presented in the form of proportion (%). For satisfaction, score 30 or more in Domain 2 were indicated as yes, vice versa. For student online readiness score 57 or more were indicated as yes, vice versa.

Results and Discussion: 86.3% students responded with mean age of 34.55 (SD = 2.047). Despite slightly low mean score on satisfaction (M = 29.51-30.15, SD = 3.9-6.48 in all respondents or in both age group), 59.4% were satisfied with e-learning continuous medical education (CME) provided by the institution. CME content arrangement was satisfactory but 43.3% disagreed that e-learning was as effective as face-to-face learning. The main advantage of e-learning is the convenience to attend CME from any location, nevertheless network connection problem, lack of self-discipline and poor learning environment may be the concern to the anaesthesia residents.

Conclusion: E-learning CME was beneficial to anaesthesia residents in Universiti Sains Malaysia during COVID-19 pandemic where face-to-face learning was relatively impossible. An upgrade on the network connection may increase the satisfaction among the residents. Further study needed to assess the effectiveness of e-learning CME provided by the institution.

7616

Emotional intelligence as a determinant factor in job satisfaction of anaesthesiologists

Ferreira L.¹, Rodrigues A.¹, Pedreira J.¹, Aires J.¹, Fidalgo A.¹, Bernardino A.¹

¹Centro Hospitalar e Universitário de Coimbra (CHUC) - Coimbra (Portugal)

Background and Goal of Study: Emotional intelligence (EI) has gained a significant role in the search for better practises.¹ This study aims to evaluate how the EI of anaesthesiologists influences satisfaction in the workplace.

Materials and Methods: Descriptive, analytical and observational study, carried out between May and December 2020. Anaesthesiology specialists and residents were asked by e-mail to fill out 2 surveys with sociodemographic variables and professional career information. Assessment of EI: WLEIS-P2 scale, 16 questions in Likert scale: 0-never to 6-always; 4 dimensions: self-assessment of own emotions (SOE), evaluation of others' emotions (EOE), control of one's emotions (COE) and use of emotions for performance (UEP). Satisfaction assessment: a survey with 24 positive statements aimed at emotional engagement and job satisfaction, in Likert scale: 0-totally disagree to 4-totally agree. Statistical analysis with SPSS 24.0®, level of significance of 5%.

Results and Discussion: 109 participants, mostly women, with a median age of 32 years old, married, specialists, weekly workload greater than 40 hours. Survey reliability: Cronbach's alpha greater than 0.7, non-normal distribution. Medians of 19 in all dimensions, except EOE with a median of 18. No statistically significant differences between variables and scale dimensions, except for the hourly load and the UEP dimension ($p=0.040$), with professional with workload above 40 hours presenting a higher mean rank. A statistically significant association was found between EI and questions "I feel good in the workplace" $p=0.004$, "Good relationship with managers" and "I feel professionally carried out" $p=0.017$; and "I feel proud to belong to the service" $p=0.020$.

Conclusion: Emotional intelligence was very balanced with large values. Women are usually more emotional and men have better control over emotions³; it didn't happen in this study. Professionals with higher workloads showed higher levels of EI in UEP, which agrees with some studies linking positive emotional states with performance. The results of this study also showed the greater the EI, the better the involvement, professional sense of accomplishment and relations within the organization.

References:

1. Social and Personality Psychology Compass. 2011; 5: 88-103.
2. Psychologica. 2011; 55: 189-207.
3. Psicothema. 2006; 18: 13-25.

7653

Steady Medical Officer Readiness Training: Increasing preparedness for COVID-19 Intensive Care Unit in Singapore

Teh Y. Y.¹, Liew C.¹, Chan W. F.¹, Chew M. F.¹

¹Department of Anaesthesiology, Intensive Care Medicine, and Pain Medicine, Tan Tock Seng Hospital - Singapore (Singapore)

Background and Goal of Study: Singapore's first COVID-19 patient was diagnosed in January 23, 2020, with first intensive care unit (ICU) admission on February 5, 2020. Increasing critical care surge capacity was amongst the top priorities, which involved deployment of anaesthesia medical officers (MO) to work in the COVID-19 ICU, also known as outbreak ICU (OICU), in the National Centre for Infectious Diseases (NCID). We hypothesised that a targeted training programme will strengthen their readiness and preparedness in (a) medical knowledge (b) practical knowledge, and (c) infection control principles, in anticipation of a rapidly escalating pandemic.

Materials and Methods: An empirical interventional study involving 23 MO from Department of Anaesthesia was undertaken to evaluate the effect of a focused training programme on the readiness for OICU work. The study consisted of three parts: 1) a survey of self-perceived preparedness for OICU work in terms of medical and practical knowledge,

and infection control knowledge; 2) identification of learning needs, followed by an education programme comprising reading material, case-based learning tutorial and a practical simulation session; 3) a repeat survey, after OICU rotation, of self-perceived confidence and feedback on programme satisfaction. Two-sample t-test was used to test the difference in self-reported confidence level pre and post training. A p-value less than 0.05 was considered statistically significant.

Results and Discussion: Significant improvements were seen in the confidence level across all aspects after the training [mean diff 0.93-1.33; $p<0.001$]. Ventilation strategies were among the top key topics identified as important knowledge, followed by ARDS and COVID theory. All found the program useful, with simulation sessions being most useful, followed by tutorial. Pre-reading material was deemed least useful. More simulation and topics were favoured for future programme.

Conclusion: The Steady Medical Officer Readiness Training is effective in improving medical officer's readiness and confidence in OICU work. It can be incorporated into outbreak response to provide timely medical education to support the delivery of high-quality, evidenced-based care during the redeployment and cross-skilling in this pandemic.

COVID19

6532

One Anesthesia Machine Supporting Multiple COVID-19 Ventilated Patients

Paul J.¹, Lilley T.¹, de Armendi A.¹

¹Oklahoma University Health Sciences Center - Oklahoma City (United States)

Background and Goal of Study As coronavirus (COVID-19) patients requiring respiratory support increases, available ventilators decreases. This research presents an alternative solution to the lack of ventilators: one anesthesia machine supporting several COVID-19 intubated patients.

Materials and Methods: Patients' circuits are arranged in parallel. Airway resistance is similar between all patient's circuits. As per Ohm's law, with equal inspiratory pressure, flow is equivalent ($Q=\Delta P/R$). With equal compliance, at a given inspiratory pressure, tidal volumes are equal ($C=\Delta V/\Delta P$) [Figure 1]. From assembled respiratory/anaesthesia equipment, one anesthesia machine ventilates multiple patients. Connect a T-piece (Figure 2) to a connector that connects to two other t-pieces constructing a t-piece manifold that eventually connects to the anesthesia machine inspiratory and expiratory limbs. Repeated this process as needed. With a 2000 milliliters (mL) anesthesia machine bellow, 20 pediatric patients (10 kg X 10 ml/kg X 20 patients = 2000 ml) may be ventilated. Lastly, connect the inspiratory and expiratory limbs of the anesthesia circuits to the t-piece manifold on the anesthesia machine. CO2 monitoring may be obtained at the anesthesia machine or at an external CO2 monitoring unit. A pressure monitoring/positive end expiratory pressure administration unit, microbial filters, and heating devices may be inserted throughout as needed. For spontaneously breathing patients, expiratory one-way valve may be used to avoid contamination of other patients.

Results and Discussion: Due to COVID-19 decreased attendance at the ASA, we have been asked to present this same abstract at an international meeting in order to disseminate its clinical important information worldwide in the care of COVID-19 infected ventilated patients while decreasing the lack of ventilator induced death and help mankind during the coronavirus pandemic and future pathogen exposures.

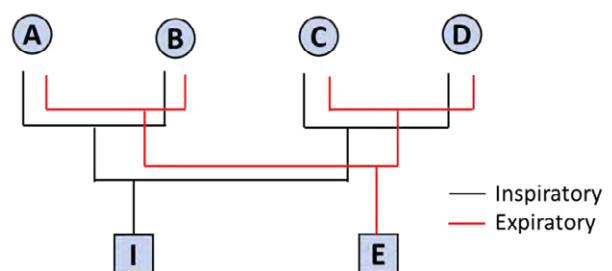


Figure 1. Schematic representation of multiple ventilation in parallel.



Figure 2. Inspiratory and Expiratory Circuit Limbs Connected to Anesthesia Machine



Figure 1A: One wall oxygen outlet being split into four pipeline supplies through the use of three Y-piece splitters.



Figure 1B: Four Percussionaire™ pneumatic-driven ventilators shown ventilating a variety of surrogate lungs.

6533

Pneumatic-Driven Ventilator Solution for COVID-19 Ventilator Supply-Demand Mismatch

de Armendi A.¹, Paul J.¹, De Armendi P.¹, De Armendi J.¹, Lilley T.¹
¹Oklahoma University Health Sciences Center - Oklahoma City (United States)

Background and Goal of Study: Care to coronavirus (COVID-19) infected patients is limited by the number of ventilators. We demonstrate a method of expanding ventilatory support supply. Using single pipeline end-source wall oxygen outlet that splits (Figure 1A) into three two-way splitters successfully ventilates four theoretically pneumatic-driven vented patients arranged in parallel (Figure 1B).

Materials and Methods: At constant 50 PSI of pressure, pneumatic-controlled-device is time controlled for tidal volume (TV) and frequency (respiratory rate). Using the AincAÔ Electronic Respirometer Model-295, four Percussionaire™ Model IPV™-1C units were analyzed to deliver reproducible TVs. The Percussionaire™ Corporation has determined that the IPV™-1C/IPV™-2C may be used as ventilators as long as: 1) external alarm is added or patient is attended, 2) humidification is added between the patient and PhasitronÔ, and 3) standard patient monitoring is used. Recently, Percussionaire™ Corporation has made available the TXP™-5 emergency ventilator with similar mechanics.

Results and Discussion: Advantages to using Percussionaire™ pneumatic-driven ventilators include: 1) runs on hospital wall gas, blended gas, oxygen cylinders or mobile compressors 2) no electrical power source needed, 3) provides invasive/non-invasive ventilation, and 4) minimal training required. A major limitation of our project is that there is no clinical proof-of-concept. And, the theoretical exhaust of the ventilator expelling viral particles into the room may be offset by the utilization of HEPA filters at the junction between the device and the patient. While a pneumatic-driven ventilator solution is less than optimal, the potential alternative exists during emergency circumstances of ventilator supply-demand mismatch when medical resources are overwhelmed by pandemics/other mass casualty events.

Conclusion: Due to COVID-19 decreased attendance at the ASA, we have been asked to present this same abstract at an international meeting in order to disseminate its clinical important information worldwide in the care of COVID-19 infected ventilated patients while decreasing the lack of ventilator induced death and help mankind during the coronavirus pandemic and future pathogen exposures.

6582

Tracheal intubation while wearing personal protective equipment in simulation studies: a systematic review and meta-analysis with trail-sequential analysis.

Tigano S.¹, Morgana A.², La Rosa V.³, Murabito P.¹, Sanfilippo F.¹, Astuto M.¹

¹University Hospital Policlinico "G. Rodolico" - Catania (Italy), ²Magna Graecia University - Catania (Italy), ³Humanitas Clinical Institute - Catania (Italy)

Background and Goal of Study: Tracheal intubation in patients with coronavirus disease-19 is a high-risk procedure that should be performed with personal protective equipment (PPE)[1]. The influence of PPE on operator's performance during tracheal intubation remains unclear.

Materials and Methods: We conducted a systematic review and meta-analysis of simulation studies to evaluate the influence of wearing PPE as compared to standard uniform regarding time-to-intubation (TTI) and success rate. Subgroup analyses were conducted according to device used and operator's experience.

Results and Discussion: The TTI was prolonged wearing PPE (eight studies): Standard Mean Difference (SMD) -0.54, 95% Confidence Interval [-0.75,-0.34], p<0.0001. Subgroup analyses according to device used showed similar findings (direct laryngoscopy, SMD -0.63 [-0.88,-0.38], p<0.0001; videolaryngoscopy, SMD -0.39 [-0.75,-0.02], p=0.04). Considering operator's experience, non-anesthesiologists had prolonged TTI (SMD -0.75 [-0.98,-0.52], p<0.0001) while the analysis on anesthesiologists did not show significant differences (SMD -0.25 [-0.51,0.01], p=0.06). The success rate of tracheal intubation was not influenced by PPE: Risk Ratio (RR) 1.02 [1.00,1.04]; p=0.12). Subgroup analyses according to device demonstrated similar results (direct laryngoscopy, RR 1.03 [0.99,1.07], p=0.15, videolaryngoscopy, RR 1.01 [0.98,1.04], p=0.52). Wearing PPE had a trend towards negative influence on success rate in non-anesthesiologists (RR 1.05 [1.00,1.10], p=0.05), but not in anesthesiologists (RR 1.00 [0.98,1.03], p=0.84). Trial-sequential analysis indicated the lack of power of results for success rate, but confirmed those for TTI.

Conclusion: Under simulated conditions, wearing PPE delays the TTI as compared to dressing standard uniform; more studies are needed to

confirm the influence on success rate. Performing tracheal intubation with direct laryngoscopy seems influenced to a greater extent as compared to videolaryngoscopy. Similarly, wearing PPE affects more the non-anesthesiologists subgroup as compared to anesthesiologists.

References:

1. Yao W, Wang T, Jiang B, Gao F, Wang L, Zheng H, et al. Emergency tracheal intubation in 202 patients with COVID-19 in Wuhan, China: lessons learnt and international expert recommendations. *Br J Anaesth*. 2020 Jul;125(1):e28–37.

6619

Safe use of FFP2 masks: The current certification method has no predictive value for the fit and safety of face masks when used by health care workers and is disproportionately unsafe for women

Galli S.¹

¹*Haaglanden Medisch Centrum - Den Haag (Netherlands)*

Background: A Dutch hospital searched for a new supplier of FFP2 mask in March of 2021 and performed preliminary quantitative fit test on a sample of 33 Health Care Workers (HCWs).

Method: A Quantitative Method Ambient Particle Counting with a TSI PortaCount according to the HSE INDG479 was used and compared with the EN149 norm.

Results and Discussion: In 5 of the 7 tested masks (71%) the norms for the EN149 was not met, with a fail rate of 23-82% and a 14-50% fail rate to even pass the FFP1 threshold of 22% leakage. Furthermore, HCWs wearing a failing brand had a 22% risk of having during at least one exercise a 100% leakage with no measurable concentration difference whatsoever between inside and outside the FFP2 mask. If the mask passed the EN149 norm, this risk was diminished to 1,7%. There was a clear gender difference with woman being up to 90% more likely to fail the fit test. Furthermore, the questionnaires showed that if we were to rely solely on fit-checking alone, a self-test advised among others by NHS self-assessment guidelines, HCWs would not have detected a little over half the failing masks.

Conclusion: Certification does not seem to protect from even severely failing FFP2 masks and woman are much more affected than men. This appears to be the result of the certification method that does not consider testing on women mandatory despite women making up to 85% of HCWs and the longstanding industry standard to perform the leakage test (TILT) solely on a manikin, a Sheffield head that comes in one size only. One study found, that after intubating a COVID-19 patients, female HCWs were more at risk of contamination with a hazard ratio of 1.36 [K. El-Boghdady 2020]. This has prompted the question whether the gendered PPE design can account for high infection rates in female healthcare workers following intubation, as there is no such biological difference in the general population [M.C. Turner 2021]. The extend of the leakage measured in this study supports this theory.

Going forward we need more research, more inclusive certification and better representation of women at decision-making level. In the meantime a webpage has been set up where HCWs can look up the full results of the different masks, get instructions on how to perform (shortened) fit tests in their own facilities and the option to share test results to help share and expand knowledge[1] and keep each other safe: <https://www.reusablemasks.nl/testresults-of-ffp2-masks>.

6623

An old foe: Cytomegalovirus superinfection in Covid-19 patients

Tümer M.¹, Sağlam C. E.¹, Kılıçaslan B.¹, Akıncı S. B.¹

¹*Hacettepe University School of Medicine - Ankara (Turkey)*

Background: Cytomegalovirus (CMV) reactivation is a condition that can develop secondary to prolonged mechanical ventilation (MV) in patients who are not immunosuppressed and can increase mortality (1). Recent studies report that Covid-19 disease may be a risk factor for CMV reactivation (2, 3). In this case series, we aim to report three cases of CMV superinfection in Covid-19 patients admitted to the Intensive Care Unit (ICU) due to respiratory failure.

Case series: Three cases out of 185 patients admitted to Hacettepe University Anesthesia COVID ICU between March 2020-May 2021 were identified as CMV reactivation. All patients were diagnosed with positive COVID-19 PCR in nasopharyngeal swab testing. Demographical, clinical, and laboratory data are shown in Table 1. Chest computed tomography (CT) images are shown in Figure 1. All three patients received steroid treatment due to COVID-19 associated respiratory failure. Acute phase reactants were not helpful to detect CMV reactivation. Two patients died in the ICU. One patient with many comorbidities and had previously received long-term immunosuppressant treatment due to renal transplantation could be discharged alive from the service. We attributed this outcome to our early suspicion of CMV reactivation and early initiation of testing and treatment for CMV coinfection.

Conclusion: Early suspicion of CMV reactivation, early initiation of testing and treatment for CMV reactivation may decrease mortality in CMV reactivation in COVID-19 patients. Therefore, we recommend CMV screening in COVID-19 patients at ICU admission and when there is a deterioration in the clinical condition of the patient during the ICU stay.

References:

- Luyt, C. E. et al. (2007). *American journal of respiratory and critical care medicine*, 175(9), 935-942.
- Le Balç'h, Pet al. (2020). *Critical Care*, 24(1), 1-3.
- Kadambari, S. et al. (2020). *Reviews in medical virology*, 30(5), e2144.

6627

Influence of the COVID-19 pandemic and general containment on the per- and post-operative complications of cesarean section

Hend K.¹, Yasmine E.², Anouar J.², Kamel K.²

¹*Hopital Habib Bourguiba - sfax (Tunisia)*, ²*Hopital Hedi Chaker - sfax (Tunisia)*

Background and Goal of Study: The Covid-19 pandemic has been developing in Tunisia officially since 2 March 2020. On March 20, the National Security Council announced general confinement which lasted until 4 May 2020. Unlike any medical activity, the obstetric activity could not be postponed or canceled. The management of these parturients was adapted and modified in order to limit the risks of the virus spreading. The aim of this study was to determine the rate of caesarean sections in our department and to identify per and post-operative complications occurred after confinement by comparing them with those occurred during the same period of the previous year.

Materials and Methods: This is a prospective descriptive comparative study carried out in the obstetrics gynecology department of 444 cases of cesarean sections over a period of 6 weeks divided into two groups as follows: Group 1: Caesarean sections performed from 05 May 2019 to 26 May 2019. Group 2: Caesarean sections from 05 May 2020 to 26 May 2020 (just after the confinement). In our study, to compare between the 2 groups we used the pre-anesthesia consultation, the pregnancy follow-up, the complication rate, the type of complication and the death rate.

Results and Discussion: During this period, 444 cesarean sections were performed with 235 in group 1 and 209 in group 2. In both groups, parturients underwent an anesthesia consultation in a comparable fashion with a p=0.467. They were followed in a comparable fashion with p=0.911. No difficulty with anesthesia was encountered in the 2 groups. The rate of maternal and fetal complications between the two groups is

comparable with $p=0.517$. It is 13.6% for group 1 and 12.4% for group 2. Traumatic complications were noticed in a single case (bladder wound). Bleeding complications accounted for 25% of all complications in group 1, 19% of all complications in group 2. Hemostatic hysterectomy was observed in 2 patients in group 1 and only 1 patient in group 2. Only 1 death was observed in group 2.

Conclusion: The covid 19 virus has changed our lifestyle and has disrupted the organization of the health structure and the care of patients. The experience of our center has shown that maintaining routine monitoring of pregnant women has avoided collateral damage.

6649

Females with chronic pain experienced a more pronounced aggravation than males during the first COVID-19 lockdown

Lang-Ilievich K.¹, Rumpold-Seitlinger G.¹, Szilagyi I.¹, Sailer M.¹, Klivinyi C.¹, Bornemann-Cimenti H.¹

¹Medical University of Graz - Graz (Austria)

Background and Goal of Study: The effects of COVID-19 itself or its psychosocial consequences on people with chronic pain have not been fully studied. The aim of this study was to reveal differences between sexes in the development of chronic pain during the first COVID-19 lockdown in German speaking countries.

Materials and Methods: An open web-based survey was conducted from July 1 to July 15, 2020 (1). Participants were recruited through self-help groups in Germany, Austria, and Switzerland. We calculated the differences of self-reported mean pain levels before and after the first COVID-19 lockdown and compared it between sexes.

Results and Discussion: A total of 579 questionnaires of 138 men and 441 women were included in the analysis. The mean age of the respondents was 42.2 ± 17.4 years. The mean pain intensity (VAS 0-100) before the first COVID-19 lockdown was 46.5 ± 20.9 for males and 44.9 ± 18.9 for females ($p=0.45790$). The mean change of pain intensity was 0.8 ± 12.6 for males and 3.9 ± 15.6 for females ($p=0.02709$). Our data clearly show that, although there was no difference in the mean pain intensity before COVID-19, females had a higher incidence of aggravation of chronic pain during the first COVID lockdown. Previous studies have demonstrated that the psychosocial effects of the COVID-19 pandemic considerably differ between sexes. Generally, women are higher affected as preexisting disparities in contributions to paid work and family responsibilities were exacerbating. (2) Anxiety, depression and acute stress were more prevalent in females.(3) These factors could contribute to our observation.

Conclusion: In conclusion, females had a higher risk for aggravation of chronic pain during the first COVID-19 lockdown.

References:

1. Lang-Ilievich K, Rumpold-Seitlinger G, Szilagyi IS, Dorn C, Sailer M, Schitteck GA, Klivinyi C, Bornemann-Cimenti H: Biological, psychological, and social factors associated with worsening of chronic pain during the first wave of the COVID-19 pandemic: a cross-sectional survey. *BJA* 2021
2. Czymara CS, Langenkamp A, Cano T: Cause for concerns: gender inequality in experiencing the COVID-19 lockdown in Germany. *European Societies* 2021
3. García-Fernández L, Romero-Ferreiro V, Padilla S, López-Roldán PD, Monzó-García M, Rodríguez-Jimenez R: Gender differences in emotional response to the COVID-19 outbreak in Spain. *Brain and Behaviour* 2020

6671

Dynamics of coagulopathy and clinical outcomes in severe COVID-19 patients

Schwartz R.¹, Lichter Y.¹, Adi N.¹, Avivi I.¹, Katz B. Z.¹

¹Tel Aviv Sourasky Medical Center - Tel Aviv (Israel)

Background and Goal of Study: The pathophysiology behind the severe oxygenation and ventilation failure in critically ill COVID-19 patients includes both fibrin and thrombi deposition along with tissue destruction. Characterization of coagulopathy in COVID-19 is confusing, since disseminated intravascular coagulation (DIC) indicators were previously demonstrated while other studies point to hyper-coagulable state. We aimed to analyze the dynamics of coagulation parameters, clot properties and clinical outcome during the hospitalization of severe COVID-19 patients.

Materials and Methods: In this retrospective observational study, all consecutive COVID-19 patients hospitalized in the intensive care unit (ICU) at the Tel Aviv Sourasky Medical Center between March 10th and April 25th 2020 were included. Demographics, medical treatment and clinical outcomes were obtained. Levels of D-dimers, fibrinogen, platelet count, and prothrombin time were repeatedly measured. Thromboelastogram (TEG) parameters and the activity of FVIII (risk factor for thrombophilia) and FXIII (effects thrombi stability) were also examined.

Results and Discussion: Seventeen COVID-19 patients were admitted to the ICU and included in the analysis. Their medical history included HTN, DM and obesity among other comorbidities, at similar rates as reported in other severe COVID-19 cohorts. All patients received some form of anticoagulation. Coagulation profiles ruled out DIC in all patients. Repeated TEG measurements exhibited lower than the normal R values in 5 (30%) of the patients and alpha angle values higher than normal in 8 (47%), with no increase in global fibrinolysis, indicating a hypercoagulable state and rapid clot formation. We found similar trends of fibrinogen and CRP concentrations, but inverse dynamics of fibrinogen and D-dimer levels throughout ICU hospitalization duration.

Increased FVIII levels were found in 88% tested patients. Reduced FXIII levels were found in 6 (75%) of these patients. In spite of thromboprophylaxis, 41% of patients developed venous thromboembolism, including 24% pulmonary embolism events.

Conclusion: We found three major factors that characterize coagulopathy in critically ill COVID-19 patients: continuous deposition of fibrin associated with local fibrinolysis; hypercoagulable state characterized both by thrombophilia and by accelerated clot formation; and tendency towards thromboembolism.

6741
Impact of the SARS-CoV-2 (COVID19) pandemic on the morbidity and mortality of high risk patients undergoing surgery: A non-inferiority study

Caballero Milán M.¹, Colomina M. J.¹, Viguera L.¹, Marin L. A.¹, Garcia S.¹, Pes A.¹
¹Hospital de Bellvitge - L'Hospitalet de Llobregat (Spain)

Background and Goal of Study: During the COVID-19 crisis it was necessary to generate a specific care network and reconvert operating rooms to attend emergency and high-acuity patients undergoing complex surgery. The aim of this study was to classify complications and mortality. **Materials and Methods:** Two different groups of surgical patients were created: Pre-pandemic COVID and Pandemic COVID., The severity of illness according to the Diagnosis-related Groups (DRG) score was assigned. Comparison were made for both groups and for DRG severity score-matched samples. Non-inferiority were established up to 10% difference for complications grade III to V, according to the Clavien-Dindo classification and up to 2% difference for mortality. **Results and Discussion:** A total of 1649 patients in the PreCOVID group and 763 patients in the COVID group were analysed; 371 patients were matched for DRG severity score 3-4 (236 preCOVID and 135 COVID). No differences were found in relation to re-operation (22.5% vs 21.5%) or late admission to critical care unit(5.1% vs 4.5%). Clavien grade III to V complication occurred in 107 patients (45.3%) in the PreCOVID group and in 56 patients (41.5%) in the COVID group, and mortality was 12.7% and 12.6%, respectively. During the pandemic, 3% of patients tested positive for Covid-19 on PCR as a postoperative complication; 12 patients undergoing elective surgery and 11 emergency surgery; there were 5 deaths, 3 of which were due to respiratory failure following Covid-19- induced pneumonia.

Figure 1: Summary of patients reviewed

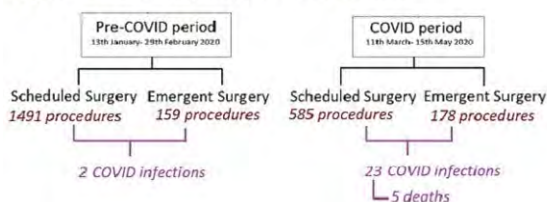


Figure 2: Patient demographics and outcomes in both study periods (preCOVID and COVID groups)

PERIOD	PRECOVID GROUP (n=1649)	PRECOVID ELECTIVE (n=1490)	PRECOVID EMERGENT (n=159)	COVID GROUP (n=763)	COVID ELECTIVE (n=645)	COVID EMERGENT (n=118)	PRECOVID vs COVID (p value)
Age, years (IQR)	62.2 (51.8 - 62.7)	62 (51.3 - 62.8)	61.7 (50.7 - 66.7)	66.1 (56.8 - 67.7)	63.1 (51.8 - 64.4)	64.6 (51.9 - 67.4)	0.065
Male sex, n (%)	899 (54.5)	807 (54.2)	92 (57.9)	379 (49.7)	341 (48)	38 (32.2)	0.008
SPECIALTY							0.028
Digestive and Gastroenterological, n (%)	461 (27.9)	391 (26.2)	70 (44)	177 (23.2)	135 (21.4)	42 (35.6)	
Orthopaedics and Trauma, n (%)	294 (17.8)	264 (17.7)	30 (18.9)	140 (18.3)	85 (14.5)	55 (46.6)	
Plastic and Reconstructive, n (%)	288 (17.5)	276 (18.5)	12 (7.6)	148 (19.4)	140 (22.2)	8 (6.8)	
Cardiovascular and Thoracic, n (%)	255 (15.5)	271 (18.2)	20 (12.6)	138 (18.1)	112 (17.6)	26 (22.1)	
Neurosurgery, n (%)	180 (10.9)	138 (9.3)	22 (13.8)	68 (9)	50 (7.8)	18 (15.3)	
Urology, n (%)	130 (7.9)	130 (8.7)	5 (3.1)	91 (11.9)	81 (12.7)	10 (8.5)	
DRG SEVERITY							
1-2 (%)	143 (8.7)	138 (9.2)	5 (3.1)	650 (85.2)	500 (77.5)	128 (108)	0.023
3-4 (%)	236 (14.3)	172 (11.5)	64 (40.3)	135 (17.7)	85 (14.5)	50 (42.4)	0.084
DRG RISK							
1-2, n (%)	1485 (90.1)	1328 (89.5)	107 (67.3)	600 (78.6)	524 (81.2)	126 (106)	0.000
3-4, n (%)	164 (9.9)	118 (7.8)	52 (32.7)	115 (15.1)	61 (9.5)	52 (43.8)	0.000
REINTERVENTION, n (%)	138 (8.4)	112 (7.5)	26 (16.4)	55 (7.2)	38 (5.9)	17 (14.5)	0.375
ICU ADMISSION							
For protocol, n (%)	470 (28.5)	430 (28.9)	40 (25.1)	130 (17)	102 (17.4)	28 (23.7)	0.600
Late admission, n (%)	20 (1.2)	11 (0.7)	9 (5.6)	18 (2.4)	15 (2.3)	3 (2.5)	
CLAVIEN-DINDO							
I, n (%)	1445 (87.6)	1320 (89.3)	75 (47.1)	580 (76)	504 (78.1)	77 (65.3)	
II, n (%)	84 (5.1)	50 (3.4)	34 (21.4)	108 (14.1)	42 (6.5)	66 (55.9)	
III, n (%)	9 (0.5)	4 (0.3)	5 (3.1)	9 (1.2)	3 (0.5)	6 (5.1)	
IV, n (%)	31 (1.9)	20 (1.3)	11 (6.9)	23 (3)	15 (2.3)	8 (6.8)	
V, n (%)	25 (1.5)	13 (0.9)	12 (7.5)	18 (2.4)	10 (1.6)	8 (6.8)	
IV+V, n (%)	24 (1.5)	15 (1)	9 (5.6)	13 (1.7)	8 (1.2)	5 (4.2)	
V, n (%)	31 (1.9)	18 (1.2)	13 (8.2)	17 (2.2)	10 (1.6)	7 (5.9)	
ICU	120 (7.3)	70 (4.7)	50 (31.1)	75 (9.9)	40 (6.2)	35 (29.7)	0.037
Length of stay (days)	10 (9-11)	8.1 (8-10.1)	18.7 (14.7-22.7)	8.6 (8-11.1)	7.8 (6.9-8.7)	17 (14.3-22.3)	0.174
DESTINATION AT DISCHARGE							
Home (%)	63.1	50	58.5	70.9	73.1	63.5	
Death (%)	1.8	1.2	8.2	3.2	0.9	6.7	0.048
Nursing home (%)	35.1	28.8	33.3	26.9	26	29.4	

Both periods (PRECOVID group and COVID group) are subdivided into elective and emergency surgery. DRG: Diagnosis Related Groups. Statistical analysis: Chi-square tests to compare the categorical variables, and the subtraction of variables using parametric or non-parametric tests for the continuous variables

Conclusion: Although this study has some limitations, it has showed the non-inferiority outcome of surgery performed in the COVID period. Hospitals can safely resume elective surgery during a pandemic if protective protocols are implemented. In summary, this study indicates that reassuming surgery in a pandemic is safe.

6766
Skin failure, another aspect of the COVID-19 narrative, following the second Astra-Zeneca vaccine (AV) - toxic epidermal necrolysis (TEN) on the spectrum of Steven-Jonson syndrome (SJS)

McCrea M.¹, Weerasekara T.¹
¹South West Acute Hospital (SWAH) - Enniskillen, County Fermanagh, Northern Ireland (United Kingdom)

Background: Vaccine development has been the mainstay of fighting the COVID-19 pandemic. TEN is a very rare but extensive cutaneous denudation and necrosis that has been associated with medication use. **Case Report:** An 80 year old female presented with 7 days history of malaise and new rash after receiving the second dose of the AV. She was COVID negative with severe penicillin allergy. The rash became progressively more extensive, painful, erythematous, bullous with sloughing over 60% of her skin -especially on the trunk, arms and legs with the face fairly spared. She was diagnosed with TEN and admitted to ICU with skin failure, for burns-like treatment. This included careful fluid balance, pain relief and infection control. She received intravenous immunoglobulin, steroids, morphine and pregabalin. Her airway was never seriously affected and 7 days post admission she was discharged. **Discussion:** To our knowledge this is the first instance of AV associated with TEN. Severe mucocutaneous reaction management includes control of neuropathic pain, infection and airway. There is no established positive relation between other vaccines and TEN (1). There continue to be many unknowns in the aetiology of both TEN/SJS and in the potential side effects of treating and preventing COVID-19. The patient's immune system may have been activated by the AV, mimicking the virus, or the vaccine constituents (2) played a part, worsened by the patient's allergic history.

References:
 1. Grazina et al. Is there an association between Steven-Jonson syndrome and vaccination? A systematic review Ann Ig 2020; 32(1):81
 2. Leventhal et al. Hypersensitivity reactions to vaccine constituents: a case series and review of literature Dermatitis 2012; 23(3):102
 3. www.cdc.gov
Learning points: We must be vigilant in assessing our patients and continue the multidisciplinary management of such conditions. Vaccines remain the only way of fighting COVID. The Centre for Disease Control advises the uptake of all the available COVID vaccines regardless of allergic history-unless there is specific allergy to the constituents as the benefits much outweigh the risks (3).



Photo: back and hand of patient

6769
Influence of Covid-19 pandemic on waiting time for emergency surgery

Mandic M.¹, Kovac N.¹
¹University Hospital Center Zagreb - ZAGREB (Croatia)

Background and Goal of Study: In 2020 Covid-19 pandemic changed European healthcare on a massive scale. To ensure the safety of anesthesia and surgical staff during pandemic, UHC Zagreb, Croatia, implemented mandatory Covid-19 testing of all patients undergoing surgery. PCR-testing for SARS-CoV-2 virus is a time-consuming process, resulting in longer stay in ED. The goal of this study is to compare the door-to-OR-table times in 2020 with those of pre-pandemic 2019 and evaluate whether there was a significant delay in care available.

Materials and Methods: We accessed ED and surgical list data of patients admitted through ED and undergoing surgery within 24 hours of admission. Time of entry to the ED was recorded, as well as time of start of surgery, and door-to-OR-table time was calculated. Those times were then compared to door-to-OR-table times of patients admitted in the same periods during 2019. Patient demographic data is included in Table 1.

	17/3-10/5 2019	26/10-26/12 2019	1.lockdown	2.lockdown	p value
M	128	116	120	116	NA
F	64	97	90	95	NA
total	192	214	210	211	NA
Age (range)	39 (1-93)	43 (0-99)	48 (1-91)	45 (1-94)	NA
ED waiting time (hours)	8:17 (±5:51)	7:09 (±4:48)	9:01 (±5:58)	10:22 (±5:04)	1. lockdown/2019 p = 0.2 2. lockdown/2019 p<0.001

Results and Discussion: In comparing data from spring 2019 to 2020 there was no significant delay in door-to-OR-time for patients being admitted (mean time in hours 8:17 vs 09:01, p=0.2). However, in the autumn period when comparing time data there was significant delay of surgery evident for patients being admitted through ED in 2020 when compared to 2019 (mean time in hours 7:09 vs 10:25, p<0.001).

Conclusion: Patients undergoing emergency surgery during Covid-19 pandemic have experienced significant delay in definite surgical care when compared to patients in the 2019. Further goals of this study are to extend the timeframe to entire 2020 and examine whether that delay in care resulted in worse outcome for patients, including but not limited to higher ICU admittance, extended hospital length-of-stay (LoS) and increase in complications following surgery and reoperations.

6779
Stress factors in the Intensive Care Unit during the COVID19 pandemic

Nagy E.¹, Escher C.², Ericson M.³, Osika W.⁴, Castegren M.⁵, Meurling L.⁴. Center for Advanced Medical Simulation and Training (CAMST), Karolinska University Hospital
¹Karolinska University Hospital Stockholm - Stockholm (Sweden),
²Norrträlje Sjukhus - Stockholm (Sweden), ³Royal Institute of Technology - Stockholm (Sweden), ⁴Karolinska University Hospital - Stockholm (Sweden), ⁵Mälarsjukhuset Eskilstuna - Stockholm (Sweden)

Background and Goal of Study: The outbreak of the COVID19 pandemic had, besides the big impact on private and professional lives for the individual, also a big impact on health care systems worldwide and in this context especially on staff working in intensive care units (ICU). (1,2) Studies from China conducted during the COVID19 pandemic imply that healthcare professionals are exposed to massive psychological stress.(3) The aim of this prospective multicenter study is to investigate and analyze stress factors regarding the perceived stress level among coworkers in ICUs while caring for COVID19 positive patients. This study is conducted in Sweden at Karolinska University Hospital, Mälarsjukhuset Eskilstuna and Norrträlje Hospital during the pandemic.

Materials and Methods: All participants (n=542; physicians, nurses and nurse assistants) gave their written informed consent. Data on stress factor perception was collected using a questionnaire with a five-level Likert-type scale (Likert scale 1 = I strongly disagree, Likert scale 5 = I strongly agree). We focused on nine stress factors: making mistakes, getting infected, infecting someone else, not knowing my colleagues, not having enough knowledge of medical equipment/medication, not finding equipment when needed, that relatives cannot visit patients, that I do not know which ward I will be allocated to next, short term notice of shifts.

Results and Discussion: Concerning stress factors while working in the ICUs during the COVID19 pandemic, we could identify as main stress factor the concern of making mistakes (34,0%), followed by the short term notice of shifts (30,3%) as well as the fact that relatives were not allowed to visit the patients (28,5%). Interestingly, just 11,4% of the staff assessed the risk of getting infected, respectively, 16,8% the risk of infecting someone else as a main stress factor.

Conclusion: The knowledge gained during the COVID19 pandemic is unique and might contribute to a better preparedness for how times of exceeded workload, like in a pandemic, can be handled in both short and long terms. This study will contribute to improve conditions regarding work environment and to maintain staff wellbeing by highlighting factors that contribute to perceived stress.

References:

1. Adams JG, Walls RM, JAMA. 2020;323(15):1439-1440.
2. Bohlken J et al, Psychiatr Prax. 2020;47(4):190-197.
3. Lai J et al, JAMA Netw Open. 2020;3(3):e203976.

6788

Characteristics and outcome of 129 COVID-19 intensive care patients at a major teaching hospital in Vienna during the second wave

Zitzmann E.¹, Oberneder K.¹, Gustorff B.²
¹Sigmund Freud University Vienna - Vienna (Austria), ²Sigmund Freud University Vienna, Department of Anaesthesia, Intensive Care and Pain Medicine, Ottakring Hospital - Vienna (Austria)

Background and Goal of Study: Although lessons have been learned from the initial pandemic, the second COVID-19 wave in 2020 challenged intensive care. Our aim was to systematically analyze all COVID-19 patients admitted to our ICU to gain a better understanding of the disease, to improve further intensive care medicine and contribute to the worldwide COVID-19 record.

Materials and Methods: Setting: 2 ICUs at a major teaching hospital entirely equipped with electronic PDMS, obstetric COVID-19 center of Vienna. Inclusion: All consecutive intensive care patients who were admitted for confirmed COVID-19 between September 1st, 2020, and February 15th, 2021, follow-up until end of hospitalization. Main patient characteristics and outcome were retrospectively analyzed from electronic records and processed using descriptive statistics.

Results and Discussion: A total of 129 critically ill patients were analyzed presenting with a median SAPS-III of 60 (34-104) points and a median age of 66.5 (26-85) years, 66.7% were male. The median duration from symptom onset to ICU admission was 7.5 (1-30) days. Half of the patients (49.6%) were suffering from severe acute respiratory distress syndrome (ARDS, Horowitz index ≤ 100 mm Hg) on admission. Overall, 67.4% of patients required invasive ventilation for a median of 8 (0.25-38) days. 32.6% of patients did not require invasive ventilation. Varying spontaneous ventilatory techniques at the maximum escalation were oxygen via nasal cannula (2.4%); high-flow oxygen (26.2%), high-flow oxygen alternating with NIV mask (23.8%) and NIV mask (47.6%). ICU mortality was 31%. Among invasively ventilated patients, mortality was 42.5%. Survivors had a median ICU length of stay of 9 (2-73) days; non-survivors died after a median of 11 (2-36) days.

		Survivors vs. Non-Survivors		
		Total count (%)	Survivors n (%)	Non-Survivors n (%)
Sex	male	86 (66.7)	59 (45.7)	27 (20.9)
	female	43 (33.3)	29 (22.5)	14 (10.9)
Cardiovascular disease		92 (71.3)	57 (44.2)	35 (27.1)
Respiratory disease		27 (20.9)	15 (11.6)	12 (9.3)
Endocrine disease		82 (63.6)	57 (44.2)	25 (19.4)
Renal disease		33 (25.6)	18 (14)	15 (11.6)
Oncological disease		18 (14.0)	4 (3.1)	14 (10.9)
Chronic infectious disease		10 (7.8)	4 (3.1)	6 (4.7)
Psychiatric disease		33 (25.6)	20 (15.5)	13 (10.1)
Obesity (BMI ≥ 30)		60 (46.5)	43 (33.3)	17 (13.2)
Pregnancy		4 (9.3)	3 (7.0)	1 (2.3)

Table: Risk factors and Co-morbidity of all 129 COVID-19 ICU-patients, comparison of survivors and non-survivors.

Conclusion: Despite a substantial number of nearly 50% patients with severe ARDS, mortality is within the range of previously described ICU mortality rates. In addition, mortality in the group of mechanically ventilated patients is below the previously described rates confirming a high standard of care even during the second COVID-19 wave.

Acknowledgements: A special thanks to our ICU teams.

6811

Going beyond ECMO treatment: activity of a regional referral center in the context of COVID-19 pandemic

Accogli A.¹, Sales G.², Montrucchio G.², Bonetto C.², Fanelli V.², Brazzi L.²
¹Department of Surgical Science, University of Turin, Italy - Turin (Italy), ²Department of Anesthesia, Intensive Care and Emergency, 'Città della Salute e della Scienza' Hospital - Turin (Italy)

Background and Goal of Study: To face the high incidence of severe H1N1 related ARDS, in 2009 the Italian Health Authorities created the ECMOnet (Extracorporeal Membrane Oxygenation Network), a national network of experienced referral ICUs where more severe patients were transferred to receive higher specialized care, such as ECMO.^{1,2} Beyond the centralization of patients requiring extracorporeal support, the network has a primary role in supporting peripheral hospitals to improve patients' clinical management and outcome.² We report the summary of the activities carried out by our ECMO center, which is part of the ECMOnet, during COVID-19 pandemic.

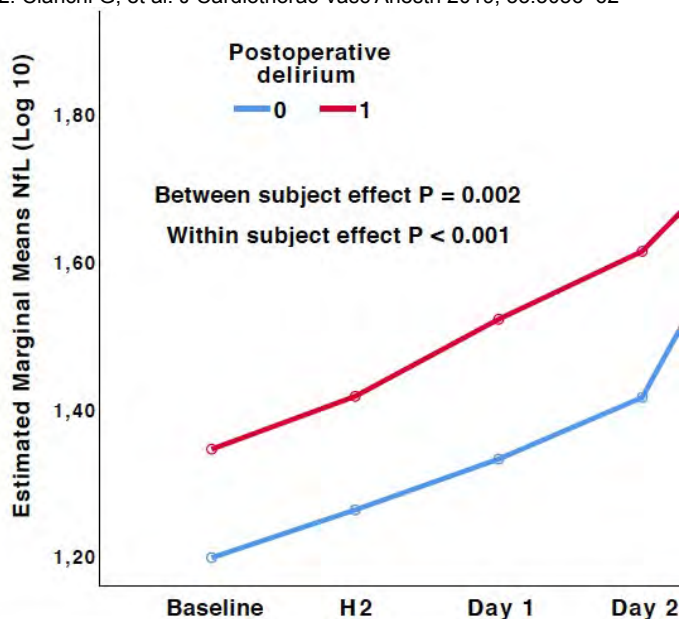
Materials and Methods : Demographic and clinical data of all patients proposed by Piedmont Hospitals for veno-venous ECMO treatment due to COVID-19 related ARDS to "Città della Salute e della Scienza" Hospital (Turin, Italy), between February and December 2020, were collected and analyzed retrospectively. ELSO indications were always used as selection criteria. Therapeutical strategies and outcome were recorded.

Results and Discussion: In the study period, 118 patients were assessed for ECMO: 35 patients underwent ECMO, while 83 did not (Table 1.A). In 36 cases, ECMO was avoided due to patients' clinical improvement achieved with ECMO team remote clinical support (Table 1.B.1) leading to an increase of median PaO₂/FiO₂ from 88 (IQR:74-100) to 140 (IQR:115-168). Even in the remaining 43 cases in which ECMO was not indicated for major exclusion criteria (Table 1.B.2), ECMO team remote clinical support led to clinical improvement in 37% of cases (median PaO₂/FiO₂ from 77 [IQR:69-95] to 110 [IQR:99-182]).

Conclusion: This experience seems to suggest how an early and continuous interaction between peripheral hospitals and the ECMO referral center allows not only to guarantee patients who need it to undergo a highly complex treatment such as ECMO, but also to limit its use to selected cases especially in a context where resources are particularly valuable such as during a pandemic.

References:

1. Patroniti N, et al. Intensive Care Med 2011; 37:1447-57
2. Cianchi G, et al. J Cardiothorac Vasc Anesth 2019; 33:3056-62



6814

How did the COVID-19 pandemic confinement period affect surgical emergencies? A descriptive approach.

Rivera H.¹, Vall M.¹, Larrañaga L.¹, García M.¹, Membrilla E.², Álvarez J.¹
¹Department of Anaesthesia and Intensive Care Medicine, Hospital del Mar - Barcelona (Spain), ²Department of Surgery, Hospital del Mar - Barcelona (Spain)

Background and Goal of Study: During the first wave of the SARS-COV-2 pandemic, healthcare activity had to adapt in order to maintain an acceptable level of medical assistance amidst a collapsing healthcare system. The goal of this study aims to describe the changes in emergency surgical activity at a general hospital.

Materials and Methods: We retrospectively registered all emergency surgeries (defined as those not planned within the previous 24h) during the stricter period of confinement and compared with the same period of the previous year.

Results and Discussion:

Type of Surgery	2019	2020	% change
Appendectomy	52	29	-44.23%
Cholecystectomy	27	12	-55.56%
Hernioplastia	14	5	-64.29%
Bowel obstruction	9	5	-44.44%
Abdominal surgery revision	14	2	-85.71%
Non-abdominal surgical revision	12	4	-66.67%
Exploratory laparotomy of non-occlusive pathology	23	13	-85.71%
Perianal abscess debridement	11	12	+9.9%
Sacral ulcer debridement	2	3	+50%
Other debridements of soft tissues	13	6	-53.85%
Necrotizing fasciitis	5	3	-40%
Stab wounds	5	5	0%
Percutaneous gastrostomy	2	7	+250%
Tracheostomy	1	14	+1300%
Organ harvesting	3	0	-100%
Kidney transplant	18	2	-88.89%
Ureteral catheterization	10	10	0%
Transurethral resection	9	4	-55.56%
Orchidopexy/orchiectomy	8	1	-85.7%
Femoral diaphyseal fracture	2	0	-100%
Ankle fracture	9	6	-33.33%
Upperextremity fractures	27	5	-81.48%
Patellar fracture	5	0	-100%
Hip fracture	64	52	-18.75%
Infected total hip prosthesis revision	1	5	+400%
Septic arthritis arthroscopy	5	0	-100%
Tendinous rupture revision	2	9	+350%
Revascularization of acute ischemia	5	7	+40%
Amputations due to acute ischemia	2	12	+500%
Oophorectomy/salpingectomy	11	11	0%
Craniotomy	11	10	-9.09%
TOTAL	477	295	-38.16%

There was a global decline in surgical emergencies (-38.16%) but confinement affected the different pathologies in an unequal manner.

Due to mobility limitations, there was a drastic fall in most fracture surgeries, less evident in hip fractures. Some acute abdomen cases were handled conservatively, avoiding surgery at least in the short-term. The change in daily habits derived from lockdown could explain the decline of some subocclusive bowel syndromes. In some cases, conservative attitudes generated more irreversible and severe pathology that would usually be less frequently seen, such as the rise in amputations due to vascular ischemia. The healthcare system's collapse involved the disappearance of surgeries that required higher-grade structural y coordination needs, as can be seen in the case of organ transplants. The complete cessation of scheduled surgeries produced a drop in surgical revisions of all sorts. Other interventions were favored by the pandemic, namely tracheostomies.

Conclusion: Confinement measures had a negative impact on the majority of surgical emergencies. Increased times of disease evolution conferred in some cases a spontaneous resolution and in other cases a drastic deterioration. The reduced incidence of some diseases could be explained by the social context that surrounded that time period. Furthermore, there is also a noteworthy proportion of urgent pathology generated as a byproduct of our own medical activity. The consequences of these changes will be seen in the months to come and require further investigation.

6823

Unexpected Difficult Airway Management in COVID-19 pandemic time. Safe airway management needs to be reviewed

Martinez-Hurtado E.¹, Sanchez Merchante M.², Aracil Escoda N.¹, De La Varga Martinez O.¹, Gimenez Santamaria M. C.³, Abad Gurumeta A.³. FIDIVA, GEVAD, GVAH

¹Hospital Universitario Infanta Leonor - MADRID (Spain), ²Hospital Universitario Fundación Alcorcón - Madrid (Spain), ³Hospital Universitario Ramón y Cajal - Madrid (Spain)

Background: we present the case of an unexpected difficult airway in a patient with a rare genetic syndrome that had not been reported in the telephone preanesthetic consultation.

Case Report: a 51-year-old woman was scheduled for left breast lumpectomy, lymphadenectomy, and contralateral breast mastopexy. Preanesthesia was by telephone due to the current COVID-19 pandemic situation, so the airway could not be assessed. 1. Before the operating room was assessed limitation of cervical extension, mouth opening <4cm., and Mallampati 4. Once in the operating room, after preoxygenation and induction, was found a HAN 2, and a Cormack-Lehane 4 with direct laryngoscopy (blade 4, Macintosh), so a second attempt was made with KingVision, although without success.

AMBU AURAONCE laryngeal mask 4 was placed with difficulty, obtaining adequate ventilation and oxygenation, and a second anesthesiologist was asked for help. Since we do not have an Intubation Catheter Aintree, patient was intubated through the LMA with FROVA guided with fiberoptic bronchoscope with considerable difficulty. Despite the difficulty and manipulation of the patient's airway, extubation was successful. After questioning the patient, she said that she had the Tricho-rhino-phalangeal syndrome (TRPS), an extremely rare autosomal dominant disorder with characteristic skeletal and facial features.

Discussion: COVID-19 pandemic current situation has led to patients not seeing before the interventions, making consultations by phone. This can lead to errors due to the omission of medical information. An inadequate approach to the airway in the face of obvious difficult airway predictors can also lead to a significant decrease in patient safety and, sometimes, death 2.

References:

1. Cook TM, et al. Airway management guidance for the endemic phase of COVID-19. Anaesthesia. 2021
2. Cook TM, et al. Major complications of airway management in the UK. Part 1: anaesthesia. Br J Anaesth. 2011.
3. Heidegger T. Management of the Difficult Airway. N Engl J Med. 2021 May 13;384(19):1836-1847.

Learning points: COVID-19 pandemic situation cannot justify a decrease in anesthetic safety for our patients. Patients should always be evaluated in person before entering in operating room, and difficult airway predictors should always be considered. Whenever difficulties in airway management are anticipated in scheduled procedures, appropriate material should be prepared and a colleague notified 3.

6832
Anesthetic management of pulmonary transplantation due to COVID-19 irreversible lung injury

Souza J.¹, Ferro E.¹, Costa L.¹, Vettorazzo L.¹
¹Hospital Israelita Albert Einstein - São Paulo (Brazil)

Background: Severe COVID-19 is often associated with acute respiratory distress syndrome (ARDS) and need for invasive mechanical ventilation (IMV). Some patients develop irreversible pulmonary injury, prolonged need for IMV and support with extracorporeal venous oxygenation membrane (ECMOV). In this scenario, lung transplantation may be a viable therapeutic option¹, despite the perioperative risk and scarce scientific data. We intend to describe the first successful case of lung transplantation performed in Brazil due to COVID-19.

Case Report: Male, 61 years old, dyslipidemic and former smoker. Hospitalized on October of 2020 by COVID-19. He evolved with severe ARDS and necessity of IMV. ECMOVV was indicated for clinical refractoriness 1 month later. In view of prolonged dependence on these support therapies and irreversible pulmonary injury, sequential bilateral lung transplantation was performed with central ECMO on February of 2021. General balanced anesthesia was used, induction made with propofol, fentanyl and cisatracurium; maintenance with sevoflurane, propofol, dexmedetomidine, remifentanyl and cisatracurium for 14 hours. Management of acute anemia was performed with replacement of 4 red blood cell concentrates and 700 ml of perioperative self-transfusion. Hemorrhagic risk reduced with the use of tranexamic acid. Transesophageal echocardiogram was used for intraoperative monitoring. Hemodynamic was optimized using balanced solution, albumin and vasopressors (norepinephrine, vasopressin and milrinone). At the end of the surgery, he was using extensive hemodynamic support, but without the need for ECMOVV. Epidural catheter was inserted on the 1st postoperative day (PO) and patient-controlled analgesia (PCA), with ropivacaine and fentanyl, was effective and with no side effects. By the 5th PO day, the patient was hemodynamically stable and without the need for IMV.

Discussion: Lung transplantation may be a viable therapy at COVID-19 with irreversible pulmonary injury. In the perioperative period, hemodynamic management and prevention of bleeding are goals to be seek. With proper precautions, Epidural PCA can be an effective and safe option in the pain management

References:

1. Hu C, Wang G, Zhou D, et al. The Anesthetic Management of the First Lung Transplant for a Patient with COVID-19 Respiratory Failure. J Cardiothorac Vasc Anesth, 2021;35:917-20.

Learning points: Lung transplantation may be a viable therapy at COVID-19 with irreversible pulmonary injury.

6847
NEWS scale prognostic value in patients with pulmonary embolism and COVID-19

Kadantseva K.¹, Likhvantsev V.¹, Berikashvili L.¹, Chaus N.², Yadgarov M.¹, Kuzovlev A.¹

¹V. Negovsky Reanimatology Research Institute - Moscow (Russia),
²Demikhov Municipal Hospital №68 - Moscow (Russia)

Background: It is considered to be fact of the matter that pulmonary embolism (PE) frequently complicates SARS-CoV-2 [1]. However, even now there is lack of knowledge about real predictors of PE in such patients [2].

Goal of Study: To investigate if comorbidity of the patient and severity of COVID 19 at the ICU admission can be considered as the predisposing factors PE occurrence.

Materials and Methods: A retrospective single-center cohort study on critically ill COVID patients admitted to ICU of the V. Demikhov Municipal Hospital from March to June 2020 (N = 403, 231 men, mean age 62.4±15.3, range 21 to 97) had been performed. After univariate analysis had been finished, Multivariate regression model was applied with the adjustments on for age, SOFA, qSOFA, NEWS, Charlson's comorbidity index, history of peripheral arterial disease, type 2 diabetes and international normalized ratio (INR) at admission.

Results and Discussion: Overall, PE has complicated COVID 19 in 12.9% of patients (52/403): 12.1% (28/231) in men, and 14.0% (24/172) in women, p = 0.653. In univariate analysis, an increase in the Charlson comorbidity index (OR: 1.20, 95% CI: 1.09-1.31, p<0.001) and an increase in the NEWS score (OR: 1.23, 95% CI: 1.10-1.37, p<0.001) were significantly associated with higher frequency of PE. The optimal cut-off value for the NEWS score was equal to 8 points. Regression analysis showed that patients with a NEWS score of 8 or more had a 3.6 times higher odds of PE occurrence (adj. OR: 3.58, 95% CI: 1.72-7.46, p = 0.001) - PE was observed in 5.6% of patients with less than 8 points on the NEWS scale (10/179) versus 18.8% of patients with 8 or over NEWS' points (42/224), p<0.001.

Conclusion: Patients with COVID 19 who had had 8 or higher score according to the NEWS' scale had from 1.7 to 7.5 times higher risk of Pulmonary embolism events. This fact may be considered as one more argument in favor of anticoagulants usage for critically ill patients with SARS-CoV-2.

References:

1. Roncon L., Zuin M., Barco S., Valerio L., Zuliani G., Zonzin P., Konstantinides S.V. Incidence of acute pulmonary embolism in COVID-19 patients: Systematic review and meta-analysis. Eur J Intern Med. 2020 Dec;82:29-37. doi:10.1016/j.ejim.2020.09.006.
 2. Scudiero F., Silverio A., Di Maio M. et al. Pulmonary embolism in COVID-19 patients: prevalence, predictors and clinical outcome. Thromb Res. 2021 Feb;198:34-39. doi:10.1016/j.thromres.2020.11.017.

6850
Organization of intensive care service for patients with COVID-19 during pandemic in the Almaty city

Kuandykov T.¹, Mutagirov V.²
¹Kazakh-Russian Medical University - Almaty (Kazakhstan), ²National Scientific Centre of Surgery - Almaty (Kazakhstan)

Background and Goal of Study: During COVID-19 pandemic outbreak in Almaty city government and local administration made great efforts to increase ICUs capacity. But still there was poor outcomes among ICU patients (pts). On the peak of the 1st wave health care administration of the city developed The Center Of Anesthesiology and Intensive Care (The Team), which was supposed to provide practical, advisory and methodological assistance in every ICU involved for COVID-19. The goal of study was learning international experience of ICU organisation experience and estimate the impact of The Team on outcomes in ICU pts.

Materials and Methods: We studied mortality, amount of pts, duration of stay in ICUs before and after The Team started its work. The Team included 8 high-skilled intensivists and 5 experienced ICU consultants. The Team provided daily supervising and consulting ICU pts, their respiratory support and medication, monitoring of appropriate ICU equipment and staffing in every 16 intensive care units for COVID-19.

Results and Discussion: We haven't find any scientific data about such intensivists teams. We studied 266 ICU cases: Gr1-142 pts (before The Team) and 2-124 pts (during). In 2nd group we have seen decreasing in ICU mortality, increasing in amount of ICU patients and duration of ICU stay (table 1). We studied Odds Ratio and Relative Risk for these pts and OR was 3.39 (95% CI: 2.01-5.71), RR was 1.57 (95% CI: 1.28-1.93).

Parametr	Before The Team	During The Team	p=
ICUs patients	142	124	
Age	64.8±12.1	63.8±16.9	0.57
Gender M/F	75/67	65/59	0.22
Daily No of ICU pts	35.9±3.6	38.2±5.2	<0.01
ICU stay	3.38±2.9	8.19±3.8	<0.01
Died	108	60	<0.01
ICU stay of the deceased	1.83±1.4	4.94±2.4	<0.01
Mortality	76.1	48.4	<0.01

Conclusion: There are no examples similar to our, when The Team of provides comprehensive advisory and practical assistance to critically ill pts with COVID 19. The Team may improves results and outcomes in COVID-19 ICU pts. This confirmed by the OR = 3.39 and RR = 1.57.

6870

Anemia and elevated cardiac biomarkers in severe COVID-19 at the time of admission to ICU at a major teaching hospital in Vienna during the second wave

Zitzmann E.¹, Oberneder K.¹, Gustorff B.²

¹Sigmund Freud University Vienna - Vienna (Austria), ²Sigmund Freud University Vienna and Department of Anaesthesia, Intensive Care and Pain Medicine, Ottakring Hospital - Vienna (Austria)

Background and Goal of Study: In severely ill COVID-19 patients' infection, anemia or cardiac dysfunction may be associated with more severe disease progression and higher mortality. It was our goal to study and share respective biomarkers in high risk ICU patients.

Materials and Methods: Setting: 2 ICUs at a major teaching hospital entirely equipped with electronic PDMS. Retrospective study, inclusion: All consecutive intensive care patients who were admitted for confirmed COVID-19 between September 1st, 2020, and February 15th, 2021, follow-up until end of hospitalization. Initial biomarkers on admission such as infection parameters (C-reactive protein and leukocytes), hemoglobin (Hb), lactate-dehydrogenase (LDH), and cardiac biomarkers (troponin and NT-proBNP) were taken from electronically archived patient records and analyzed with descriptive statistics.

Results and Discussion: A complete set of 129 intensive care patients was evaluated (100% inclusion). Median SAPS III score was 60 points, 49.6% presented with severe ARDS; ICU-mortality was 31%. The median CRP level at the time of ICU admission was 110 (3.3-697) mg/l. Overall, 57% (74) of patients had a CRP value greater than 100 mg/l. When survivors (median 109 mg/dl, 3-697) and non-survivors (median 118 mg/dl, 3-327) were compared, there were no major differences between the two groups. Furthermore, no median deviation of the leukocyte count from the reference range (4-10 G/l) was observed in the total population (median: 9.45 G/l, 0.34-69.13). In addition, 55% (71) of patients were admitted with anemia (median 10.7 g/dL, 5.8-12.8). A difference is noticeable between the survivors (median: 12.6 g/dL, 5.8-16.7) and non-survivors (median: 11.7 g/dl, 7.7-16.8). Furthermore, we detected LDH elevation above 240 U/l in 83% (107) of patients. Troponin was elevated by a median of 19.8 (3.5-231) µg/l and differed more than double between survivors (median 15, 3.5-4113) and non-survivors (median 37, 5.6-23,130). A similar trend is also observed for NT-proBNP (median 888 ng/l, 22-78.761; survivors: median 541 ng/l, non-survivors: median 1791 ng/l). **Conclusion:** Despite a limited number of patients, we confirm an actual trend in COVID-19 publications: not traditional infect but anemia and cardiac biomarkers at admission may distinguish ICU outcome. Especially the anemia of patients should be subject of further research to guide better understanding in the context of COVID-19.

6885

Development of symptoms in asymptomatic SARS-CoV-2 positive patients pre anesthetic procedure

Oliveira F.¹, Dias A. L.¹, Barros M.¹, Fonseca D.¹, Lusquinhos J.¹, Mourão J.¹

¹Centro Hospitalar Universitário de São João - Porto (Portugal)

Background and Goal of Study: Surgical stress can decrease cellular immunity, which is important for the control of SARS-CoV-2 infection. The authors intended to evaluate the development of postoperative symptomatology in previously asymptomatic patients.

Materials and Methods: Prospective study of 27 patients positive for SARS-CoV-2 submitted to an anesthetic procedure between March and May of 2020 at a Hospital Center in northern Portugal. Evaluation of anthropometric data, presence of pre-procedure symptoms, surgical risk according to the European Guidelines for non-cardiac surgery, type of anesthesia, post-procedure symptoms and need of postoperative invasive mechanical ventilation were performed.

Results and Discussion: 2 patients were excluded (n=25). Ratio male:female was 9:16 and ASA physical status was ASA III in 11 patients. Symptomatic(s):asymptomatic(a) patients=7:18; surgical risk s:a was: low=2:11, intermediate=1:6, high=4:1. In previously asymptomatic patients, anesthesia type was: balanced=7, TIVA=1, subarachnoid=7, combined(general+epidural)=1. 9 of 18 previously asymptomatic patients (56.3%) developed respiratory stress and/or fever

in the postoperative period, with a median time to symptoms development of 48 hours postoperative (IQR48h-96h). This fact suggests that surgical stress and/or anesthesia could be related to clinical deterioration in patients with SARS-CoV-2 infection. The majority of patients with surgical indication and positive result on screening for SARS-CoV-2 infection in the preoperative period was asymptomatic (72%). Postoperative onset of COVID-19 related symptoms didn't relate with none of the following variables: gender (p=0.999), age (p=0.536), ASA (p=0.816), risk of surgery (p=0.78) and type of anesthesia (p=0.999). None of the patients with postoperative onset of COVID-19 related symptoms needed postoperative invasive mechanical ventilation.

Conclusion: In this study half of the previously asymptomatic SARS-CoV-2 patients became symptomatic in the 48 hours postoperative. However, individual progression of the COVID-19 is unknown, so more studies are needed to investigate if the surgical stress could contribute to rapid onset of the disease.

6903

Prevalence and clinical characteristics of COVID-19 in perioperative period in patients underwent urgent surgeries during the first wave COVID-19.

Martín J.¹, Monsalve X.², Barrera L. C.², Cardozo M.², González - Suárez S.²

¹Vall D'Hebron - Barcelona (Spain), ²Hospital Universitario Vall D'Hebron - Barcelona (Spain)

Background and Goal of Study: During the first wave of the COVID-19, urgent surgery was maintained. The aim of this study was to determine the prevalence of perioperative COVID-19 in patients underwent urgent surgery during the first wave as well as their clinical postoperative complications and mortality one month after surgery.

Materials and Methods: This retrospective study was performed in Vall d'Hebron University Hospital, Barcelona, from March 1 to May 1, 2020. Patients underwent urgent surgery and in whom a perioperative screening (RT-PCR) had been performed, were included. Non-COVID-19 patients were transferred to COVID-19 free hospital areas in the postoperative period. Baseline patient demographics, clinical symptoms, comorbidity, surgical risk stratification, length of hospital stay, complication listed and mortality at 30 days from surgery were collected.

Results and Discussions: PCR were performed in 141 patients; 18 patients were positive in the preoperative period and 15 patients became positive in the first 30 days after surgery. Most SARS-CoV-2 positive patients was male (66.7%) with a median age of 58.39 ± 1.83 years. In PCR + patients the percentage of patients who presented ASA 1, 2, 3 and 4 was 6.1, 24.2, 57.6 y 9.1% respectively. The 3 most prevalent symptoms were fever, cough, and dyspnea. The intensive care unit admission rate was 1.19 ± 1.74 and hospital stay 34.13 ± 30.33 days. The perioperative mortality rate was 33.3%; all these patients presented pneumonia, 1 veno-venous ECMO, 2 pulmonary embolism and 2 intestinal ischemia. The main complications are shown below. Pneumonia: 60.6%. Noninvasive mechanical ventilation:12,1%. Invasive mechanical ventilation: 36.4%. ECMO:12.1%. Aspergillus infection:3%. Thrombus: 21.2%. Pulmonary embolism:15.2%. Acute respiratory distress syndrome:30.3%. Vasoactive drugs:24.2%. Arrhythmias:15.2%. CVVHDF: 9.1%. Shock: 21,2% . These recorded complications are similar to those obtained in previous publications. The greatest patient's vulnerability after urgent surgery could be a risk factor for becoming infected with SARS-CoV-2 in postoperative period despite staying in COVID-19 free areas.

Conclusion: Of the total number of patients undergoing urgent surgery in the first wave, 23.4% were positive to SARS-CoV-2 in the perioperative period with a mortality rate of 33.3%. The most frequent complication was pneumonia (60.6%) requiring mechanical ventilation in 36.4% of the patients.

6943

The beneficial effects of Tocilizumab in the management of critically ill patients with COVID-19. A single center randomized controlled trial.

Abuarafah M. K. I.¹, Benbenishty J.¹, Plotkin Y.¹, Abu Jareis T.¹, Galun E.¹, Pizov R.¹

¹Hadassah University Hospital, Ein Kerem - Jerusalem (Israel)

Background and Goal of Study: The majority of COVID-19 deaths are a result of hyperinflammation pneumonitis which deteriorates to acute respiratory distress syndrome (ARDS). Although there is some benefit of corticosteroid therapy, the mortality in the severely ill population remains very high. Due to the similarity between the COVID-19 ARDS and a cytokine storm with potential involvement of interleukin 6 (IL6), a therapy with the anti-IL6R Tocilizumab (TCZ) was sporadically applied. We hypothesized that TCZ will reduce mortality in critically ill COVID-19 patients.

Materials and Methods: The study was approved by the IRB of Hadassah Medical Center (HMO-0224-20). Eligibility criteria for the study included : critically ill adult patients, defined by a requirement of at least 50% oxygen to reach an oxygen saturation of 90%, with positive COVID-19 PCR and admitted to ICU. A written informed consent was obtained in conscious patients, and by an independent physician in unconscious ones. This is a two-arm, 2:1 (intervention:control), open-label controlled trial. The treatment group received TCZ 8 mg/kg IV over 1h, once. The control group received a 100 ml saline IV infusion, over 1h. Patient allocation was by a blind randomization protocol.

Results: We recruited 54 patients, 37 in the TCZ group and 17 in the placebo group. There was no difference in age (TCZ - 61.8±12.7 years; placebo - 65.8±14.0 years; mean ± SD) or gender between the two groups. At recruitment, 57% of TCZ and 71% of placebo patients were invasively ventilated (p = 0.383). Both groups had elevated CRP levels, TCZ - 20.7±9.0, placebo - 21.7±8.9 mg/dL. Although the TCZ group had a tendency of higher occurrence of secondary infections (blood stream infections and ventilator-associated pneumonia), it had a statistically non-significant trend towards better 30-day survival (figure).

Conclusion: Mortality in severely ill COVID-19 patients is very high. Although patients treated with TCZ showed a tendency of increased secondary infections, they also had a trend toward better 30-day survival.

6952

Pre-hospital emergency medicine in COVID times: a comparative analysis

Dos Santos S. D. E.¹, Oliveira J.¹, Vieira A. L.¹, Queixinho Martins I.¹, Castro M.¹, Infante C.¹

¹Centro Hospitalar e Universitário de Coimbra - Coimbra (Portugal)

Background and Goal of Study: In Portugal, most of pre-hospital emergency care is provided by ambulance first-responders. When life-threatening situations occur, another team is activated – the VMER (Emergency Medical and Resuscitation Vehicle) that is a pre-hospital intervention vehicle with equipment for Advanced Life Support in critical medical or trauma situations. During the COVID pandemic, there was a perception of some changes at this line of work. The aim of this study is to carry out an analysis regarding the number and type of activations of VMER during the first wave of the pandemic in 2020, comparing with the same period of 2019.

Materials and Methods: In a retrospective observational study we compared the period from March 2 to May 2 of 2019 and 2020. We analysed the number and type of activations - cardiac arrests, trauma, neurological, cardiac or respiratory medical situations - and the place where it occurred. We checked if the patients had suspicious COVID symptoms, if they were positive, comparing mortality rates. Chi-square and Fisher tests were used to compare the several variables.

Results and Discussion: In 2019, there were 435 VMER activations, compared to 375 in 2020. In the type of occurrences, we verified a statistically significant difference in relation to cardiac arrests [12,9% vs 21,1% (p=0.002)] and a total of non-trauma situations [74,3% vs 62,4% (p<0.001)]. As for the location, there were differences in the patients

located at home [38,6% vs 58,1%] (p<0.001)]. In the 2020 cases, 102 (27,2%) had suspicious symptoms and 71 underwent a COVID test, which was positive in 7% of cases. The mortality rate in COVID positive and negative patients was not statistically significant (p=0.283).

Conclusion: We attribute the difference in cardiac arrests and non traumatic situations to the fear of the population in resorting to health services. The absence of differences in respiratory and other medical situations may be due to some protection of VMER teams that were only activated in critical cases and to the well defined activation algorithms. In activation locations, the higher number of activations at home is the result of the confinement in Portugal over this period. As for the absence of differences in mortality, we justify it with the small numbers of the sample. The covid pandemic was a challenge to all health professionals but we highlight the changes in the populations in the way they resorted to health services.

6953

The prospect of using the ESP-block for anesthesia of patient with COVID - 19. Clinical case.

Domoratskyi O.¹, Kryzhevskiy V.¹, Shostak M.², Sozanskyi V.², Oleynikova J.²

¹NMAPE named P.L. Shypik - Kiev (Ukraine), ²Kiev municipal hospital №6 - Kiev (Ukraine)

Background: The current COVID-19 pandemic has posed a number of unique challenges for anesthesiologists around the world. Considering the features management of patients with severe COVID-19, such as difficulties with tracheal intubation, difficulties in patient's ventilation and oxygenation, potential deterioration after transfer to mechanical ventilation (MV), and difficulties with weaning from MV, the regional methods of pain relief have a lot of advantages. However ESP-block is a paraspinal fascial block, the basis of which is an injection of anesthetic deep under the musculus erector spinae and superficial to the ends of the transverse thoracic processes.

Case Report: Patient Z. 69 years old, weight 117 kg, was treated for severe COVID-19 in Kyiv clinical hospital №6. On the 13th day the disease was complicated by rupture of the rectus abdominis muscles from coughing with formation of a tense hematoma in the case of the rectus abdominis muscles. At the time of the decision to conduct an urgent surgery, the patient was treated with enoxaparin 0.5 mg/kg, and had an SpO2=92-90% (FiO2-0,21) and SpO2=96% with oxygen support through a face mask of 5-6 l/min. The authors made the decision to perform the surgery under the conditions of ESP-block + intravenous sedation with dexmedetomidine. A bilateral ESP-block was performed at the ThVII level and was injected 200 mg of lidocaine, 50 mg of bupivacaine, 4 mg of dexamethasone on each side. After 25 minutes, the surgery was started, its duration was 37 minutes, opioids were not additionally prescribed. Sedation with dexmedetomidine was carried out at an initial rate of 1.5 µg/kg/h for 15 min, then 0.7 µg/kg/hour for 10 min, the entire operation time was 0.5 µg/kg/h. Oxygen support was through a face mask 10 l/min, SpO2 95=98%. For dynamic observation, the patient was transferred to the ICU. Postoperative anesthesia lasted 12 hours, opioids were not used in the postoperative period, anesthesia with paracetamol 500mg 4 times per day per os. After 24 hours, the patient was transferred to the surgical department, with further recovery.

Discussion: Performing general surgical interventions in the conditions of the ESP-block or the inclusion of the ESP-block in the anesthesia regimen is an effective, safe and promising technique that allows to reduce the risks of both the patient with COVID-19 and the anesthesia team.

6990

Airway pressure release ventilation (APRV) and duration of mechanical ventilatory support

Stojanovic M.¹, Markovic M.¹, Perisic D.¹, Popovic S.¹
¹University medical center Zvezdara - Beograd (Serbia)

Background and Goal of Study: Corona virus 19 leads to a severe form of pneumonia and the development of acute respiratory distress syndrome (ARDS) which requires treatment with mechanical ventilation. The goal. Airway Pressure Release Ventilation (APRV) is one of the ventilation modes that can shorten the duration of mechanical ventilation of patients with pneumonia caused by coronavirus 19.

Materials and Methods: The method of retrospective random sampling was used to select 20 patients with radiographically proven bilateral pneumonia who developed ARDS that required the use of mechanical ventilatory support and who were successfully cured. The first group included 10 patients who used APRV ventilation mode for 48 hours, patients were sedated and relaxed during this ventilation mode and then transferred to Bilevel Positive Airway Pressure (BIPAP) mode of guided small tidal volume. The second group included 10 patients who used the BIPAP ventilation mode, all of whom underwent sedation and relaxation for 48 hours, followed by sedation until mechanical ventilation was discontinued. We compared the degree of change in PaO₂/FiO₂ ratio and duration of mechanical ventilatory requirements.

Results and Discussion: There was a highly statistically significant difference in the variables APACHE II score (p = 0.004), SOFA score (p = 0.001), PaO₂/FiO₂ ratio (p = 0.05) and duration of mechanical ventilation (p = 0.002) in two studied groups. APRV ventilation mode showed that the degree of change in PaO₂/FiO₂ ratio was higher compared to BIPAP ventilation mode (60% vs. 30%). The number of days of mechanical ventilation in patients who were on APRV ventilation mode was statistically significantly lower (7 days compared to 12 days, p = 0.002).

Conclusion: Patients who used the APRV ventilation mode had a faster improvement in the PaO₂/FiO₂ ratio and a shorter duration of mechanical ventilation compared to patients in whom only the BIPAP ventilation mode was used.

References:

1. Joseph DK, Baltazar GA, Jacquez RA, Islam S, Stright A, Divers J, Brathwaite C, Petrone P. A pilot study of patients with COVID-19 related respiratory failure utilizing airway pressure release ventilation (APRV). *Innovations in Surgery and International Medicine* 2021; 1(1):3-8.

7045

COVID era : Regional anesthesia expertise, a boon or a necessity?

Kaushik P. S.¹, Shah S.¹, K Kamat S.¹, Krishnadas B.¹, Mehta H.¹
¹Sir HN Reliance Foundation Hospital - Mumbai (India)

Background: COVID 19 pandemic having affected masses has made surgeries and hence anesthesia to such patients inevitable; be it in infective or post recovery phase. Due to grave respiratory profile of these patients and to minimize exposure to health care workers, the need to use regional anesthesia cannot be much emphasized

Case Report: A 71 year old lady with a background of hypertension, hypothyroidism, chronic kidney disease (not on dialysis) and COVID infection 6 months back, was posted for breast conservative surgery and axillary lymph node dissection for carcinoma right breast. She was on steroids, requiring oxygen 2 L/min via nasal prongs due to post COVID Interstitial lung disease (ILD). She was morbidly obese (BMI 43kg/m²). Computerized tomography of chest revealed diffuse interstitial fibrosis and bronchiectasis. Regional in lieu of general anesthesia was our plan. After informed consent, in the supine position, ultrasound guided Pectoralis Block 1 and 2 (PEC 1, PEC 2) and serratus anterior (SA) block with total volume of 40ml of 0.5% levobupivacaine+2% lignocaine was given. The surgery and post operative course were uneventful with early (2nd day) discharge.

Discussion: PEC-I and II and SA blocks purportedly block the medial and lateral pectoral nerves, T2–T6 intercostal nerves, and intercostobrachial and long thoracic nerves providing effective analgesia to the anterior chest wall and axilla.[1] They reduce postoperative opioid consumption and pain scores in comparison with paravertebral blockade following

mastectomy.[2] Obesity is associated with higher block failure rate but effective analgesia and overall patient satisfaction is high, encouraging regional blocks[3].

References:

1. Blanco R, Fajardo M, Parras Maldonado T. Ultrasound description of Pecs II (modified Pecs I): A novel approach to breast surgery. *Rev Esp Anesthesiol Reanim* 2012; 59:470–5
 2. Wahba SS, Kamal SM. Thoracic paravertebral nerve block versus pectoral nerve block for analgesia after breast surgery. *Egyptian J Anaesth* 2014; 30:129–135
 3. Nielsen KC, Guller U, Steele SM, Klein SM, Greengrass RA, Pirotton R. Influence of Obesity on Surgical Regional Anesthesia in the Ambulatory Setting: An Analysis of 9,038 Blocks. *Anesthesiology*. 2005; 102: 181–187

Learning points: Regional block is an indispensable tool for an anesthesiologist in COVID era. PEC1,2 and serratus anterior block solely provide good anesthesia and post op analgesia for breast surgeries

7079

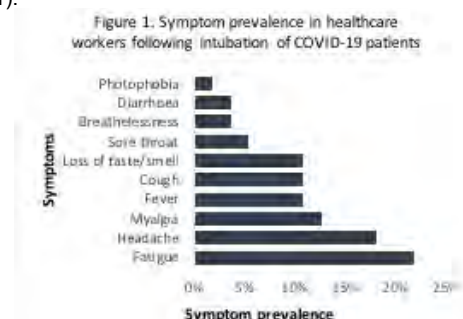
Prevalence of transmission of SARS-CoV-2 to healthcare workers following intubation of COVID-19 patients in Polish healthcare facilities

Dudek P.¹, Zawadka M.¹, Ibrahim R.¹, Andruszkiewicz P.¹
¹Medical University of Warsaw - Warsaw (Poland)

Background and Goal of Study: Intubation of patients with COVID-19 is an aerosol-generating procedure and can expose healthcare workers to airborne transmission of infections. An international observational prospective cohort study was conducted to demonstrate the association between endotracheal intubation of COVID-19 patients and the subsequent development of corresponding symptoms in healthcare workers [1]. We analyzed the Polish subset of data for comparison with the combined results of the aforementioned study.

Materials and Methods: Participants registered voluntarily to a web-based database where baseline data was collected. The platform was later used to record intubation procedure, follow-up, and outcome in a self-reporting manner. Symptoms were reported on a regular basis following intubation. Type of Personal Protective Equipment (PPE), number of staff in the room, and COVID-19 status of patients were also documented. The primary outcome was interpreted as lab-confirmed COVID-19, hospitalization or self-isolation due to symptoms within 21 days of exposure.

Results and Discussion: 77 participants were included in the analysis, 33 (42.9%) were female. The mean age was 37.6 ± 8.3 years. Together, the participants performed 292 intubations, of which 233 (79.8%) were equipped with adequate PPE according to WHO standards. A primary outcome was found in 12 (15.6%) participants; 5 female and 7 male. Fatigue, headache, and myalgia were the three most reported symptoms with a prevalence of 12 (21.8%), 10 (18.2%), and 7 (12.7%) respectively (Figure 1).



Conclusion: The Polish subset of data shows that 15.6% (n = 12) of participants had an outcome related to COVID-19. Interestingly, the combined international data demonstrated by El-Boghdadly and colleagues shows an outcome in 10.7% of participants. In contrast to international data, female gender was not linked to the primary outcome.

References:

1. El-Boghdadly et al. Risks to healthcare workers following tracheal intubation of patients with COVID-19: a prospective international multicentre cohort study. *Anaesthesia*. 2020 Nov;75(11):1437-1447. doi: 10.1111/anae.15170.

7091

Acute kidney injury in COVID-19 intensive care patients without previous renal disease – a predictor for mortality?

Obermayer K.¹, Zitzmann F.¹, Gustorff B.²

¹Sigmund Freud University Vienna - Vienna (Austria), ²Sigmund Freud University Vienna, Department of Anaesthesia, Intensive Care and Pain Medicine, Ottakring Hospital - Vienna (Austria)

Background and Goal of Study: Prior studies suggest that kidney injury is associated with higher mortality in COVID-19 patients. Our aim was to evaluate whether acute kidney injury without prior renal disease leads to higher mortality and whether mortality can be reduced by dialysis.

Patients and Methods: Setting: 2 ICUs serving as COVID-19 centers at a major teaching hospital in Vienna. Inclusion: All ICU patients admitted for confirmed COVID-19 between Sept 1st, 2020, and Feb 15th, 2021, follow-up until end of ICU stay. The sample of 129 patients was divided into three groups. Patients with a history of previous renal disease (group 1), prior healthy kidney patients with acute kidney injury on day 5 of the ICU stay defined as a GFR of <90 ml/min (group 2) and patients with normal kidney prior and on day 5 GFR ≥90 ml/min (group 3). Main outcomes were retrospectively analyzed using descriptive statistics, chi-square tests, single factor analysis of variance, U-test and Spearman rank correlation.

Results and discussion: There were 33 patients in group 1(26%), 26 patients in group 2(20%) and 70 patients in group 3(54%). A highly significant association can be found between the three groups and ICU survival ($\chi^2_{2,15.60}$, $p<.001$). In group 1, 18 of 33 (55%) survive, while in group 2 only 12 of 26 (46%) survive. The highest proportion of survivors is in group 3 with 58 of 70 (83%). In the renal injured groups (1 and 2) survival probability is significantly below average (adjusted standardized residuals <-2.0), indicating a higher mortality compared to normal kidney function. Neither earlier onset (U-test: $U=92.5$, $z=-1.30$, $p=.192$), nor number of days of dialysis (U-test: $U=72.0$, $z=-1.88$, $p=.061$) showed a significant difference in survival. However, a statistical trend can be assumed. The number of days of renal replacement therapy is higher in survivors (median=11.5, $Q1=4.5$, $Q3=15.5$) than in deceased (median=5.0, $Q1:1.0$, $Q3=8.5$). ICU length of stay in survivors is significantly related to the number of days with renal replacement therapy ($r(s)=.92$, $p=.001$, $n=12$), the longer the duration with renal replacement therapy, the higher the length of stay in survivors.

Conclusion: Kidney dysfunction is a relevant risk factor for ICU mortality. Even more, acute kidney injury due to COVID-19 was associated with higher ICU mortality compared to preexisting renal impairment. Only a moderate tendency towards renal replacement therapy's impact on survival was evident.

7100

The COVID-19 pandemic reality lived in a tertiary maternity

Correia A.¹, Ramos S.¹, Sá S.¹, Vilhena I.¹, Melo L.¹, Silva I.¹

¹Coimbra University and Hospital Center - Coimbra (Portugal)

Background and Goal of Study: The management of obstetric patients infected with Coronavirus Disease 2019 (COVID-19) requires unique considerations. The purpose of this research is to analyse the anaesthetic approach in these patients in a tertiary maternity (TM) and compare it with pregnant not infected.

Materials and Methods: Descriptive and retrospective observational study with data from a sample of 3064 patients admitted in a TM between January 1, 2020 and April 30, 2021. The analysed data was collected from the TM database. The sample was divided into infected with COVID-19 group (IG) and non-infected group (NIG). The variables (age; place where real-time reverse transcriptase–polymerase chain reaction (RT-PCR) tests were performed; timing of the results were known; personal protective equipment (PPE) used; symptoms; type of delivery; type of analgesia/anaesthesia; need for emergency surgery (ES)) and their associations were analysed through statistical tests (Kolmogorov-Smirnov test; Mann-Whitney U Test; Fisher exact test) using the SPSS tool (version 24).

Results and Discussion: In this sample, 2.1% of pregnant women were infected with COVID-19. 98.5% of these cases did the RT-PCR test at hospital. Within these, 70.8% of results were known before labour, 6.2% during and 12.3% after. The remaining 10.8% of infected pregnant women were referred from other maternity that didn't admit infected patients. In 86.2% of the detected cases, advanced PPE was used, in 10.8% basic PPE and in 3.1% no PPE was used. In the IG 6.2% had respiratory symptoms. Regarding the age of the patients in the IG ($\bar{X}=32,4$) vs NIG ($\bar{X}=33,6$), there was no statistically significant difference ($p=0.05$). The same happened with the gestational age (IG: $\bar{X}=37,3$ vs NIG: $\bar{X}=38,4$). When comparing the type of delivery and the type of analgesia/anaesthesia among the two groups, there was a statistically significant difference ($p<0.01$): 38% of births were cesarean deliveries (CD) in IG vs 24% in NIG. 20% of CD in IG required general anaesthesia with endotracheal intubation vs 2% of CD in NIG. Regarding the need for ES, a statistically significant difference ($p=0.02$) was also present. 26.2% of ES occurred on the IG compared to 16.1% on the NIG.

Conclusion: Although neuraxial labour analgesia/anaesthesia is mainly recommended in obstetric patients infected with COVID-19, in this TM the practice of general anaesthesia during CD was higher in IG, which can be related to the higher percentage of ES.

7157

TIMING, a fine line between life and death of mechanically ventilated COVID-19 patients.

Peris F.¹, Stojanovic Stipic S.¹, Carev M.¹, Duplancic B.¹, Stipic T.¹

¹University Hospital Split - Split (Croatia)

Background: Patients with critical coronavirus disease, characterized by respiratory failure requiring mechanical ventilation (MV), are at extremely high risk of mortality. Here, we present two cases of COVID-19 who received MV and were managed successfully with timing attentive therapy and weaning protocol.

Case Report: Two critically ill patients with median age of 60 are described in this case report. Both of them had 15 year history of hypertension and were admitted because of dyspnea. Upon admission a nucleic acid tests following nasopharyngeal swabs confirmed SARS-CoV-2 infection. After receiving noninvasive ventilator (HFNC) with 80% FiO₂ for 3 hours, patients remained in respiratory distress with persistently low P/F ratios (70 and 82). Consequently, each patient was advanced to invasive MV with tidal volume of 6ml/kg ideal body weight and 10-14 cmH₂O of PEEP, RR of 20-24 breaths/min and 45%-90% FiO₂. For the first day of MV, each patient lay in the prone position 16 h. Second day prone position was used for 12 h and on third, fourth and fifth day for 10 h. Pharmacological and non-pharmacological infection prevention measures were employed. We were attentive to sedation control, enteral feeding, strict hand hygiene and pharmacotherapy that is practice for critical COVID-19 patients in our ICU. Each patient's P/F ratio improved gradually during the course of MV with prone positioning, until it reached 250 (fifth day of MV). On the sixth day of MV, patient's were subjected to the same weaning protocol. Each patient was first transitioned to pressure support ventilation (PS 10 cmH₂O, PEEP 6-8 cmH₂O, FiO₂ 40%). After, they advanced to 15 min of spontaneous breathing with smooth airbag leak test. During weaning protocol cuff leak test was also performed. Then, each patient was extubated and transferred to non-rebreather mask with stable oxygen saturation and cardiovascular condition.

Discussion: Timely intubation and comprehensive MV weaning protocol is crucial for critical COVID-19 patient's as it may prevent respiratory failure following extubation, and reduce mortality.

References:

1. Peng M, Ren D. Two mechanically ventilated cases of COVID-19 successfully managed with sequential ventilation weaning protocol. *World J Clin Cases* 2020; 8(15): 3305-3313.

Learning Points: 1. Timely intubation and prone positioning can drastically benefit the outcome of MV; 2. Universal MV weaning protocol for COVID-19 patients can save lives.

7166
COVID-19 screening in asymptomatic pregnant patients when labor epidural analgesia is required after non-scheduled admission for delivery. Any chances to consider an alternative to PCR?

Gallo Carrasco A.¹, Corbella C.², Elena M.², García Huerta M.², Vicente J. M.², Bermejo L.²

¹Hospital Gregorio Marañón - Madrid (Spain), ²Hospital Gregorio Marañón - Madrid (Spain)

Background and Goal of Study: Early SARS-CoV2 detection for isolation of infectious people is of paramount importance in the obstetric setting. Molecular tests results may not be available when we are requested to perform a labor epidural technique after a non-scheduled admission. Our goal is to asses if this percentage of pregnant women is significant in our recent current practice.

Materials and Methods: This retrospective study was conducted in our hospital, between 1st march and 30th april 2021, consulting the electronic medical records. We selected asymptomatic pregnant women admitted directly from the emergency triage to the labor ward, and specifically those who requested epidural analgesia. On admission the screening test routinely performed for SARS-CoV2 was RT-PCR in nasopharyngeal sample. In this study we analyzed the number of epidurals carried out without a previous RT-PCR result.

Results and Discussion: Throughout that period a total of 839 pregnant women were admitted to our hospital for delivery, 221 of them met the inclusion criteria. The PCR test result was not available at the time of performing the labor epidural in 137 patients (62%). Hence, in certain cases, the standard PCR test fails if used in a surveillance regimen, as it requires transport to a centralized lab staffed by experts, which increases costs and can delay results¹. The introduction of rapid antigen tests for both symptomatic and asymptomatic patients upon arrival in the emergency department may improve the overall management of the infectious risk, limiting asymptomatic spread. They intend to reduce the prevalence of SARS CoV-2, returning results quickly, being less expensive and easy to execute (for repeated testing)².

Conclusion: Tests used in effective surveillance regimens, try to reduce the prevalence of SARS CoV-2. Therefore, it is essential to have updated, synthesized, protocolized and evidence-based information. In the closed population studied a viral detection analysis in real time, antigen test, may prove more cost-effective for screening than the molecular test performed (more sensitive but with longer delay time and cost).

References:

1. Mina M, et al. Rethinking Covid-19 Test Sensitivity- A strategy for containment. NEJM, Nov 26 ,2020, 383;22.
2. Candel FJ, et al. Antigenic tests in diagnosis of acute SARS-CoV -2 infection: attitude in different clinical settings. J Spanish Society Chemotherapy 2020, 33(6):466-84

7213
The 5th day on the ICU: Do laboratory parameters allow a distinction in respect to outcome in COVID-19 patients?

Obeneder K.¹, Zitzmann F.¹, Gustorff B.²

¹Sigmund Freud University Vienna - Vienna (Austria), ²Sigmund Freud University Vienna, Department of Anaesthesia, Intensive Care and Pain Medicine, Ottakring Hospital - Vienna (Austria)

Background and Goal of Study: COVID-19 patients put a high strain on intensive care. It is often not possible to predict which patients will have a long duration of stay, require invasive ventilation, or develop a severe disease progression. With this study we want to analyze patients status on the 5th day of ICU stay to create a better understanding of the disease and its outcome.

Materials and Methods: Setting: 2 ICUs at a major teaching hospital, COVID-center of Vienna. Inclusion: All intensive care patients admitted for confirmed COVID-19 between September 1st, 2020, and February 15th, 2021, follow-up until end of hospitalization, retrospective study. Main data at day 5 and outcome were analyzed from electronic records and processed using descriptive statistics.

Results and Discussion: 21 patients were excluded for early discharge (n=14) or death (n=7) before day 5. The ICU mortality of the remaining 108 patients was 30.6%. The median Horovitz index was 124 mmHg (Survivors(SV):122, Non-survivors (NSV):126 mmHg). The creatinine clearance shows large differences between SV and NSV. While SV had a median normal value of 116, NSV showed a moderate renal function impairment with a clearance of 52 ml/min. After day 5, 9 patients required dialysis, of whom 7 died on the ICU. 24-h-fluid balance on day 5 was -282 ml median in SV and -3 in NSV. The median RASS score was -3, with a median of -1 in SV and -4 in NSV. CRP on day 5 was a median of 66.6 mg/l (SV: 54.5 mg/l; NSV: 121 mg/l) and leukocytes 9,65 G/l (SV: 9,58 G/l; NSV: 11,36 G/l). 59.3% (n=64) received at least one antibiotic (SV: n=23; NSV: n=51). Despite comparable blood glucose levels (SV 130 mg/dl, NSV: 134 mg/dl), non-survivors required a higher median insulin dose on day 5 (SV: 32.6 IE; NSV: 50.3 IE). 54.2% of the patients (=58) had anemia (Hb< 12mg/dl) on day 5 (SV: n=36; NSV n=22).

	Total Median (range)	Survivor Median (range)	Non-Survivor Median (range)
Respiratory			
Horovitz-Index in mmHg	123 (41- 332)	122 (55- 273)	126 (41- 332)
BGA: pO2 in mmHg	85 (38- 213)	86.5 (38- 213)	84.7 (41- 132)
BGA: pCO2 in mmHg	44 (27- 67)	42 (27- 67)	45 (30- 63)
RASS-Score	-3 (-5- +2)	-1 (-5- +2)	-4 (-5- 0)
Infektion			
CRP in mg/l	66.6 (2.9- 505)	54.45 (2.9- 296)	121 (9- 505)
Leukocytes in G/l	9.65 (0.51- 64.29)	9.59 (0.51- 31.79)	11.36 (2.49- 64.29)
Metabolism			
LDH in U/l	320 (33- 964)	316 (33- 744)	348 (234- 964)
Glucose mg/dl	132 (67- 542)	129.5 (67- 542)	134 (82- 267)
Total insulin dose in I.E.	36,5 (0- 183)	32.6 (0- 183)	50.3 (0- 144)
Renal			
Creatinin in mg/dl	0.8 (0.2- 5.2)	0.8 (0.2- 5.2)	0.9 (0.4- 4.8)
Creatinin-Clearance in ml/min	100 (0- 348)	116 (1- 348)	*52 (0- 277)
Coagulation			
Platelets in G/l	290 (39- 518)	324.5 (71- 518)	188 (39- 445)
Fibrinogen in mg/dl	5.36 (0.52- 9.0)	4.76 (0.52- 9.0)	6.1 (1.23- 451)

Fig.: Clinical parameters on day 5 of the ICU stay

Conclusion: In our data, 3 parameters stand out at day 5: RASS score, CRP level, and creatinine clearance. Severe sedoanalgesia, high inflammatory parameters in the form of CRP and impaired renal function could contribute to higher mortality among ICU patients.

7219 CSF positivity in COVID-19 patients – Anesthesiology as an ally in systematic microbiological screening

Elvas-Leitão T.¹, Marques Da Costa F.¹, Paulino A.¹, Melo Cristino J.¹, Ormonde L.¹

¹Centro Hospitalar Universitario Lisboa Norte - Lisboa (Portugal)

Background and Goal of Study: The commonness of neurological symptoms in COVID-19 patients has turned the presence of SARS-CoV-2 in CSF and its importance into a topic of debate. As societies of Anesthesiology around the world increasingly recommended the preferred use of regional techniques for surgery in these patients, we devised the idea of systematically screening COVID-19 patients subject to spinal anesthesia in our tertiary institution for the presence of SARS-CoV-2 in CSF.

Materials and Methods: A protocol for this observational study was developed in the Anesthesiology department of our institution and accomplished through a collaboration with the Clinical Pathology department. The protocol enjoyed approval by the ethics committee. COVID-19 confirmed or suspected adult patients subject to any surgery with an indication for spinal anesthesia were eligible. A box gathering all the necessary material was stored in the dedicated COVID-19 operating room and the protocol was made available on site and by e-mail to the whole department. After obtaining patient consent, anesthesiologists were asked to perform spinal anesthesia as usual yet draw 3 mL of CSF before administering drugs. Samples were transported to the Clinical Pathology laboratory and cytochemical, bacteriological and SARS-CoV-2 PCR analysis were performed.

Results and Discussion: Preliminary results have demonstrated the effectiveness of such a systematic approach for safe screening of COVID-19 patients' CSF status. Access to the subarachnoid space for anesthetic purposes is the perfect opportunity for CSF sampling in the general population without causing unnecessary harm to patients. So far 3 patients with confirmed COVID-19 (with and without neurological symptoms) have been screened and tested negative for the presence of SARS-CoV-2 in CSF but an ongoing effort involving the entire department will presumably increase these figures and allow for a significant contribution to the body of evidence. To our knowledge this is the first study to document systematic use of anesthetic procedures to advance knowledge on SARS-CoV-2 and the COVID-19 pandemic.

Conclusion: Systematic screening for the presence of SARS-CoV-2 in CSF of COVID-19 patients can be safely and effectively accomplished in standard anesthetic procedures without causing unnecessary harm. The COVID-19 pandemic has undeniably driven healthcare professionals to strengthening collegiality and collaboration towards common goals.

7226 Post-ICU Syndrome in a Tertiary Hospital. The great forgotten.

Palau Martí C.¹, Mateo Rodríguez E. M.¹, López Alarcón M. D.¹, Puchades F.¹, Ezzeddine A.¹, De Andreés Ibáñez J.¹ Post-Intensive care Syndrome Group: Eva Mateo Rodríguez; María Dolores López Alarcón; Francesc Puchades; Pilar Piles; Ana Jiménez; Cristian Palau Martí; José de Andrés Ibáñez

¹Consorcio Hospital General Universitario de Valencia - Valencia (Spain)

Introduction: Post Intensive Care syndrome is a phenomenon characterized by the physical, cognitive, or psychological deterioration that appears after a critical illness and that persists beyond hospital discharge. This entity carries high morbidity, however, currently, there is no standardized model for monitoring these patients. The Respiratory Distress Syndrome caused by SARS-COV2 caused a collapse in critical care units, thus appearing an excellent cohort for the study of Post Intensive Care Syndrome.

Objective: To determine the incidence of Post ICU Syndrome in patients admitted to the Critical Care Unit of a Tertiary Hospital during the first wave of the pandemic.

Material and Methods: This is a descriptive and prospective study in which patients admitted to the ICU-COVID of the General Hospital of Valencia were contacted to determine the onset of Post Intensive Care

Syndrome. Through the results of the different tests applied that assessed the quality of life, physical, cognitive, and pain status, 2 levels of severity were established: mild, if only one of those studied was affected, or severe if two or more of them were affected.

Results: Data were obtained from a total of 29 patients. 10% did not present alteration in any of the applied tests, while the remaining 90% did so in 1 or more, highlighting that 28.5% presented 3 or more altered tests. In addition, a statistical analysis was carried out in which the characteristics before admission to the intensive care unit of the mild and severe groups were compared, and no statistically significant differences were found between both groups.

Conclusions: This study shows that, in our center, up to 90% of the patients admitted to the ICU-COVID have presented a Post Intensive Care Syndrome, this being related to greater comorbidity. That said, more studies are needed to encourage greater follow-up of these patients to improve their conditions and our quality of care.

7230 More data about the role of thrombosis and inflammation in Covid-19 outcomes

Barquero Lopez M.¹, Colomina M. J.¹, Puig G.¹, Rama H.¹, Bellafont J.¹
¹Hospital universitari de bellvitge - Barcelona (Spain)

Background and Goal of Study: Thromboinflammation and hypercoagulability play an important role in the fisiopathology of hospitalized and critically ill coronavirus 19 (COVID 19) disease patients (1). The purpose of this study is to describe changes of coagulation and inflammation tests correlated to the disease's evolution. Also, we want to investigate if there is any parameter capable of predicting future patient worsening. This would allow us to apply a more aggressive treatment and/or earlier (specially anticoagulation) (2), and more individualized.

Materials and Methods: We carried out a multidisciplinary retrospective register including all patients hospitalized in critical or semi-critical units with the diagnostic of COVID 19 disease from 1/3/2020 to 31/5/2020. Anesthesiology, Intensive care medicine, pneumology and cardiology specialists have participated in this register. We have included clinical and analytical parameters, that allows us to investigate the aim of the study. The data has been analyzed using Kruskal-Wallis test and Cox proportional hazards models.

Results and Discussion: 219 patients have been included in the analysis. We have objectified a high mortality index: 33%, because the registry includes only the most severe critically ill patients. We observed an increased number of thromboembolic events in critical patients with COVID 19 (12.9%) compared to critical patients no COVID from the same period of the previous year (2.54%) (p<0.01). In our preliminary results we have objectified those patients with a worse clinical evolution had higher D-dimer (p 0.002) and aPTT (p 0.035) values, they had lower platelet values (p<0.01) and, finally, they have higher values in LDH (p<0.001) and inflammatory parameters (specially CRP, p<0.001).

These results confirm an increase in thrombotic and inflammatory activity in patients affected by COVID 19 and with a worse evolution (mortality index).

Conclusion: Our data confirms that abnormal coagulation and inflammation tests are related to adverse outcomes, and that there is an increase in thrombotic activity in those patients with a worse evolution. These results highlight the potential role of antithrombotic interventions and show us that we would probably need a test capable of measuring hypercoagulability, like viscoelastic techniques, in order to individualize the treatment.

References:

1. Connors J.J Thromb Haemost.2020;00:1-3
2. Tang. J Thromb Haemost.2020;18(5):1094-9

7259

Venovenous extracorporeal membrane oxygenation support (ECMO) for COVID-19-related acute respiratory failure (ARDS) in 71 year old man at non-ECMO center

Khomenko O.¹, Zatsarynnyy R.¹, Mazur A.¹, Moshta S.¹, Vysotskiy A.²
¹A. A. Shalimov National Institute of Surgery and Transplantology - Kyiv (Ukraine), ²Oleksandrivska clinical hospital - Kyiv (Ukraine)

Background: We would like to share a case of successful ECMO of the patient with severe COVID-19 related ARDS outside of ECMO center with on-demand ECMO-expert support.

Case Report: 71 year old man admitted to the ICU at day 15 of disease (COVID-19 positive) with noninvasive respiratory support with FiO₂ 100%, PEEP 12 cmH₂O and SpO₂ 92% (without respiratory support SpO₂ 64%). Patient was treated with anticoagulants (enoxaparinum) and from Day 2 methylprednisolone was added. On Day 6 first event of atrial fibrillation (AF) occurred, treated with amiodarone. On Day 12, AF occurred again and lead to patient agitation, treatment-continuous amiodarone infusion with switch to 400 mg per os daily up to discharge. On Day 13, patient desaturated (PaO₂/FiO₂=72), deeply sedated, intubated and tracheostomized. Patient received lung protective PCV with TV-6ml/kg, Pplat-27cmH₂O and PEEP-12cmH₂O, RR-24/min. PaO₂ improved to 105 mmHg, however, PaCO₂ started to increase up to 91 mmHg. We invited a consultant-ECMO expert to decide if it is possible to transfer a patient to ECMO center. Because of no empty bed, expert offer to start vVECMO on place the same day. Patient cannulated with 2 cannules - out-flow- v.femoralis dextra and in-flow v.jugularis dextra, ECMO flow-4 l/min, O₂ flow-3 l/min. Heparin we titrated to achieve APTT between 60 and 90 sec. Every 8 hours we monitor pre-and post-oxygenator gases. During ECMO patient was ventilated in proportional support ventilation mode (NAVA). Patient was successfully weaned from ECMO in 10 days of the procedure and became independent from the ventilator in 4 more days. Patient's tracheostomy was decannulated after 3 days spontaneously breathing. Next morning sudden cardiac arrest occurred followed by successful CPR. Patient discharged from the hospital at Day 51, fully compensated, without cognitive dysfunctions.

Discussion: WHO and ELSO recommend to use ECMO in specialised centers for the patients with severe ARDS¹. ELSO indicate patient's age more than 65 years as a relative contraindication for ECMO². Our case is unique as was successful despite the above limitations.

References:

1. Ramanathan K, Shekar K, Ling R. et al. CritCare 25,211(2021) <https://doi.org/10.1186/s13054-021-03634-1>
2. Shekar K, Badulak J, Peek G et al. ASAIO J.2020;66(7):707-721. doi:10.1097/MAT.0000000000001193

Learning points: ECMO expert's support increases chances for successful vVECMO in non-ECMO center. Special equipment, monitoring and team work required.

7369

Incidence of difficult airway in patients with Mucormycosis, an epidemic amidst COVID19 pandemic- A retrospective study.

Rathod D.¹, Kumari K.¹, Meshram T.¹, Sangamala V. P. K.¹, Sethi P.¹, Bhatia P.¹
¹All India institute of medical sciences, Jodhpur - Jodhpur (India)

Background and Goal of Study: Recently, increasing cases of rhino-orbito-cerebral mucormycosis are being reported in patients with COVID-19 world-wide. It had been declared as epidemic during May 2021 in western Rajasthan, India. Along with multiorgan involvement, airway difficulty is anticipated due to oropharyngeal fungal growth and edema in supraglottic area. This study aimed to evaluate the incidence of difficult airway in these group of patients

Materials and Methods: In this retrospective observational study, we evaluated data of 218 patients who underwent surgical resection for rhino-orbito-cerebral mucormycosis under general anaesthesia, at a tertiary care hospital in western Rajasthan, India during the period of May-June 2021. Demographic characteristics, covid status, associated comorbidities, difficult mask ventilation, Cormack Lehane grading, type of laryngoscope used, intubation attempts, extubation at the end of surgery were recorded. We considered Cormack Lehane grade 3 and 4 as difficult laryngoscopy whereas grade 2B is designated as near difficult laryngoscopy.

Results and Discussion: Among the 218 patients of mucormycosis, 90.8% of patients were diagnosed with Sino-nasal mucormycosis, whereas 6% and 3.2% had orbital and cerebral involvement respectively. Among 218 patients, 24.3% were covid positive, 42.7% had history of covid. 15 patients had evidence of difficult bag mask ventilation; all the patients had Sino-nasal mucor. 29 patients had combined difficult and near difficult laryngoscopy (CL- 2b/3/4) out of which 72.4 % (21) patients were with Sino-nasal mucormycosis, 20.7 % (6) with orbital involvement and 6.9 % (2) with cerebral involvement. The association was found to be statistically significant with p value of 0.002 using Fisher Exact test. 5.5% of patients had evidence of difficult intubation. With no significant association with any type of mucormycosis.

Conclusion: We found a significant association of higher Cormack lehane grades with Sino-nasal and Orbital mucormycosis. We suggest that Anaesthesiologists should be prepared for dealing with a difficult airway in patients with mucormycosis. Further studies can be done using radiological imaging, fiberoptic laryngoscopy etc for better understanding of airway anatomy in patients with mucormycosis.

7400 Infectious complications in COVID-19 critically ill patients: a retrospective cohort study

De Donder L.¹, De Bruyn A.¹, Hermans J.¹, De Pauw I.¹, Dubois J.¹, Stessel B.¹

¹Jessa Hospital Hasselt - Hasselt (Belgium)

Background: Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is the cause of the pandemic of coronavirus disease. Patients with SARS-CoV-2 can develop severe illness and possibly require intensive care (1). As all critically ill patients, they are susceptible for secondary infections, which can aggravate the severity of illness and increases the risk of death. Therefore, there is a clinical need for further investigation of secondary infections (secondary pneumonia, bacteremia, catheter-related sepsis) in critically ill patients infected with SARS-CoV-2.

Methods: All patients admitted to the ICU of JESSA hospital Hasselt, Belgium with laboratory-confirmed diagnosis of COVID-19 pneumonia between March 13th and October 17th 2020, were included in the study. Data covering patient demographics, medical history and clinical outcomes were retrospectively reviewed together with incidence of secondary infections. Data are shown as mean ± standard deviation or frequencies and percentages.

Results: From March 13th until October 17th 2020, 116 COVID-19 patients were admitted to the ICU. After exclusion of 22 patients, 94 patients were included in the analysis. Table 1 shows baseline characteristics and outcomes measures. Figure 1 shows the incidence of secondary infections. Almost two thirds of patients (n=64 (68%)) suffered from at least one of three predefined secondary infections. Among the investigated demographics (age, gender, BMI, diabetes mellitus, hypertension, smoking) only diabetes mellitus was associated with a higher risk of acquiring a secondary infection together with the cumulative dose of corticosteroids.

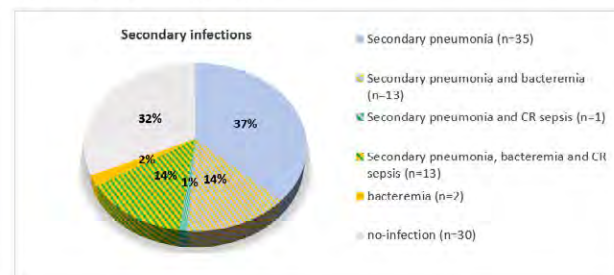
Conclusion: The most prevalent secondary infection in patients infected with SARS-CoV-2 is secondary pneumonia. Diabetes mellitus and the cumulative dose of corticosteroids were identified as possible risk factors for a secondary infection.

Table 1. Baseline characteristics and outcome measures

	No secondary infection N=30	Secondary infection N=64
<i>Baseline characteristics</i>		
Age (years)	71.43 ± 9.65	67.92 ± 10.86
BMI (kg/m ²)	26.99 ± 6.68	28.09 ± 5.63
Gender (male)	13 (43.3%)	42 (65.6%)
<i>Co-morbidities</i>		
Smoking	1 (3.3%)	3(4.7%)
Reumatological disease	4 (13.3%)	4 (6.3%)
Obesity	9 (30.0%)	22 (34.4%)
Arterial hypertension	22 (73.3%)	36 (56.3%)
Diabetes	14 (46.7%)	18 (28.1%)
<i>Outcome measures</i>		
LOS ICU (days)	5.93 ± 2.66	25.00 ± 19.46
LOS hospital (days)	13.56 ± 6.83	38.08 ± 26.40
ICU mortality	12 (40.0%)	17 (26.6%)
Invasive mechanical ventilation	6 (20.0%)	46 (71.9%)

Data are presented as mean ± Standard Deviation or frequencies (%)

Figure 1. Incidence of secondary infections



7428 Changes on the treatment and management of pain, in an Acute Pain Unit, during Sars-CoV-2 pandemic

Correia A.¹, Gomes P. C.¹, Vaz M.¹, Vieira A. L.¹, Cruz M.¹, Cruz D.¹
¹Coimbra University and Hospital Center - Coimbra (Portugal)

Background and Goal of Study: During the Sars-CoV-2 pandemic, healthcare reduced the number of surgeries/elective procedures, non-urgent consultations and hospital visits. The aim of this study was to assess the impact of the pandemic on the treatment and management of pain in an Acute Pain Unit (APU). With this purpose, data from 2019 and 2020 was analyzed considering to the number of patients referred to the APU; number of consultations on the 1st postoperative day; referral time to this unit; type of hospital admission; type of analgesia; physical status according to the American Society of Anesthesiologists (ASA); register of adverse effects and monitoring of the effectiveness in pain control.

Materials and Methods: Descriptive/retrospective observational study with data analysis from a sample of 1981 patients admitted in the APU, between the 1st of January of 2019 and the 31st of December of 2020. The sample was divided by year of admission and associations of variables were analyzed using the SPSS tool.

Results and Discussion: The number of patients referred to the APU decreased 30% in 2020 (808 admissions) when comparing with 2019 (1173 admissions). There was a statistically significant difference in referral time between 2020 (median 3 days) and 2019 (median 2 days) (p<.001). In 2020, the patients' ASA scores were higher (49% ASA >II in 2020 vs. 39% in 2019 (p<0.001)). With regard to internal consultations, in 2020 fewer visits were made on the 1st postoperative day (81% in 2020 vs. 86% in 2019; p<0.001). Considering the monitoring of the effectiveness of pain control using the Visual Analogic Scale (VAS), a statistically significant difference (p<0.001) in the number of records between these two years was verified, with a decrease of 7% in 2020 when compared to 2019. There was no statistically significant difference in the type of hospital admission (urgent or routine), distribution by surgical specialties, type of analgesia administered or register of adverse effects.

Conclusion: During the pandemic, a longer referral time was verified and the admission of patients with more severe comorbidities and less follow-up in the immediate postoperative period were also present. Therefore, it can be concluded that with the Sars-CoV-2 pandemic, the monitoring of patients in the context of acute pain was compromised and it is essential to consider new strategies to optimize available resources in this context.

7470 Risk factors associated with mortality in patients with severe COVID-19

Khapov I.¹, Sokologorskiy S.¹
¹Sechenov university - Moscow (Russia)

Background and Goal of Study: Despite the measures taken the pandemic of COVID-19 is not unfortunately close to being over. Early prediction of COVID-19 course could potentially improve disease outcome. The goal of this study was to define factors associated with mortality in ICU patients with COVID-19.

Materials and Methods: 324 adult ICU patients (165 male; 159 female) with confirmed COVID-19 were enrolled in this retrospective cohort study. Outcomes were available for 316 patients. 70 clinical and laboratory parameters obtained during hospital admission and thereafter during clinical deterioration and ICU transfer were included for statistical analysis. Clinical deterioration was considered as unstable hemodynamics, urine output less than 0.5 ml/kg/hour for 6 hours, respiratory rate>30, altered mental status, qSOFA>2. At first univariate analysis was carried out to investigate association between considered parameters and clinical outcome. Then multivariable logistic regression model was performed which included all statistically significant (p<0.05) potential predictors from univariate analysis.

Results and Discussion: During patient admission the following parameters were associated with in-hospital mortality: patient age (p<0.001), history of chronic kidney disease (RR=2.74; 95%CI: 1.65-4.34) and diabetes mellitus (RR=1.86; 95%CI: 1.21-3.24), serum creatinine (p=0.013) and urea levels (p=0.004). Interestingly, male gender and lung CT severity scale were not associated with mortality as many other

studies have shown. When obtained during clinical deterioration lower hemoglobin level ($p=0.001$), lower thrombocytes count ($p<0.001$), lower albumin ($p=0.003$), higher serum creatinine ($p<0.001$), higher serum urea ($p=0.002$), higher neutrophils in % ($p<0.001$), lower lymphocytes count ($p<0.001$), higher CRP level ($p=0.001$) were associated with in-hospital mortality.

Conclusion: Patient age, history of chronic kidney disease and diabetes mellitus, serum creatinine and urea levels were the only factors (in an early disease course) significantly associated with in-hospital mortality in the study. Unfortunately, many statistically significant factors (in a late disease course) which correlate with a poor outcome are simultaneously markers of already occurred organ damage and organ failure. The discovery of sensitive markers in the early stages is crucial.

7511

Facial ulcer caused by non-invasive mechanical ventilation in a patient with COVID-19.

Méndez Martínez E.¹, Lara A.², Rubio Í.², Ccara@unav.Es C.², Monedero P.²

¹Hospital Universitario Donostia - San Sebastian (Spain), ²Clinica Universidad de Navarra - Pamplona (Spain)

Background: Non-invasive mechanical ventilation is part of the therapeutic management of COVID-19 pneumonia, a disease that is ravaging our world today. It is known to us that one of the side effects of non-invasive mechanical ventilation with a face mask (BIPAP / CPAP) is facial redness or even the appearance of ulceration at the interface support points on the face. An increase in the incidence of the appearance of facial ulcers in critically ill patients could be foreseeable, taking into account the two previous ideas.

Case Report: We are dealing with a 54-yo man who is admitted to the ICU due to hypoxemic respiratory failure secondary to bilateral COVID-19 pneumonia with poor clinical evolution. Noninvasive mechanical ventilation with BIPAP is started immediately. Due to his lack of initial improvement, it was decided to indicate awake prone positioning, maintaining ventilation with BIPAP. Despite this, the evolution continues to be unfavorable, so intubation is indicated as the next measure and he is placed in the prone position. After seven days intubated, it was possible to extubate and go back to non-invasive mechanical ventilation with BIPAP alternating prone and supine positions. After this new ventilatory strategy, the patient begins to present ulcerative lesions in the facial region: nasal wing and right chin, coinciding with the support points of the face mask and the support points on the bed. Images are attached. These lesions begin to improve after the withdrawal of ventilation with BIPAP.

Discussion: There are already studies which suggest an incidence of up to 47% in the appearance of facial ulcers due to non-invasive mechanical ventilation in patients with COVID-19 pneumonia. We must remember the prevention measures for these lesions.

References:

1. "Perioral pressure ulcers in patients with COVID-19 requiring invasive mechanical ventilation". Aseel Sleiwah et al. Eur J Plast Surg. 2020.
2. "Facial Pressure Injuries from Prone Positioning in the COVID-19 Era". Sarah C Shearer et al. Laryngoscope. 2021.

Learning points: We are healthcare professionals with a continuous presence in critical care units, so we are familiar with both the use of non-invasive mechanical ventilation and COVID-19. Non-invasive mechanical ventilation is one of the fundamental pillars of patients with severe COVID-19 pneumonia. The appearance of complications associated with this technique in these patients is to be expected.

7552

Pathological skeletal muscle features in critically ill patients infected with SARS-CoV-2: a prospective observational cohort study

Mostien T.¹, Stevens S.², Agten A.², Stessel B.³, Snijders T.⁴, Vandenabeele F.²

¹Jessa Hospital Hasselt - Hasselt (Belgium), ²Rehabilitation Research Center, Faculty of Rehabilitation Sciences and Physiotherapy, Hasselt University - Diepenbeek (Belgium), ³Department of Anaesthesiology, Jessa Hospital, Hasselt, Belgium - Hasselt (Belgium), ⁴Maastricht University, Department of Anatomy & Embryology, Faculty of Health, Medicine and Life Sciences - Maastricht (Netherlands)

Background: SARS-CoV-2 infection in combination with bed rest and mechanical ventilation can lead to severe muscle wasting with a decrease in muscle fiber size and functional decline resulting in long-term morbidity. There is a need of more in-depth understanding of the effects of SARS-CoV-2 infection on muscle wasting. Therefore, the aim of this study is to determine structural muscular changes that occur within the first week of intensive care unit admission due to a SARS-CoV-2 infection.

Methods: Multiple biopsy samples of the Vastus Lateralis muscle were obtained from consecutive patients between day 1-3 (pre) and day 5-8 (post) to evaluate musculoskeletal involvement in critically ill patients admitted to the intensive care unit of the Jessa Hospital (Belgium). Muscle samples were collected to perform immunofluorescence stainings to investigate the change in muscle fibre size and composition, and various indices of capillarisation.

Results: Patient characteristics are displayed in table 1. A total of 22 (69±14 years, BMI 28±5 kg/m²) patients underwent the first muscle biopsy, eighteen patients also the second one. We couldn't observe a significant alteration in type I or II muscle fiber size (+5.74% type I, -5.17% type II) because individual data showed large variability (figure 1). The percentage of type I fibers increased by +9.96%, and type II fibers decreased by -7.47%. No significant interactions were found for capillary content. A -1.5% and -7.02% decrease in the number of capillary contacts (CC) was observed for respectively type I and II muscle fibers. No abnormal luminal obliterations nor micro-thrombi could be observed within the arterioles and venules.

Conclusion: Surprisingly, a subset of patients showed an increase in muscle fiber size after 1-week of ICU admission. This suggests that in addition to the known atrophy caused by ICU admission, myocyte swelling may be part of a degenerative cascade following critical illness by SARS-CoV-2 infection in a subset of patients. Absence of micro embolisms in our samples is probably due to sub-therapeutic to therapeutic thromboprophylaxis.

7580

The impact of Covid-19 on emergency surgery at Birmingham Heartlands, Good Hope and Solihull Hospitals.

Uffia L.¹, Gao-Smith F.¹, Rooney M.¹

¹Birmingham Heartlands Hospital - Birmingham (United Kingdom)

Background: Covid-19 has impacted surgery in many ways; elective operations cancelled, theatre teams redeployed and operating theatres used for extra ICU capacity. The NELA interim report illustrates the impact of Covid-19 on laparotomies in England and Wales. Few large, multicentre studies exist to look at other surgical specialties. Aim: To estimate the impact Covid-19 has had on all types of emergency surgery within a large NHS trust in England. Outcomes include case numbers and 30 day mortality.

Method: This multicentre, retrospective study compared emergency surgery data between pre-pandemic March 2019-February 2020 with pandemic data between March 2020-February 2021.

Results & Discussion: Overall, 16329 emergency procedures were performed across 3 hospital sites; 9365 from March 2019-February 2020 and 6964 from March 2020-February 2021. There was a dramatic fall in the number of cases at the start of 'lockdown'; 294 in April 2020 compared to 767 the previous year (61.5% reduction). 30 day mortality rate was identical pre-pandemic and pandemic (2.2%). Specialties performing emergency procedures associated with higher mortality rates

included gastroenterology (10.5%) and vascular surgery (6.1%). 30 day mortality rate was highest in patients over 80 years old (8.2%) compared to patients 18 to 79 years old (1.6%). Several factors are likely to have influenced these results. The trust relied on other hospitals to facilitate emergency procedures, in particular thoracic surgery and trauma (see Fig 1). Certain conditions normally treated surgically were managed conservatively, e.g appendicitis.

Figure 1

Specialty	% reduction / increase
Ear, nose and throat	8% reduction
General surgery	13.5% reduction
Gynaecology	18.2% reduction
Obstetric surgery	46.7% increase
Thoracic surgery	72.7% reduction
Trauma and orthopaedics	66.0% reduction
Urology	10.3% reduction
Vascular surgery	32.5% increase

Conclusion: Further investigation is needed to compare mortality in Covid-19 positive and negative patients undergoing emergency surgery, and look into postoperative ICU admissions. By understanding differences between pre-pandemic and pandemic data we can use this information to plan ahead, as unfortunately, we are likely to face another in the future.

References:

1. NELA. The impact of Covid-19 on emergency laparotomy – an interim report of the National Emergency laparotomy Audit, 23 March 2020–30 September 2020. London: RCOA 2021.

7606

Inhaled nitric oxid in severe pulmonary hypertension secondary to hypoxic vasoconstriction in Covid 19 pneumonia

Pla Escrivà G.¹, Ricart Hernandez A.¹, Gascó Serna I.¹, Maciel Gonçalves J. L.¹, Rodríguez Maurell C.¹, Vives Santacana M.¹
¹Hospital Universitari Dr Josep Trueta - Girona (Spain)

Background: Nitric oxid (NO) is used as a treatment for pulmonary hypertension (PH). Hypoxic vasoconstriction caused by severe acute respiratory distress (ARDS), may induce secondary pulmonary hypertension with hemodynamic implications, mainly to the right ventricle (RV) systolic function impairment (1).

Case Report: A 36-year-old woman affected with severe ARDS associated with coronavirus disease 2019 (COVID-19) pneumonia requiring invasive mechanical ventilation was admitted in ICU. Prone position was required for several days. On day 25th presented clinical signs of cardiac dysfunction. Moderate tricuspid insufficiency (TI) allowing the estimation of systolic pulmonary artery pressure (sPAP) of 72 mmHg, moderate dilated RV and impairment of RV transversal contractility of the free wall along with paradoxical septal motion (PSM) were observed by transesophageal echocardiography (*). Nor RV hypertrophy neither right atrium dilatation were observed suggesting an acute episode. PaO₂/FiO₂ ratio was 85mmHg. A CT pulmonary angiogram was performed to rule out the presence of a pulmonary embolism. Inhaled NO was initiated at 15ppm. Oxygenation and hemodynamic improvement was observed allowing stopping vasopressors. Following 24 hours of treatment, PaO₂/FiO₂ ratio increased up to 190mmHg and TTE was performed observing the disappearance of the TI, a non-dilated RV, no-impairment of transverse free wall contractility and no PSM. NO was stopped after 6 days of gradually decreasing the dose without incidences and maintaining an improvement of oxygenation and hemodynamic status, allowing respiratory weaning.

Discussion: Hypoxic vasoconstriction is a physiologic phenomenon that may cause PH along with RV pressure overload and RV systolic function impairment. PH can be caused by ARDS secondary to covid 19 infection, worsening the hemodynamic and respiratory status. NO may be used to improve oxygenation and hemodynamic parameters while the acute process leading to the deterioration is reversed.

References:

1. Longobardo A et al. Inhaled nitric oxide minimally improves oxygenation in COVID-19 related acute respiratory distress syndrome. *Br J Anaesth.* 2021;126(1):e44. (*) An image video will be available.

Learning points: Sustained acute hypoxia in ARDS secondary to covid 19 infection may lead to PH causing a ventilation/perfusion mismatch and RV systolic impairment. NO may be considered in patients with severe PH causing RV impairment and hypoxemia.

7665

Healthcare-associated infections in icu during the Covid-19 pandemic: periodic predisposing factors, agents and antimicrobial sensitivity profiles

Altintepe N.¹, Aktaş Tekin E.¹, Turgut N.¹, Şimşek F.¹, Başkurt O.², Okur O.¹

¹PROF DR CEMIL TASCIOGLU CITY HOSPITAL - ISTANBUL (Turkey),
²HAKKARI STATE HOSPITAL - HAKKARI (Turkey)

Background and Goal of Study: This study aimed to determine the epidemiological features, predisposing factors, antimicrobial susceptibility models of isolated microorganisms of healthcare-associated infections in intensive care patients with the diagnosis of COVID-19 pneumonia as well as the effect of these infections on morbidity and mortality of patients.

Materials and Methods: One-hundred and thirty-six intensive care patients with a diagnosis of COVID-19 pneumonia and nosocomial infections were retrospectively evaluated in three terms reflecting the three picks that occurred in Turkey. Patients' demographics, comorbidities risk scores (SOFA, CCI, SAPS II), amount of antivirals and immunomodulatory drugs administered, laboratory findings, number of invasive interventions, respiratory therapy methods, isolated pathogens, isolation sites and antimicrobial susceptibility profiles were compared between the three terms.

Results and Discussion: Length of ICU stay in days was highest in 1st term patients. There were no significant differences in risk scores between the three periods. Use of convalescent plasma, methylprednisolone and dexamethasone were lowest in 1st term. The mortality of HAI patients was found to be 74.3% with the highest mortality rate being in the 3rd term. The mean of the highest CCI Score, SAPS II scores, N/L ratio were significantly higher in mortal cases. Length to a first positive culture in days was positively correlated with the length to peak N/L and peak T/L ratio in days.

Conclusion: In our study, the most common isolation site was blood cultures making bloodstream infections the most common type of infection with a rate of 57%. The most commonly isolated agents were *K.pneumoniae*, *A.baumannii*, MRSA and *C.albicans* in respectively. The second most common isolation site was urinary cultures with a rate of 31% where *K.pneumoniae* and *C.albicans* were the most commonly isolated pathogens. The antibiotic susceptibility profiles were such that 51.4% of the *K.pneumoniae* cases were pan-resistant and 14.7% were susceptible to fosfomycin; 18% of the *C.albicans* cases were susceptible to fluconazole, voriconazole, caspofungin and micafungin. 30% of the *A.baumannii* cases were pan-resistant and 22% of the cases were susceptible to colistin. 39.5% of the MRSA cases were found to be susceptible to vancomycin, daptomycin and linezolid.

7679

Inhalation sedation and COVID-19 ARDS

Flors Catalán G.¹, Rodríguez Tallero J.¹, García García C.¹, Galiana Ivar M.¹, Gómez Salinas L.¹

¹Hospital General Universitario de Alicante (HGUA) - Alicante (Spain)

Background and goal of study Severe acute respiratory syndrome is the main cause of mortality in COVID-19 patients. It is demonstrated that COVID-19 patients have higher iv sedation drugs requirements due to long stay in ICU and sedation drugs tolerance which caused a worldwide shortage of many of most common iv sedation drugs. The aim of our study was to determine the safety and effectiveness of inhaled sedation with AnaConDA system for SARS COVID-19 patients. **Materials and methods** Up to 140 consecutive critically ill SARS COVID-19 patients were retrospectively studied using our hospital database. These patients were admitted to a Critical Care COVID Unit from September 2020 to July 2021 in Alicante General Hospital. Only 8 patients were sedated with inhaled sedation through AnaConDa system. RASS and BIS were used to study effectiveness of sedation at the beginning and 24h after inhaled sedation. Haemodynamic stability, renal function and delirium were used to determine the safety of the system. Qualitative nurse comfort was also studied.

Results and discussion A total of eight patients were included in the study. Mean age was 58 years old, mean ICU stay was 21 days. All

patients required inhaled sedation use due to poor control with other sedative agents. 75% of the patients were sedated with sevoflurane, and 25% with isoflurane. BIS was studied at the beginning and 24 hours after inhaled sedation, with values of 54 and 47 respectively. The patients were sedated a mean of 6,3 days. RASS score show higher level of sedation. 50% of the patients had acute renal failure before AnaConDa system was used, with no worsening after inhaled sedation use. 75% of the patients needed vasopressors for haemodynamic stability, two patients needed VV ECMO therapy. Hyperactive delirium only appears in 25% patients after weaning of sedation. In one patient isoflurane therapy had to be stopped because a non-reactive mydriatic pupils. 100% of nursing staff reported positively the ease of handling the device in a survey.

Conclusions Inhaled sedation with it is effective in patients with ARDS due to COVID-19, maintaining acceptable BIS and RASS levels after 24 h of treatment. Inhaled sedation with AnaConDa system is safe, no direct correlation with inhaled anaesthesia and renal failure, delirium or haemodynamic instability was shown. AnaConDa system is comfortable to use as per nurses perception. Future studies are needed to compare inhaled vs iv sedation drugs.

7680

A Novel Combined Nasal Mask-Face Tent Provided Continuous Pressure-Control Ventilation/Oxygenation and Reduced Aerosol/Droplet Spread while Teaching a Medical Student in Performing Unexpected Difficult Intubation Amid the COVID-19 Pandemic

Tse J.¹, Rademaker C.¹

¹*Rutgers Robert Wood Johnson Medical School - New Brunswick (United States)*

Background: Amid COVID-19 pandemic, a simple combined nasal mask-face tent provided continuous oxygenation GA induction, intubation and extubation in a COVID-19 positive patient and a morbidly obese patient.1-3 It reduced aerosol/droplet spread during intubation/extubation.1,3 We used it in teaching unexpected difficult intubation.

Case Description: A 67-year-old male with NIDDM, HTN and atrial-fibrillation, presented for EPS/ablation. He had 2 caps (#7 & 8) and Mallipati I airway. He gave consent for photography/case report. A modified infant facemask-face tent was secured over his nose and connected to the anaesthesia machine/circuit delivering 4L O₂/min. Following nasal CPAP pre-oxygenation, he received fentanyl/lidocaine/propofol/rocuronium. Nasal pressure-control ventilation (NPCV) was easily accomplished. A hand-held video-laryngoscopy (VL) with MAC 4 blade was performed under face tent while NPCV provided continuous oxygenation. VL revealed Cormack-Lehane IV laryngeal view. To avoid causing oral/dental injury, a free-standing VL with a highly angulated blade (#4) was requested. Meanwhile, he continued to receive NPCV/oxygenation. Endotracheal intubation was easily accomplished with the angulated VL blade under the face tent. He maintained 100% SpO₂ throughout induction and intubation. Prior to extubation, the nasal mask-face tent was re-secured on his nose and his mouth. Oral suctioning was performed under the face tent to reduce aerosol/droplet spread. He was extubated smoothly without coughing and maintained spontaneous nasal CPAP ventilation and 100%SpO₂.

Discussion: This simple nasal mask-face tent provided continuous ventilation/oxygenation and reduced aerosol/droplet spread while teaching unexpected difficult intubation in a patient undergoing EPS/atrial-fibrillation ablation. Amid the COVID-19 pandemic, it may improve patient safety and provide additional provider protection at a low cost.

References:

1. www.tsemask.com; 2.ASA AM: MC1280, 2020; 3.NYSSA 74thPGA: MCC201, 2020

Learning points: How to assemble a paediatric mask-face tent < 2 mins. How to provide continuous nasal oxygenation using pressure-control ventilation. How to reduce aerosol/droplet spread during intubation and extubation using the nasal mask-face tent.

7681

A Novel Combined Nasal Mask-Face Tent Maintained Spontaneous CPAP Ventilation/Oxygenation and Reduced Aerosol/Droplet Spread in a Frail Elderly Patient with OSA and Severe Cardiopulmonary Diseases during OGD under Sedation Amid the COVID-19 Pandemic

Tse J.¹, Musovic S.¹, George A.¹, Manning A.¹, Villaluna C.¹, Landgraf B.¹

¹*Rutgers Robert Wood Johnson Medical School - New Brunswick (United States)*

Background: Airway manipulations such as endotracheal intubation/extubation and oesphagogastroduodenoscopy (OGD) are aerosol generating procedures which are concerns amid the COVID-19 pandemic. A simple combined nasal mask-face tent provided continuous oxygenation and reduced aerosol/droplet spread during GA induction and intubation/extubation in a COVID-19 positive patient and a morbidly obese patient.1-3

We used it here in a frail elderly patient undergoing OGD.

Case Description: A 79 year-old female with OSA on home CPAP, COPD, NIDDM, CKD, HTN, hypothyroidism, CAD s/p MI, CABGx3V, PCIx5 stents, HFREF (EF 30-35%), history of LVAD, on home milrinone infusion, atrial-fibrillation s/p failed ablation, ischemic cardiomyopathy s/p AICD/PPM, Barrett's esophagus, GERD, history of GIB and PUD for outpatient OGD.

Patient and daughter gave consent for photography/case report. She received albuterol inhalation pre-treatment. She had a Mallampati II airway. An infant facemask was secured over her nose and connected to the anesthesia machine/circuit delivering 2-4 cmH₂O CPAP (4L O₂/min). Her SpO₂ improved from 97% to 100%. Her oropharynx was treated with local anesthetic spray.

Deep sedation was titrated with lidocaine, etomidate, and propofol and maintained on propofol infusion (50 mcg/kg/min). Her mouth was covered with a clear plastic sheet (face tent) to reduce aerosol/droplet spread. She maintained spontaneous nasal CPAP ventilation and 100%SpO₂ throughout EGD without requiring any airway manipulation. She tolerated the procedure well and was discharged home without complications.

Discussion: This simple combined nasal mask-face tent maintained spontaneous CPAP ventilation/oxygenation in a frail elderly patient with OSA and severe cardiopulmonary diseases during OGD. It also reduced aerosol/droplet spread during the procedure. Amid COVID-19 pandemic, it may improve both patient and provider safety at a low cost.

References:

1. www.tsemask.com; 2. ASA AM: (MC1280), 2020; 3. NYSSA 74th PGA:MCC201, 2020

Learning points: How to assemble a nasal mask-face tent using a paediatric mask in <2 mins. How to maintain spontaneous nasal mask CPAP ventilation during sedation. How to reduce aerosol/droplet spread during OGD.

AUTHORS INDEX

Author Abstract ID			
	Accogli Agnese 6811	Ahijado Agudo José María 6770 6819	Alegret Antonijuan Marc 6836
Abad Gurumeta Alfredo 6823 6915	Adamowicz Sebastian 6993	Ahmed Ibrahim Walash Ibrahim 6567	Aleksi Albana 6467
Abdelhafez Hanaa 6518	Adembri Chiara 6879	Ahmed Rania 7354	Alfadhel Abdulaziz 6793
Abdelhamid Karoui 6625	Adi Niod 6671	Ailinger Alex 6714	Algyar Mohammed Fouad Mohammed 6547
Abdoolraheem Mohammad Yusuf 6960	Adler Christoph 6714	Aires Jorge 7452 7589 7616	Ali Saedah 7551
Abdul Mukmin Laila 7551	Adya Anish Kumar 7055	Aisci Gaetano 6977	Alidge Kerrie 7497
Abdul Mukmin Laila 7550	Afonso José Pedro 7245	Akça Başak 7184 7214 7338	Alkhelaifi Mashael 7117
Abdul Razak Norsila 7550	Agarwal Vandana 7318	Akdag Sukriye 6837	Alkis Neslihan 7069
Abdullayev Ruslan 7192	Aghasaryan Nairi 7353	Akesen Selcan 7356	Allaert Silvie 6528 6656
Abdyli Asead 7455	Agibetov Asan 6628	Akinci Seda Banu 6623	Almaraz Estafania 7614
Abelha Fernando 7599	Agra Ikaro 7537 7539 7540 7541 7542 7543 7544 7545	Aktaş Tekin Esra 7665	Almeida Carolina 7021 7027 7118
Abene Salim 6502	Agten Anouk 7552	Alaez Azucena 6781	Almeida Daniela 7424
Abgrall Gwenole 7325	Aguado Sanchez Sana 7553 7639	Albers Kim 7483	Alonso Eduardo 6742
Abraham Aril 7378	Aguiar Ana Rita 7145 7647	Albini Marco 6923	Alonso Elia 6835
Abrard Stanislas 6647	Aguiar Filipa 6523 6524 6525	Albon Lorraine 7103 7124	Al-Rawi Yasir 6916
Abreu Fátima 7536	Aguiar Silva Bruno 7224 7227	Albuerne-Estrada Isabella 7210	Alsina Estíbaliz 7032
Abrunhosa Rosário 6663		Albuquerque Diogo 7532	Al-Taie Ruaa 6556 7081
Abu Jareis Tamer 6943		Al-Dabbagh Abdulhamed 7548	Altınöz Sönmez Esin 7571
Abuarafah Mohammad Khaled Ibrahim 6943			Altintepe Nihan 7665

- Altun Bingöl Demet
6831
7571
- Álvarez Escudero Julian
6688
6762
6906
- Álvarez Juan
6814
- Álvarez Refojo Felisa
7198
- Alvarez Villegas David
7438
- Álvarez-Baena Lucía
6490
6581
- Alvarez-Villegas David
7345
- Alves Ana Rita
7570
- Alves Ângela
6815
7525
- Alves Bárbara
6492
7625
- Alves Catarina
7478
- Alves Joana
7228
- Alves Petra
7234
- Alves Sara
6744
- Amabili Philippe
7494
- Amacher Simon Adrian
7388
- Amaral Joana
6565
- Ambulkar Reshma
7318
- Amemiya Cinthia Emy Endo
6982
- Amin Kanish
7093
7103
7124
7507
- Amorim Peo
7676
- Ampatzidou Foteini
6559
- Ananth Manohar Ramesh
6693
- Ančić Bočina Nina
6791
- Ancos De
6781
- Andolz Isabel
6877
- Andonov Dimislav Ivanov
7026
- Aneeva Antonia
6834
- Aneiros Peña Francisco
6822
- Angelov Sophia
7281
- Angelucci Alessana
7325
- Anjelova Diana
7353
- Ankay Yıbaş Aysun
7645
- Ankay Yılbaş Aysun
6612
7184
- Annecke Thorsten
6714
- Anouar Jarraya
6560
6627
- Antoniou Efstathios
7262
- Antunes Catarina
7121
- Antunes Peo
7635
- Anuszkiewicz Paweł
7079
7088
- Aphram Gaby
6630
- Aponte-Gatica Juan Francisco
6662
7040
- Apostolidou Sofia
7269
- Appel Dominik
7225
- Appenzeller-Herzog Christian
7388
- Aptekman Boris
6896
- Aracil Escoda Norma
6823
6893
6915
- Arantes Ana
6744
7305
7508
- Arantes Rita
7218
7234
- Araújo Ana
7671
7672
- Arawwawala Dilshan
7459
- Arbonés Aran Elisa
6644
- Ardicli Burak
7557
- Arenas Ernesto
7512
- Argente-Navarro Pilar
6985
6995
- Aries Marcel
6889
- Arina Pietro
6655
- Arita Valeria
7406
- Armengol Gay Mireia
7639
- Armengol Hernández Laura
7560
- Arnalich Ana
7613
- Arnaoutoglou Eleni
6912
6919
7501
- Arslan Muhammad
7119
7160
7354
- Arunagiri Babu
7376
- Asani Egzon
7649
- Aschkenasy Gabriella
7578
- Assunção José
6492
7635
- Assunção José Peo
7595
7625
- Asteri Theodora
6559
- Astuto Marinella
6582
6584
6585
7065
7074
- Athauda A.A.T.R
7334
- Atoui Hadi
7565
- Avital Avraham
7324
- Avivi Irit
6671
- Avrham Tal
6777
- Aykac Zeynep Zuhai
6837
7192
- Azevedo-Mendes Manu
7494

- Baar Yuval
6896
- Baboolal Hemanth
7418
- Baca Berta
7502
- Baca Pose Berta
7619
- Bachero Amanda
6949
- Bader Anés
7152
- Bader Karlen Stade
6542
- Badole Usha R.
7111
- Baeza Álvarez Luis
7368
- Baeza Luis Manuel
7488
- Bagntasarian Stella
7164
- Baierl Aneas
6632
- Bal Ee Onur
6782
- Balcan Alina
6841
6905
6999
7015
- Ball Lorenzo
7223
- Balmer Mathias
6536
- Balmer Yves
6505
- Balust Jaume
6765
- Balzani Eleonora
7089
- Banagi Devaraju Vaishnavi
7587
- Banai Shmuel
6802
- Bandagi Ambika
7431
- Banerjee Arnab
7283
- Bansal Sonia
7374
- Barakat Habib
7565
- Barata João
7001
- Barata Melanie
6485
- Barbosa Carlos
7145
- Barbosa Joselina
BAPC-3 7039
- Barbosa Rita
7605
- Bareka Metaxia
6912
6919
7501
- Bárez Caballero Yasmina
6761
- Barquero Lopez Marta
6767
7230
- Barragán Lourdes
6490
- Barrera Bohórquez Lady
Carolina
6723
6726
6727
6778
- Barrera Carolina
6903
- Barriuso Vilà Esther
6573
- Barros Marisa
6885
7020
7031
7073
7628
- Barsa Maksym
7327
- Bartakke Ashish
7454
7611
- Barturen Fernando
7611
- Barvais Luc
6955
BAPC-1 6495
- Bash Lori D.
6923
7563
- Baskar Vignesh
7318
- Başkurt Ozan
7665
- Basora Misericordia
7029
- Basurto David
6552
- Batista Sofia
7465
- Bayrak Fatih
6616
- Baytas Volkan
7069
- Becerra Bolaños Angel
6764
6922
6944
7618
- Becic Tina
7526
- Beck Florian
6531
7299
- Beck Katharina
7388
- Becker Christoph
7388
- Becker Simon
6561
- Beckett Samuel
7575
- Begoña Quitana-
Villamandos
7614
- Beilstein Christian
6586
6694
6851
- Bekos Chris
6852
- Belba Amy
7456
- Belba Gjergji
6467
- Belba Monika
6467
7456
- Bell Max
6830
- Bellafont Javier
7230
- Bellafont Peralta F. Javier
7438
- Belmaati Rajaa
7317
- Belmonte Cuenca Carmen
7438
- Beloncle François
6647
- Belousova Tamara
6539
6541
6555
- Beltrán de Heredia Sandra
6759
6835
- Beltrán Sana
6949
- Benaam Sophie
6777
- Benbenishty Julie
6943
- Bentoumi Kahina
7519
- Ben-Yishai Shimon
6673
- Beqiri Erta
6889
- Berberana Margarita
7489

- Berendonk Christoph
6536
- Bergé Raquel
6645
- Berger-Estilita Joana
6536
6704
- Berikashvili Levan
6847
- Berkenstadt Haim
6776
6898
6907
- Berlière Martine
6502
- Bermejo Albares Lourdes
6474
- Bermejo Lourdes
7041
7166
- Bernard Paul
6697
- Bernardi Martin
7320
- Bernardi Ricardo
7633
- Bernardino Ana
7452
7589
7616
7663
- Bernardino Marta
7121
- Bernardino Morcillo Carmen
7393
- Bernardo Ricardo
7662
- Bernat Ma Jose
6469
- Berrevoet Frederik
6734
6902
- Bervini David
BAPC-6 6901
- Berwertz Martyna
7295
7296
- Bezerra de Lima Novo Joao
7038
7136
BAPC-3 7039
- Bezu Lucillia
7010
- Bhalla Swaran
7011
- Bhatia Pradeep
7369
7427
7486
7573
7587
- Biehlarov Oleksan
7082
- Bilaj-Miraka Marjeta
7455
- Bilgili Beliz
7446
- Bilgin Hülya
7356
- Biliaiev Aniy
7646
- Bilotta Federico
7088
- Binyamin Yair
6777
- Bisbe Vives Elvira
6651
- Biscaiburo Juan Pablo
6534
- Bisdorff Max
6955
- Bishop Bridget
7266
- Biswas Subhra
6657
6746
- Blasco-Torres Laura
6966
- Bläsius Felix
7142
- Blázquez Juan
6778
- Bleeser Tom
6552
- Blobner Manfred
7361
7463
- Blueher Max
7069
- Blülle Rafael
6536
- Bluth Thomas
7223
- Boemer François
7311
- Bohren Chantal
7388
- Boichat Catherine
6472
- Bollen Pinto Bernardo
6626
- Boncanoska Panovska
Slavica
7649
- Bondar Mykhailo
6987
- Bonetto Chiara
6811
- Bonhomme Vincent
6531
7494
- Boogaerts Jean
7555
- Boran Ertay
7030
- Boran Mertay
7030
- Borges Joana
6744
- Borges João
7027
- Borgstedt Laura
7361
7463
- Bornemann-Cimenti Helmar
6649
- Borrat Xavier
6765
- Bosch Laia
6759
- Bosteels Arnaud
6519
- Botros Makram Joseph
6547
- Brands Michiel
7457
- Branea Ionut
7251
- Brattou Panagiota
7134
- Bräuer Anselm
7352
- Braun Lara
BAPC-2 7122
- Brazdil Dominik
6488
- Brazzi Luca
6655
6811
7089
- Brogly Nicolas
6742
6781
6807
7104
- Brogly Nicolás
7032
- Brookfield Layla
7093
- Brotis Alexanos
6912
7501
- Brovman Ethan
6793
- Brull Sorin J.
7638
- Bryancev Evgenii
6539
- Buhre Wolfgang
7068
BAPC-8 7199
- Buinac Ana
6680
- Bulat Cristijan
6590
- Burgos Santamaría Alba
7613

Buriticá Aguirre Aiana María 7664	Camcı Ee 6831	Carlos Ricardo 7358	Castro Diana 6938
Burkhard Fiona 6694	Campfort Maëva 6476	Carlos Sampaio José 7538	Castro Fernandes Rita 7609
Burkhard Fiona C. 6699	Campistol Mas Elena 7345	Carmona Maria 7358	Castro Heloisa 7424
Burlacu Crina 7568	Camprubí Sociats Inma 6767	Carneiro Emília 7073 7136	Castro Lalin Agustina 6648 7043 7152
Bushman Gerald 6665	Cañamas Catalá Maria 6742	Carpintero Cruz Angie Catherine 6573 7553	Castro Mafalda 6941 6952 7605
Busignani Serena 6701	Canbay Özgür 7184 7645	Carrero Enrique 6633	Castro Maria De Lurdes 7290
Busmail Alberto 7406	Candeias Maria José 6515	Carrilho Alexane 7399	Castro Maria Lurdes 7118
Butori Romain 6653	Cara Carmen 7511	Cartwright Anthony 6669	Catalán Escudero Patricia 6816
Buttaro Martín 6648	Cara Gilabert Carmen 7061	Caruso Pier Francesco 6923	Cavaleri Marco 6585
Buttigieg Michael 7343 7632	Caramelo Susana 7538	Carvalho Clístenes 7540 7541 7542 7543 7544 7545	Cavalier Etienne 7311
Buyse Klaas 6969	Carbó Lisano 7043		Cay Melero Sara 7664
Buyuk Dilan 6831	Cardoso Hélder 7245		Cayla Cléor 6476
Büyük Dilan 7571	Cardoso Priscilla 7358	Carvalho Clístenes 7521 7522 7537 7539 7581 7585	Cecconi Maurizio 6923
Buyurgan Sevinç 7184	Cardoso Tiago Miguel 6849 7673		čela Dina 6791
Byadovskaya Irina 6539	Cardozo Maximiliano 6903	Carvalho Marta 7661	Cenicante Teresa 7027
Caballero Milán Marta 6741	Carella Michele 6531 7299	Carvalho Sofia 7297	Cerqueira Isabel 7218
Caesar Harvey 7072	Carev Mladen 6590 7157 7485	Casanovas Georgina 6633	Cerqueira Rita 7530
Cakmak Gul 6837 6897 6900	Caria Telma 6684	Castanheira dos Reis Gisela Carina 7246	Ceulemans Angelique 7528
Cakmak Gül 7448	Caridade Miguel 6744	Castegren Markus 6779	Chaikittisilpa Nophanan 7379
Calhau Ricardo 7478	Cariñena Amigo Agustin 6822	Castro Ana 7647	Chakrabarti Dhritiman 7374
Callebaut Ina 7289 7528	Carles Michel 6472	Castro Ana Isabel 7145	Chan Wan Fen 7653

Chandler Hannah 7187	Clanet Matthieu 7415	Corbella Giménez Carmen 6474	Costa Miguel 7671
Chang Yi-Ting 7313	Coburn Mark 7476 BAPC-2 7122	Corcoy Marta 6877	Costa Peo 7433
Chauhan Ankit K. 6950	Coeckelenberg Sean 6955	Cordeiro Lisbete 6624 7085	Costa Yuri 7537 7539 7541 7542 7543 7545
Chauhan Ashish 7055	Coelho Adelaide 7652	Cordeiro Nuno 7118	
Chaus Nikolay 6847	Coelho Inês 7148	Correa Barrera Juan José 7077 7336 7432	Costamagna Anea 6655
Che Omar Sanihah 7597	Coelho Marta 7246	Correia Ana 7100 7428	Costantini Julián 7043
Chekkapalli Snarayana 7375 7376	Cogan Rebecca 6597	Corson Nils 6505	Costea Dan 6999 7015
Chen Ying 7607	Cohen Barak 6673 7083 7267 7524 BAPC-7 6570	Cortell-Ballester José 6995	Costea Daniel-Ovidiu 6905
Cheng Hung-Wei 7049		Cortez Jorge 6513	Coto Cristina 7488 7512
Cheng Shang Ming 7493	Cohen Merle 7507	Cortez Mariana 7027	Crawford Megan 6483
Chernishof Vasili 6665 6668	Collange Olivier 7171	Cortifias Diaz Julio 6688	Crisóstomo J.N.R.S.R. 7530
Chinchilla-H Andrés 7406	Colom Anna 6573	Costa António 7672	Cristinar Mircea 7171
Chinchilla-H Maria Carolina 7406	Colomina Maria J. 6741 7230 7345	Costa Daniela 6920	Cruz Daniela 7428
Chitty Lyndsey 7252		Costa Diogo 6523 6524	Cruz Gerson 6752
Chloropoulou Pelagia 7164	Colomina Soler María José 6767		Cruz Margarida 7428
Cho Sung-Ae 6479	Comino-Trinidad Oscar 6765 7029	Costa Fábio 6744 7218 7228 7234	Cudia Antonella 7519
Chumela Teresa 6682 6718	Conceição Catarina 7038	Costa Gabriela 6515	Cuesta Montero Pablo 6818
Ciano Francesca 6977	Conde Patrícia 6815 7525	Costa Gomes Piedade 7428	Cugat Torres Carla 7611
Cicconi Eugenio 6662 7040	Conde Rita 7525 7531	Costa Jose Mateus 6982 6994 6998	Cuñat Tomás 7029
Cindea Iulia 6841 6905 6999 7015	Corbella Carmen 6817 7041 7166	Costa Luiz 6832	Cunha Filipa 7534
			Cunha Filipa Andrade Almeida da 6725

- | | | | |
|---|---|--|--|
| Cunha Peo
6959 | De Backer Daniel
7519 | De Mattos Raphael
7092 | Desmond Fiona
6463
6482 |
| Cunha Sofia
7538 | De Baerdemaeker Luc
6902 | De Meyer Gregory
6568
7357 | 6483
6549
6597
6737 |
| Cunha Yacira
6859
7469 | De Bel Nele Rita
6656 | De Pauw Ilse
7289
7400 | Devadze Guram
6834 |
| Cusumano Giacomo
6585 | De Boer Arjen
7563 | De Riva Nicolás
6889 | Devarakonda Bhargava
7659 |
| Cuttaia Helena
7555 | De Bruyn Astrid
7400 | De Vicente Martin Marta
7391 | Devroe Sarah
6552 |
| Cyril Gladys
7378 | De Coster Laurence
6637 | De Vooght Pieter
6969 | Dharan Baiju S.
7624
7659 |
| Da Silva Pereira Filipe André
7413
7425 | De Donder Laurenz
7400 | De Waal Eric
6652 | Dhillon Manprit
6657
6746 |
| Dabrowicz Aian
7364 | De Groof Pieter
7434 | Declercq Guy
6637 | Di Paola Aurora
7074 |
| Dabrowska Dominika Marta
6654 | De Grunt Midas
6703 | Deflane Eric
7410 | Diakomi Maria
7288 |
| Dahan Esther
7267 | De Hert Stefan
6734
6902 | Degesves Maxime
7272 | Diamantaki Eleni
7155 |
| Damasceno José
7098 | De Jong Michel
6652 | Degroof Pieter
6828 | Dias Ana Lúcia
6677
6885 |
| Danny Indra
6463 | De Keijzer Ilonka
7367 | Dehé Lukas
7600 | Dias Catarina
7666 |
| Dao Van-Anh
6916
7063 | De Kerchove Laurent
6629 | Dehne Sarah
7133 | Dias Cecília
6720 |
| Davies Lewis
7497 | De Klerk Eline
6703 | Del Mar Montaner Maria
7560 | Dias Cláudia
6979 |
| Davies Simon
7367 | De Korte Dianne
BAPC-8 7199 | Del Río Morales María Elena
7176 | Dias José
6677 |
| Davies Sioned
7575 | De Korte-De Boer Dianne
7068 | Delgado Alonso Candelaria
6764 | Dias Mafalda
7593
7642 |
| De Aneés Ibáñez José
7226 | De La Fuente Fernando
Pascual
6761 | Denisova Tamara
6602 | Dias Natália
7478 |
| De Anés Ibáñez José
6761
7200 | De La Quintana Jimenez
Beatriz
7391 | Deo Alka
7431 | Dias Sofia
7627 |
| De Armendi Alberto
6532
6533 | De la Varga Martinez Olga
6823
6893
6915
7198 | Deprest Jan
6552 | Diaz Alejandro
7085 |
| De Armendi Joyce
6533 | De Lurdes Castro Maria
7108
7121 | Derry Joseph
7395 | Diaz Eva
7502 |
| De Armendi Philip
6533 | | | |

- Díaz Gómez Tamara
Valentina
7553
7639
- Díaz Uceda Laura
7560
- Dibiasi Christoph
6628
6632
6712
6724
- Dilrukshi K.D.T
7334
- Dimakopoulou Antonia
6834
6865
- Dimitropoulou Katerina
6865
- Dimitrovski Aleksandar
7644
7648
7657
- Dincer Muserref Beril
6831
- Dinis Inês
7595
- Dinis Isabel
6947
- Dinis Marco Rafael Basílio
7623
- Diosdado Alberto
7496
- Diskina Dina
6890
- Divatia Jigeeshu
7318
- Do Nascimento Junior Paulo
6754
- Dodsworth Benjamin
6635
- Doherty Jane
6601
- Doldán Pérez Patricia Noemí
6762
- Domi Rudin
7455
- Domingues Sana
6526
- Domínguez Arbelo Ancor
6944
- Dominguez Daniela
7406
- Domínguez Díaz Yurena
6944
- Domínguez María
7611
- Dominguez María Ximena
6662
- Domínguez Suárez Enrique
7368
- Domoratskyi Oleksii
6953
- Donsbach Martin
6916
- Dorneanu Olvia Simona
7096
- Dos Santos Sérgio Diogo
Eufrásio
6952
- Dourado Claudia
6485
- Dow Olivia
6881
- Duarte Ana
7108
7121
7290
- Duarte Flávia
7465
7478
- Duarte Portela Inês
Domingos
7254
- Dubois Jasperina
7289
7400
- Dubrov Sergii
6821
7271
- Ducloy-Bouthors Anne-
Sophie
7186
- Dudek Paula
7079
7088
Duerr Marcia-Marleen
7275
- Duplancic Bozidar
7157
- Dupoiron Denis
6647
- Duran Miguel
7614
- Durand Sylvere
7010
- Durón Andrea
7406
- Dziuba Dmytro O.
6760
- Echarri-González Gemma
6913
6974
7061
- Edouard Louis
7272
- Efrat Rachel
7324
- Ego Amédée
7496
- Eiras Mariño María Del Mar
6917
- Ekelund Kim
6542
6784
- Eladib Ahmed Rhassane
7317
- Elarras Siham
7317
- Eldho Binta
7187
- Eldin Sultan Wesam
6567
- Eldo Nidhin
7378
- Elena Monge
7166
- Elkhay Sally
7500
- Ellerkmann Richard
7500
- Eloy André
6513
6515
- Eloy Ané
6514
6624
6720
6920
- Elsahn Fatimah
6518
- Elvas-Leitão Tomás
6679
7219
- Emamdee Russel
7453
7459
- Engel Dominique
6586
6694
- Engelman Edgard
6955
- Enjuto Martínez Diego
Tristan
7336
- Epstein Inna
6776
- Erdem Ilhan
7448
- Ericson Mats
6779
- Escher Cecilia
6779
- Escribano Arranz Angela
7061
7071
- Escribano-Arranz Angela
7028
- Esposito Tanya
7035
- Essafti Meryem
7317
- Esteves Catarina
7224
- Eulufi Sebastián
7014
- Evers Stefan
7457
- Ezzeddine Aida
7226
- Fábregas Neus
6783

- Facchini Arthur Oliveira
6998
- Fadeur Marjorie
7309
- Falasca Zamponi Hanna
6556
- Falco Lisa
6635
- Falcone Edoardo
7065
7074
- Falkingham Edward
7187
- Fanelli Vito
6655
6811
- Fang Chew Mei
7653
- Farag Mohamed
6731
- Faria Sanchez Teresa
Palmira
7300
- Farrauto Laure
7311
- Fassoulaki Argyro
7308
- Fayed Nirmeen
7500
- Fazliu Albulena
7352
- Fechner Joerg
BAPC-1 6495
- Federspiel Jannic
7225
- Fehrlin Eloy
7620
- Felgueiras Lopes Luciana
Bárbara
6485
- Félix Filipa
7508
- Fernandes Antero
6729
- Fernandes Diana
6498
- Fernandes Joana
6959
- Fernandes Mariana
7073
- Fernandes Marina Cordeiro
6994
- Fernandes Paula
6780
7025
- Fernandes Raquel
7647
- Fernandes Sofia
7662
- Fernandes Tiago
7145
- Fernandez Plotka Barbara
6474
- Fernández-Esmerats Anna
6645
6765
7377
- Fernandez-Lopez Ignacio
6888
7614
- Fernández-Plotka Bárbara
7041
- Fernanz Jesús
6469
- Ferraz Inês
7297
- Ferré María Soledad
7152
- Ferreira Amélia
7628
- Ferreira Ana
7433
- Ferreira Carla
7228
7305
7508
- Ferreira Irene
6624
7085
- Ferreira José Luis
7413
- Ferreira Leonardo
7609
- Ferreira Luis
7452
7554
7589
7616
- Ferreira Luís
7518
- Ferreira Miguel
6931
7531
7623
- Ferrero Coloma Carlos
6642
6702
6818
- Ferro Eduardo
6832
- Ferros Catarina
7635
- Ferrufino Renan
6793
- Fichte Julia
6545
- Fidalg Ané
6938
- Fidalgo Ané
6929
7518
7554
7589
7616
- Fiedler Ulrich
6466
- Figueiral Márcia
7595
- Filipenko Olena
7678
- Filipowski Stephan
6556
- Fils Jean François
6697
- Filyk Olha
6736
7163
- Fitzgerald Mark
7204
- Fiúza António
7206
- Flor De Lima Isabel
7297
- Flors Catalán Guillermo
7679
- Fonseca Diana
6885
7599
- Fonseca Diana João
7536
- Fontinhas Teresa
6526
- Fornaess Katarina Mari
6936
- Fort Pelay Beatriz
7553
7639
- Foulon Pierre
7519
- Francisco Emília
6492
- Francisco Iglesias Cristina
6688
6691
6762
6763
6822
6906
6917
- Frankic Mileva
7485
7526
- Frassanito Luciano
6977
- Freire Carvalho Rita
7224
7227
- Freire Peo
6690
6942
6947
- Freitas Rita
7403
- Frias Paulo
7038
- Friederich Patrick
6507
- Friedman Maria
6776

- | | | | |
|--|---------------------------------------|--|--|
| Friedman Zeev
6898 | Galun Eytan
6943 | García-Mansilla Agustín
6648
7043 | Gherghina Viorel
6841
6905
6999
7015 |
| Frieich Christine
7064 | Gama De Abreu Marcelo
6904
7051 | García-Martínez Ernesto
6770 | Ghira Miguel
7297 |
| Frydman Shir
6802 | 7223
7244
7312 | García-Orellana Marta
6783
6889 | Gholamian Ovejero Soraya
7077
7634 |
| Fuchs-Buder Thomas
6697 | Gao Shaowei
7294 | García-Ramos Sergio
6888 | Giaccone Alice
7089 |
| Fuest Kristina
7361
7463 | Gao-Smith Fang
7580 | Gardeta Adela
7489 | Gibert Roxane
7186 |
| Furrer Marc Alain
6586 | Garcés-Sánchez Sonia
6985
6995 | Garipov Albert
6878 | Giebl Aneas
6993 |
| Fuste Rodríguez María
Dolores
6761 | García Ballester Sara
6836 | Garrido-Ondoño Silvia
6966 | Gil Fernanda
7218 |
| Gadin Lopez Sana
6915 | García Barrasa Ines
7137 | Garrigós Noemí
7559 | Gill Thomas
7103
7124 |
| Gadomski Jaroslaw
7621 | García Carla
6742 | Gärtner Matthias
6527 | Gilliot Sixtine
7186 |
| Gaertner Matthias
6545 | García Castaño Montserrat
7339 | Gasalla Cadórniga Alvaro
Manuel
7368 | Gilsanz Fernando
7032
7104 |
| Gaig Carles
6645 | García García Covadonga
7679 | Gascó Serna Iñaki
7606
7619 | Gimenez Santamaria Maria
Claudia
6823 |
| Gaitán Kristhel
7406 | García Huerta Margarita
7166 | Gasiunaite Diana
6667 | Gimenez-Milà Marc
7345 |
| Gál János
7078 | García Margarita
6817 | Gass Annette
7476 | Girard Thierry
6466 |
| Galego Ferreiro Alba
7438 | García Miguel
6814 | Gaudio Ana Maria
7614 | Girgin Incekoy Feyza
7192 |
| Galiana Ivar María
7679 | García Orellana Marta
6573 | Ge Fangbo
7480 | Gisbert Livia
7232 |
| Galiana Ivars Maria
6642
6818 | García Patricia
7488 | Gehlen Lena
7506 | Gkiouliava Anna
6559 |
| Galli Alessano
7325 | García Rojas Isabel
7014 | George Aamod
7681 | Glocker Felix
6527 |
| Galli Sara
6619 | García Sara
6741 | George Alexandre
7410 | Gloria Escobar Salomón
7664 |
| Gallo Carrasco Alba
7166 | García Teresa
6727 | Geppert Johannes
6561 | Glumac Sandro
6590 |
| Gallo Oreste
6879 | García Zamorano Sara
7232 | Geroldinger Angelika
6710 | Godfried Marc
6470 |
| Gal-Oz Amir
6802 | García-Bartolo Carolina
6966 | | |
| | García-Larrosa Alejano
6877 | | |

- Golden Eran
BAPC-7 6570
- Gomes Celina
6744
7305
- Gomes Cristina
7234
7508
- Gomes Leonor
6929
7570
7583
- Gomes Nelson
6640
- Gómez Del Pulgar Vázquez
Blanca
7336
7432
- Gómez Luis Juan
6781
- Gómez Salinas Luis
6702
7679
- Gómez Sánchez Esther
7198
- Gonçalves Ana Rita
7673
- Gonçalves Décia
7583
- Gonçalves Delilah
6914
- Gonçalves Lúcia
6938
7570
- Gonçalves Nídia
6855
6856
- Gonçalves Pereira Ana
Isabel
6498
- Gonçalves Ribeiro Sara
Raquel
7674
- Gonçalves Ribeiro Sara
Raquel
7661
- Goncalves Roigo
7092
- González - Suárez Susana
6903
- Gonzalez Ciccarelli Luis
Fernando
6793
- González Del Pozo Irene
7137
- Gonzalez Estevez Max
7186
- González Fernández
Joaquín
6702
6818
- González Jiménez Luis
6702
- González Velasco Raquel
7634
- González-Suárez Susana
6723
6726
6727
6778
- Gopalakrishnan Arun
7659
- Gorey Denise
7258
- Gorham Julie
7496
- Gos Laura
7494
- Goshen Yaron
7324
- Goudkamp Daniel
7361
- Gouveia Bárbara
7609
- Gouveia Francisco
6485
- Gouveia Henrique
6661
- Gouveia João
7297
- Gouveia João Peo
7435
- Goyagi Toru
6501
- Goyal Shilpa
7486
7573
7587
- Gozal Yaacov
7578
- Graça Maria Inês
7599
- Gralnek Ian
7324
- Granja Cristina
6967
- Granström Anna
6830
- Gratz Johannes
6632
Graverot Mélodie
6472
- Greco Massimiliano
6923
- Gredilla Elena
7104
- Greenberger Chaim
6896
- Greenhalgh Samuel
6654
- Greif Robert
6505
6536
6704
6705
- Grigoras Ioana
7096
- Grizhymalskyi Ievgen
7594
- Grousouzakou Eirini
7052
- Gruber Gerhard
7125
- Grynovska Marta
7247
- Guardabassi Diego
7335
- Guasch Emilia
6742
6781
7104
- Gucwa Natalia
7026
- Guerra Hernández Elisabet
7618
- Guimarães Diana
6565
6682
6718
6780
7025
- Guimarães Luís
7020
7031
- Guímaro Joana
6513
6514
7085
- Gujja Srikanth
7375
7376
- Gulsen Büsra
7048
- Gummert Jan
6685
7140
- Günther Ulf
6579
- Gupta Anil
6830
- Gustorff Burkhard
6788
6870
7091
7213
- H. Maio Maria Beatriz
7435
- Habijanec Borna
6794
- Hacking Douglas
6549
- Haddad Sam
6654
- Hadjigregoriou Aris
6852
- Hady Razak Hady
6792
- Hakim Rony
7324

- Hallqvist Linn
6830
- Halvi Togataveera Prashant
6745
- Haneya Assad
7064
- Hans Gregory
7299
7494
- Hapuarachchi C.
7314
- Hardy Pierre-Yves
6511
7272
- Harha Andrii
7594
- Harnik Michael
6989
- Haseneder Rainer
7264
- Hassan Shamsul Kamalrujan
7597
- Haylock-Loor Carolina
7406
- Heerman Jan
6528
- Heger Andrea
7125
- Hegvik Tor-Arne
6936
- Heijkoop Emese
7445
- Heller Tim
7275
- Helsloot Dries
7204
- Hend ketata
6560
6625
6627
- Hendrickx Paul
7289
- Henickx Jan F.A.
6656
- Henikx Emmanuel
7410
- Hermanides Jeroen
6703
7393
7515
BAPC-5 6880
- Hermann Alexander
7139
- Hermans Johan
7400
- Hernández Aguado Carmen
6606
6840
- Hernandez Ana Ricart
7606
- Hernandez Carmen
7502
- Hernandez-Perez Yossune Itzel
7210
- Hernanz Rodriguez Gema
6922
- Hertling Arthur
6890
- Herut Matar
7083
- Heukels Marie-Anne
7517
- Hidalgo Martínez Francisco
6913
- Higashi Midoriko
6891
- Hight Darren
7620
- Hilbert Tobias Christian
7476
BAPC-2 7122
- Hill Matthew
7187
- Hindle Elise
7497
- Hinkelbein Jochen
6714
- Hinz Ann-Charlotte
7125
- Hinzmann Dominik
7264
- Hita Guillermo
7232
- Hoefnagel Amie
7252
- Hoeks Sanne
7445
- Hofer Debora
6989
- Hokenek Ummahan Dalkilinc
7212
- Hol Liselotte
7443
- Holc Fernando
6648
7043
- Holdstock-Brown Benjamin
7453
- Hollmann Markus
6703
7443
- Hollmann Markus W.
7393
BAPC-5 6880
- Hong Rebecca
7480
- Hoope Werner Ten
7393
- Hopf Hans-Bernd
6527
6545
- Horst Klemens
7142
- Hováth Noel
7411
- Hrazdilova Olga
7637
- Hrushevska Anna
7087
- Huang Chanyan
7294
7607
- Huang Wenqi
7294
7607
- Huber Markus
6586
7620
BAPC-6 6901
- Hubert Romain
7106
- Huhle Robert
6904
7051
7223
7244
- Hui Rex Wan Hin
7287
7402
- Hulde Nikolai
6685
7140
- Hulgur Uthunjaya
7395
- HUNG YI AN
7313
- Hunziker Sabina
7388
- Huprich Anna Franziska
7398
- Hurtado Paola
6783
- Husarova Viera
7258
- Hussein Dib González Zoraya
7618
- Huti Gentian
7455
- Huyghe Louis
7567
- Ibañez Esteve Cristina
7176
- Ibeanusi Ikenna
7187
- Ibrahim Kamaruddin
7597
- Ibrahim Rock
7079
7088
7621
- Ide Tomoko
6891

- Iliakopoulos Konstantinos
7134
- Imen Zouche
6625
- Infante Cândida
6952
- Infante Jacklyn
7307
- Ioannidis Rafail
6559
- Ioscovich Alexander
6777
- Isidro Guillermo
6469
- Işık Özgen
7356
- Italiano Stefano
7014
- Iturriagoitia Bassas Xavier
6734
- Ivanova Elena
7598
- Ivry Michal
6776
6898
- İzgi Murat
6782
- Jacobson Anders
7638
- Jain Nidhi
7529
- Jakobsen Rikke Vita Borre
6542
- Jamar Kristina
6600
- Jamel Amani
6463
- Jammer Ib
6936
- Jamora Vanessa
7307
- Jandu Amritpal
7459
- Janssen Henrike
7139
- Jaquet Oceane
7494
- Javillier Benjamin
7410
- Jayasekera Dushyanthi
7459
- Jeanpierre Emmanuelle
7186
- Jen-Fu Tsai
7373
- Jerney Pascal
6694
- Jiménez Anea Lara
6913
- Jiménez Gómez Bárbara
María
7368
- Jiménez Marrero Peo José
6922
- João Moreira
7464
- João Quelhas Maria
6484
7647
- Joerg Fechner
7048
- John Stephen
6886
- Johnson Brittany
7252
- Jonker Philip
7445
- Jorens Philippe
6568
- Jorge João Valente
7642
- Joris Jean
6511
7272
- Jovanovic Vladimir
6845
- Jovanovski-Srceva Marija
7648
- Juarez-Pomes Miquel
6966
- Jung Hilke
6685
7140
- Jungwirth Bettina
7026
- Kadantseva Kristina
6847
- Kaefer Keitiane
7519
- Kagebauer Simone
7026
- Kahn David
6630
- Kaiser Heiko
6705
7620
- Kale Ahmet
7212
- Kalipinde Francis
7181
- Kalmar Alain F.
6656
- Kalmar Alain Frédéric
6528
- 6637
- Kalopita Konstantina
7158
- Kalaria Narender
7587
- Kamara Yusufu
7284
- Kamat Shivani K.
7045
- Kamatayeva Gulzat
7414
7416
- Kamel Kolsi
6560
6627
- Kang Pyo-Yoon
6479
- Kang Wei Pin
7550
- Kaoru Umehara
6634
- Kapanidis Konstantinos
6962
- Kaplan Gaby
6896
- Kapoor Seema
6745
- Kapoulas Konstantinos
6852
- Kara Hakan
6831
- Karagöz Ayşe Heves
7338
- Karanovic Nenad
6590
- Kardum Goran
6590
- Karmelic Dora
6794
- Karras George
7052
- Kartalov Anijan
7644
7648
7657
- Kashaeva Ludmila
6603
- Kastsiuchenka Siarhei
6669
- Katsanoulas Konstantinos
6962
7052
- KATSAROS DIMITRIOS
6834
- Katsika Eleni
6962
7052
- Katz Ben-Zion
6671
- Kaur Manbir
7427
7486
- Kaushik Prajwala Shankara
7045
7111

- Kazuhiro Shirozu
6634
- Keijzer Christiaan
7483
7563
keiko nobukuni
6634
- Kelleci Yavuz
7446
- Kellens Sebastiaan
6973
- Keller Marius
7275
- Kelly Nicola
7430
- Ken Yamaura
6634
- Kepp Oliver
7010
- Kerremans Oliver
6637
- Kersten Bastiaan Johannes
6652
- Khalifa Céline
6629
6630
- Khalil Jack
6693
- Khalil Magdy
6547
- Khapov Ivan
7470
- Khodatars Shaida
6960
- Khomenko Olena
7259
- Kilger Erich
6993
- Kılıç Çakmak Elif
7645
7655
- Kılıçaslan Banu
6623
- Kim Eunhee
6479
- Kim Michael
6499
- Kimberger Oliver
6628
6631
6710
6712
6724
- Kindler Félix
6472
- Kindler Ulrich
6472
- Kirov Mikhail
6578
- Kismul Aakre Elin
6936
- Klabusayova Eva
6487
6488
- Klaschik Sven
7476
- Klibus Mara
7177
- Klican Jaic Katarina
6646
- Klink Sarah
6670
- Klivinyi Christoph
6649
- Klok Toni
6470
- Klose Katharina
7352
- Klotz Rosa
7133
- Klucka Jozef
6487
6488
- Koerich De Souza Júlia
6998
- Koessler Stefanie
7171
- Kollmann Camaiora Andrea
6556
7081
- Komorowska-Wojtunik Ewa
6792
- Konkaev Aidos
7414
7416
- Konstantopoulos
Konstantinos
7288
- Kopunova Anna
6878
- Koraki Eleni
7164
- Korichi Nourredine
6562
- Kornilov Evgeniya
7506
BAPC-2 7122
- Korotchuk Natalia
6622
- Korstanje Jan-Wiebe
7445
- Korwin-Kochanowska
Katarzyna
6991
- Kosciuczuk Urszula
6792
- Kosluk Gurler Harika
7212
- Kothari Nikhil
7573
- Koufopoulou Christina
7262
- Kouna Niki
7262
- Kounnos Christos
6852
- Koutoulaki Emmanouela
6867
7155
- Kovac Natasa
6680
6769
- Kovaleva Kseniya
6878
- Krejcic Vladimir
BAPC-6 6901
- Krijtenburg Piet
7563
- Krischek Boris
6714
- Krishnadas Bineeta
7045
- Kroemer Guido
7010
- Krönauer Thomas
6507
- Kruys Veronique
6600
7555
- Kryzhevskiy Vadym
6953
- Kuandykov Tleuberdi
6850
7057
- Kulikov Ilyas
6541
- Kulikowski Leslie
7358
- Küllmar Mira
6512
7398
- Kumar Abhyuday
7503
- Kumar Neeraj
7117
- Kumar Pati Binod
7487
- Kumar Rajnish
7487
7503
- Kumar Sangamala Venkata
Prem
7369
- Kumar Singh Prashant
7503
- Kumara S.K.W.R
7334
- KUMARI KAMLESH
7369
7486
7529
- Kumari Poonam
7487
7503
- Kummer Laura
7114
7139
- Kunotaite Aurelija
6667

- Kurz Christian Tobias
6561
- Kuzina Natalia
6539
6555
- Kuzmanovska Biljana
7644
7648
7657
- Kuzovlev Artem
6539
6541
6555
6847
- Kyselova Iryna
7211
7646
- La Rosa Valeria
6582
6585
- La Via Luigi
6946
7000
7066
- Ladeira António
7532
- Lagen Coscojuela Cristina
7664
- Lagny Marc
7299
- Lakhani Ria
6996
- Laksa Edgars
7177
- Lalmand Manon
6653
- Lamperti Massimo
6669
- Laņa Sara
6729
- Lance Marcus
7117
- Landgraf Benjamin
7681
- Langford Anna
7480
- Lang-Ilievich Kordula
6649
- Lanzafame Bruno
7065
- Lanzaro Camile
7154
- Lara Anea
7511
- Lara Jiménez Andrea
7071
- Lara-Jiménez Andrea
6974
6985
6995
7028
- Laranjeira João
7492
- Laranjo Marta
6929
6938
7570
7583
- Lareiro Nuno
7658
7666
- Lares Poeira Rita
7425
- Larmann Jan
7114
7133
7139
- Larrañaga Leire
6814
- Lasda Eleni
6919
- Lasocki Sigismond
6476
6647
- Lassnigg Anea
7320
- Lathouwers Kevin
6928
- Latrech Bausard
7415
- Lauretta Maria Paola
6701
- Lavado Joana
6929
- Laver Kathryn
7364
- Laxar Daniel
6631
6710
6712
- Lazarini Lucas
7092
- Lazic Igor
6845
- Leal Beatriz
7471
7532
- Lebrun Thierry
6472
- Lebuffe Gilles
7186
- Lecompte Alexandra
6508
- Lecoq Jean-Pierre
6531
7299
- Leder Oren
7578
- Lee Bernett
6657
6746
- Lee Dong-Kyu
6670
- Lee Ming-Yung
7049
- Lee Shona
6499
- Lee Wen-Shen
6463
- Lefering Rolf
7204
- Léger Maxime
6476
- Lehmann Lutz Eric
6851
- Lehmann Thomas
6989
- Leister Nicolas
7404
- Leite Silva Ana
6484
7105
- Lema María
6490
6581
- Lema Tome Maria
6474
- Lemaire Guillaume
6629
- Lemos Leonor
6485
- LENIN DHARANI
7503
- Lenoir Nadine
6653
- Lenskens Daniele
7457
- Lepore Daniel
7309
- Lersch Frieich
7620
- Leung Choy May
7402
- Leung Choy May
7287
- Li Jasun
6670
- Li Xiaoling
BAPC-5 6880
- Libbrecht Dominique
7272
- Lichter Yael
6671
- Liew Clarabella
7653
- Lijovic Lada
6646
7325
- Likhvantsev Valery
6847
- Lilley Tristan
6532
6533
- Lima Ana Patrícia
7467
- Lima Clara
7647

Lindelof Kim 6784	López Gil Vicente 6702	Luis García Carol 6644	Madelon Peters 7068
Link Carolina 7476	López González Jose Manuel 7368	Luís Mariana 6498 6661	Madrid Martínez Enrique 7656
Lior Yotam 7083	Lopez Herrera Isabel 6474	Lukas Anne 7068	Madroñero Melo Fernando 7203
Llau Pitarch Juan Vicente 7656	López Jose Manuel 7488	Lukavska Ella 7678	Maes Jan-Willem 6528
Lloret Angela Violeta 7559	López Lede Alba 6808	Lunca Catalina 7096	Magalhães Juliana V. 7625
Lloret I Villas Bernat 7619	López Olaondo Luis 6808 6913	Lungu Olguta 7096	Magunia Harry 7275
Lloyd Joanne 7453	Lopez Vizcaino Miguel 6807	Luo Wei 7294 7607	Maia Joana 6565 6682 6718
Locatello Luca Giovanni 6879	López-Baamonde Manuel 6765 7014	Lupu Lior 6802	Maia Nuno André de Sousa 7605
Loeffel Lukas 6586	Lorenzen Ulf 7064	Luque Peláez Marta 7028 7061 7071	Maki Jun 6891
Lokosek Vedran 7325	Loskutov Oleg 6987	Lusquinhos João 6885	Makris Alexanos 6510 7288
Lombardo Davide 7089	Loskutov Oleg A. 6760	Ma Basas Eva 6469	Makrypodí Marina 6865
Lopes Clara 6509 6921	Loskutov Oleh 6622 6638	Macedo Ana 6941	Maldonado Felipe 6783
Lopes Luciana 7245 7628	Lourenço Ané 7086	Macedo Duarte Sónia 7673	Maleczek Mathias 6631 6710 6712 7320
Lopes Simões Duarte D.F. 6640	Louro Juliana 7305	Macedo Lima Thaís Maria 6795	Malhotra Rajiv 7283
Lopes-Pimentel Peo 6509 6921	Low Aaron 7418	Machado Andreia 6959	Maliamanis Dimitrios 6852
López Alarcón María Dolores 6761 7226	Lowings Marilyn 7430	Machado Aneia 6971	Malja-Aguirre Maria Eugenia 7210
López Álvarez Servando 7368	Lucania Sara 7309	Machado Humberto 7424	mallol montse 6767
López Arguello Eliana Ximena 6573	Lucena De Pablo Elena 6893	Machado Mariana 7467	Malysh Ihor 6622 6638
Lopez Garcia Isabel 7454	Lueers Jan-Christoffer 6714	Maciel Gonçalves Jorge Luis 7606	Mandic Marin 6769
López García Sheila 6767	Luis Garcia Carol 6651 7553 7639	Mackenzie Cameron 7513	Mangoyan Harutyun 7353
	Madeira Isabel 6849		

- Manning Alex
7681
- Manoel Marielle
7521
7522
7581
7585
- Manohar Ramesh
6601
- Mantzoros Ioannis
7164
- Manukyan Araks
7353
- Maqueda Bastien
7519
- Marchandise Clémentine
6475
- Marchante-Sánchez Marta
6985
6995
- Marcinkevics Zbignevs
7177
- Marcos Vidal Jose Miguel
7198
- Marczin Nandor
6618
- Margarson Michael
7093
7103
7124
7507
- Marginean Lucian
7251
- Mariano Paulo
7300
- Marin Leo A.
6741
- Maris Seppe
7457
- Markovic Milan
6990
- Marques Catarina
7012
- Marques Da Costa Filipe
6679
7219
- Marques Franco Rita
7658
7666
- Marques Margarida
7469
- Marques Pedro
7554
7663
- Marques Peo
7518
- Marra Edoardo
6701
- Marrero Angel
7232
- Martín Baeza Sonia
7560
- Martín Jaramago Julia
7656
- Martín Juan
6903
- Martín Núria
7029
- Martín Sandra
6778
- Martin Thomas
6482
6483
- Martínez Domingo Ana
6606
6840
- Martínez García Ernesto
6816
6819
- Martínez Gascón Antonio
7664
- Martínez González Estefanía
7656
- Martínez Hurtado Eugenio
Daniel
6893
- Martínez Ocón Julia
7176
- Martínez Otero Samira
7014
- Martinez Salgado Aian
6688
6763
6906
- Martínez Vela Josué
6702
- Martinez-Hurtado Eugenio
6823
6915
- Martínez-Ocón Julia
7377
- Martinovic Petar
6680
- Martins Alda
6544
- Martins Conceição
6859
- Martins Karina
6807
- Martins Mafalda
7628
- Martins Tânia
6544
6729
7132
- Martos Gisbert Natalia
7634
- Maruniak Stepan
6622
6638
- Mases Anna
6759
6835
6949
- Masoodi Anna
6760
- Masourou Zoi
6540
7329
- Massoth Christina
6512
7398
- Masuda Lei
7355
- Matas Marijana
6894
- Mateo Rodríguez Eva María
7226
- Mathias Ligia
7633
- Matias Francisco
7518
- Matilla Jose
7320
- Matos Delgado Ané
6931
- Matos Sara
7025
- Matot Idit
6673
7083
7267
7524
- Mavri Maria
7262
- Mavropoulos Christos
6962
- Maze Mervyn
6600
- Mazur Aniy
7259
- Mbuagbaw Lawrence
6635
- McCrea Madalina
6766
- Mcgraw Philip
6657
6746
- Medeiros Lucas
7521
7522
7581
7585
- Mehmood Khalid
7354
- Mehrabi Arianeb
7133
- Mehta Hemant
7045
7047
- Meissner Winfried
6989
- Mejía Arnaud Rossel Alina
7634
- Meleiro Hugo
7536
- Melemeni Aikaterini
7269
- Melo Cristino J.
7219

- Melo Luís
7100
- Melone Arturo
6888
- Melotti Rita Maria
6701
- Membrilla Estela
6814
- Memon Zulfiqar
7119
- Mendes Castro Alfredo
7627
- Mendes Chantal
6890
- Mendes Morais Diogo
7538
- Mendes-Castro Alfredo
6967
- Méndez Martínez Elena
6808
6816
6819
7511
- Méndez-Martínez Elena
7028
- Mendoza Mark Joseph
7355
- Mendoza Michael
7355
- Menezes Marcelo
7020
7031
- Menyhárd Júlia
7078
- Menzel Christoph
7404
- Menzenbach Jan
BAPC-2 7122
- Merkely Béla
7078
- Merola Federica
6946
7000
7074
- Mertes Paul-Michel
7171
- Meschini Natalia
6817
7041
- Meshram Tanvi
7369
7529
- Mesotten Dieter
6928
6969
- Messina Simone
7066
- Mestdagh François
6502
- Mestrum Roel
6991
- Meuli Matías
7152
- Meurling Lisbet
6779
- Mexêdo Carlos
7671
- Meyer Agnes
6851
- Meyer Eva
BAPC-6 6901
- Midoriko Higashi
6634
- Midory Marques Monteiro
Rebecca
6795
- Mielke Benjamin
7352
- Miguel Bernardo
7001
7471
- Mikjunovikj-Derebanova
Ljubica
7644
- Miklić Bublíc Martina
6894
- Milakovic Branko
6845
- Millemann Harmony
7415
- Miller Clemens
7352
- Miranda Ivanete
7652
- Missant Carlo
7204
- Misset Benoit
7309
7311
- Mitchell Bethany
7187
- Mitsikostas Dimos Dimitrios
6540
- Miyagi Yonamine Any
Minerva
7336
- Miyake Rena
6557
- Mladenovic Jovan
7387
- Mocsári Eduardo Ferro
6982
6994
6998
- MOHAMED MATOUK
6758
- Möhnle Patrick
6993
- Mohr Niklas
6685
- Moita Jorge
6920
- Moka Eleni
6510
- Molero Díez Yaiza Beatriz
7339
- Moliner Velázquez Susana
7200
- Momeni Mona
6508
6629
6630
- Monastyrskaya Katia
6699
- Mondero Rodriguez Pablo
7071
- Monedero Pablo
6974
7511
- Mongan Paul
7252
- Monge Cid Elena
6474
- Monge Elena
6817
7041
- Monsalve Ximena
6726
6903
- Monteiro Teresa
7532
- Montenegro Ledo Luís
Augusto
7132
- Montenegro Luís
6755
- Montero López Pablo
7061
7071
- Montrucchio Giorgia
6811
7089
- Mora Azabal Ester
6836
7438
- Mora Cruz Freitas Ferreira
Catarina Isabel
7098
- Mora Marina
6581
- Morais Diogo
6663
- Morais Larissa
7652
7662
- Moreira Aiano
7099
7112
- Moreira Sónia
6684
- Moreira Zélia
7098
- Moreno Martinez Carlos
Eduardo
6651
- Morgan Steffan
7575

- Morgana Alberto
6582
- Morley Adam
BAPC-1 6495
- Morrison Stuart
6568
7357
- Moshta Svitlana
7259
- Mostien Toon
7552
- Motsch Johann
BAPC-1 6495
- Mounce Adam
7575
- Moura Fernando
7023
7245
7547
- Mourad Michel
6502
- Mourão Joana
6885
7136
BAPC-3 7039
- Mouraux Ané
6629
- Mousa Shaaban
7600
- Moussa Ahmed
6731
- Moustafa Ashraf
6518
- Muendane Paulo
7570
- Muiño Palomar Virginia
6922
- Mulic-Lutvica Ajlana
7081
- Mumbwe Mbangu
7181
- Mumphansa Hazel
7181
- Munar Francisca
7024
- Munasinghe Malaka
7314
7334
- Muñoz Romero Juan Luis
7454
- Murabito Paolo
6582
6584
- Muratbekova Baktykul
7414
7416
- Murphy Caitriona
7281
- Murselovic Tamara
6680
- Musilova Tereza
6487
6488
- Musovic Sabina
7681
- Mutagirov Vladimir
6850
7057
- Muthuchellappan
Radhakrishnan
7374
- Naaz Shagufta
7487
- Nabecker Sabine
6505
6705
- Nacera Benmouhoub
6758
- Naco Majlinda
6467
- Nadler Moshe
6907
- Nagy Balint
6894
- Nagy Elisabeth
6779
- Nair Suresh G.
7378
- Nandar Chaw
6693
- Nardai Gábor
7411
- Nastasovic Tijana
6845
- Naumovski Filip
7644
- Navarro Echevarria Patricia
7137
- Navarro Martínez Jose
6642
6818
- Navarro Ripoll Ricard
7014
7560
- Nave Patrícia
7161
- Nazarova Victoria
6878
- Nelson Mark
7284
- Nemeth Marcus
7352
- Nemoto Akira
6501
- Neri Maria Inês
6690
6942
6947
- Neves Clarinda
7595
- Neves Inês
7627
- Neves Isabel
6679
- Neves Joanna
7453
- Neves Silvia
7154
- Nezha Ilir
6467
- Ng Renemy
7597
- Nicosia Tiziana
7065
- Nielsen Dominic
7603
- Nieuwenhuizen Rik
6656
- Niiyama Yukitoshi
6501
- Nijbroek Sunny
7443
- Nik Mohamed Nik Abdullah
7551
- Nir Eshel
7578
- Nóbrega Sónia
7413
- Nogueira Goncalo
7206
7224
7227
- Nogueira Sara
7020
7031
- Nohales Gloria
6877
- Noirit Apinya
7379
- Nome Pia Louise
6936
- Nordin Julia
7638
- Nordstrom Johan
6830
- Norrby Fredrik
7638
- Norte Gustavo
6663
- Nour sameh
6665
6668
- Noutsos George
7262
- Novo João
6971
- Novo Pereira Susana
Patrícia
6996
- Ntalarizou Nikoleta
6919
7501
- Ntalouka Maria
6912
6919
7501

- Nunes Joana
7564
- Nunes João Maria Caldeira
Ribeiro
6553
6752
6815
- Nunes Sara
6661
- Nunez Maria
6835
- Núñez María
6949
- Nuyens Vincent
6600
7555
- Nyktari Vasileia
6867
7155
- Nzekwu Bernadette
7561
- Oakey Mark
7093
7103
- Rodríguez Alcalá Cristina
7104
- Rodríguez Lago Minia
6688
6691
6762
6763
6917
- Rodríguez Lago Minia Maria
6822
6906
- Rodriguez Malatesta Roy
Alexander
6877
- Rodriguez Maurell Cristina
7606
7619
- Rodriguez Perez Aurelio
6922
- Rodríguez Pérez Aurelio
6764
6944
7618
- Rodríguez Rivas Uxía
6573
- Rodriguez Tallero Jaime
7679
- Rodríguez-Rodríguez Lucía
6888
- Roelants Fabienne
6508
- Rojas Giraldo Raquel
7391
- Rolo Vasco
7118
- Román Lorena
6759
- Román Rosa Lorena
6949
- Romera Anea
6490
6581
- Romero Kevin
6807
- Romero Vargas Esther
7123
- Ron Villalba Zaida
7664
- Ronel Ilaí
6896
- Rooney Matthew
7580
- Roriz Carolina
6929
6938
- Roriz Diana
6914
- Rosa Filipa
7536
- Rosas-Lario Mercedes
6966
- Rosenberger Peter
7275
- Rosenheim Zoe
7333
- Rossaint Rolf
6618
- Rotem Reur
6777
- Rousseau Anne-Françoise
7309
7311
- Rowe J.C.
7284
- Roxo Miguel
7021
- Rubins Uldis
7177
- Rubio Baines Iñigo
6913
- Rubio Iñigo
7511
- Rubio-Baines Iñigo
7028
- Rudenko Vasylyna
6821
- Rueda Mireia
6835
- Ruetzler Kurt
BAPC-4 7222
- Ruiz Buera Leticia
6836
- Ruíz Simón Francisco
Antonio
7339
- Ruiz Velasquez Enrique
7523
- Ruiz-Hernandez Atzin Sua
7210
- Rumpold-Seitlinger Guun
6649
- Ruzić Katarina
6680
- Sá Paula Alexana
7674
- Sá Steven
7100
- Saba Hala
7565
- Sabaté Sergi
6759
6835
6949
- Sabelnikovs Olegs
7177
- Sacak Bulent
7192
7448
- Sachde Dr. Jigisha
7641
7667
- Sacramento Sana
6725
- Sadeghirad Benham
6635
- Saez Ruiz Elena
6915
- saffer emily
7603
- Sağlam Canan Esin
6623
- Sahay Nishant
7487
- Sahgal Omair
6916
- Sahoo Pallavi
7573
- Sailer Michaela
6649
- Saitta Thomas
6879
- Sakai Norihiro
6557
- SAKAMOTO Hiroshi
6550
6551
- Sakar Mustafa
7192
- Sala Trull Carmen
7061
7071
- Sala-Blanch Xavier
7029
- Salam Atef
6730
6731
- Salas Esteban
6642

- Saldanha Marques Joao
7073
7080
7086
7099
7112
7206
- Saldien Vera
7357
- Salem Yasser Salem
6547
- Sales Gabriele
6811
7089
- Salgado Sana Silvan
7040
- Salgueirinho Carolina
7599
- Salma Ketata
6625
- Salman Ee
7356
- Saloua Ammar
6560
- Samalyuk Kateryna
6855
- Sammut Fiona
7035
- Samoila Bianca
6841
6905
- Sampaio Catarina
6914
6971
- Sampaio José Carlos
6663
- Sanahuja Blasco Josep
Martí
7377
- Sánchez Carlos Manuel
7656
- Sánchez Cyntia
7559
- Sanchez Lopez Ainhoa
7137
- Sanchez Merchante Miriam
6823
- Sanchez Novas Delfina
7152
- Sánchez Solano Sonia
7432
- Sánchez Tabernero Álvaro
7339
- Sánchez Vásquez Ulises
7210
- Sánchez Zamora
Purificación
7077
7336
7432
- Sánchez-Quirós Belén
6985
6995
- Sancho Azahara
7032
- Sándor Ágnes
7173
- Sándor Ágnes Dóra
7110
- Sanfilippo Filippo
6582
6584
6585
- Sanjuan Álvarez Mónica
7077
- Sanjuan Erika
6490
6581
- Santana Ortega Luis
6922
- Santiveri Papiol Francisco
Javier
6651
- Santos Adriana
7025
- Santos Ané
7399
- Santos Mariana Louro
7037
- Santos Olga Daniela
6920
- Santos Patrícia
7080
- Santos Pinheiro Rita
7224
7227
- Santos Rui
7023
- Santos Sérgio
7605
- Sanz Gonzalez Rosa
6893
- Sanz Iturbe Maite
6836
7438
- Sanz María
6490
- Saoulidou Eleftheria
6865
- Saparov Askhat
7414
7416
- Saracoglu Ayten
6837
6897
6900
7192
7212
7446
7448
- Saraçoglu Ayten
6618
- Saracoglu Kemal Tolga
6897
6900
- Saraiva Alexana
7671
- Saraiva Luísa
7658
- Saraiva Raquel
6526
7254
- Sarao SARBPREET
6676
- Sargatal Borell Neus
6606
- Saso Srdjan
6886
- Satomoto Maiko
6866
- Sauvat Allan
7010
- Savran Karadeniz Meltem
7629
- Savran Oğuz Fatma
7629
- Saxena Kirti Nath
6745
- Saxena Sarah
6600
6955
7555
- Sazonov Vitaliy
7414
7416
- Schaden Eva
6632
- Schäfer Michael
7225
7600
- Schaller Stefan J.
7361
7463
- Scharf Sebastian
7264
- Scharffenberg Martin
6904
7051
7223
7244
7312
- Schaub Isabelle
6519
- Scheeren Thomas
6528
7367
- Scheffer Gert Jan
7483
7563
- Schembri Agius Velitchka
7035
- Schepens Tom
6568
7357
- Scheriau Georg
7320
- Schippers Frank
6916
7063

- Schmalix Wolfgang
6899
6908
6909
7058
7142
- Schmartz Denis
6653
6697
- Schmidt Marc Thorsten
BAPC-4 7222
- Schmitz Sarah
7311
- Schmutz Gelsomino Nayeli
6635
- Schneider Gerhard
7264
- Schneider Marc P.
6699
- Schultz Marcus
7443
- Schvartz Reut
6671
6802
- Schweizer Thilo
6505
- Schwellenbach Judith
6512
- Sciberra Stephen
7035
- Sciberras Stephen
7343
7632
- Scorzoni Marco
6977
- Seabra Manuel
7647
- Sebastião Raquel
7534
- Seegers Valérie
6647
- Segers Jolien Naledi
6928
- Sehgal Leena
7376
- Sekulić Ante
6894
- Selas Cobos Salomé
6917
- Şentürk Çiftçi Hayriye
7629
- Senturk Emre
7629
- Şentürk Mert
7629
- Seror Cuiabano Igor
6754
- Serrallonga Castells Aina
6644
- Serrano Nuno
7471
- Sethi Priyanka
7369
7427
7486
7529
7587
- Sezen Ozlem
6897
6900
- Sghaier Raouf
6697
- Shacham Yacov
6802
- Shah Runil
7513
- Shah Sheetal
7045
- Shallik Nabil
6900
7117
- Shaqura Mohammed
7600
- Sharizal Zulhilmi
7551
- Sharma Aarti
6499
- Sharma Amit
7011
- Sharma Ankur
7573
7587
- Sharma Kritika
7047
- Shaylor Ruth
BAPC-7 6570
- Shiba Sarah
7548
7626
- Shimura Edna
7633
- Shirouzu Kazuhiro
6891
- Shostak Maxim
6953
- Sifaki Freideriki
6559
7164
- Silva Acácia
7547
- Silva Ana
7464
7468
7469
7628
- Silva Ané
6544
- Silva Barros Mariana
7547
- Silva Carla
6492
7635
- Silva Cristina
7025
- Silva Inês
7671
- Silva Isabel
7100
- Silva João
7136
- Silva Manuel
7136
- Silva Marisa
7413
- Silva Pinto José
7108
7121
- Silva Rita Luis
7023
- Silva Sousa Bárbara
Carolina
7533
7564
- Silvestre Cepeda Marta
7523
- Simevska Slobodanka
7649
- Simões Daniela
7658
- Şimşek Funda
7665
- Simsek Tahsin
6897
6900
- Singh Govind
7427
- Singh Gunjan
7055
- Singh Guriqbal
6950
6957
- Sio Natalia
7152
- Šitum Ivan
6794
- Skinner Andrew
7364
- Skrisovska Tamara
6487
6488
- Siullitel Pablo
6648
- Smaranda Iancu Luminita
7096
- Smielewski Peter
6889
- Smith Jennifer E.
6793
- Smolders Julien
6828
- Smulders Pascal S. H.
7393
- Sng Ban Leong
7493

Snijders Tim 7552	Souheil Chamandi 7565	Srourac Petr 6488	Stojanovic Maja 6990
Snoeck Marc 7483	Sousa Dias Carolina 7108 7399 7413	Staikou Chryssoula 7308	Stojanovic Stipic Sanda 7157 7306 7485 7526
Soares Ana 7633	Sousa Guilherme 7625	Stamatakis Emmanouil 7158	Stojanović Stipić Sanda 6791
Soares De Siqueira Rafael Eduardo 6754	Sousa Mara 7609	Stamer Ulrike 6989	Stojkovska Ana 7648
Soares Elsa 7228	Sousa Miguel 6640	Stamoulis Konstantinos 6912	Stolker Robert Jan 7445
Soares Joana 7246	Souza Ana 7581 7585	Starke Henning 7140	Stolic Mila 6845
Soares Maria 7189	Souza Ana Beatriz 7521 7522	Stavropoulou Evmorfia 6510	Stouffs Alexane 6629
Soares Yuri 7540 7544	Souza Julia 6832	Stech Stefanie 7264	Stourac Petr 6487
Soehle Martin 7506	Soysa Lasitha 7314	Stefan Klaus 7114 7139	Stricker Daniel 6536
Sokologorskiy Sergey 7470	Sozanskyi Vitalii 6953	Stefanakis Georgios 6867 7155	Struys Michel M.R.F. BAPC-1 6495
Somaglia María José 6534	Spáčilová Hana 7637	Steinberg Irene 6655	Stüber Frank 6989
Sommer Alias D'abate Matías Javier 7040	Spahn Donat R. BAPC-1 6495	Stephan Jean Claude 7565	Suba Krisztina 7411
Sommer Matías Javier 6662	Spang Verena 7153	Stessel Björn 7289 7400 7457 7528 7552	Subramaniam Nishanthan 7314
Sønderby Pelletier Caroline 6784	Spannagl Michael 6993	Stevens Sjoerd 7552	Subramanion Sivasankaran 7659
Song In-Sun 6479	Spencer Leina 7021 7148 7300	Stinga José Luis 7040	Suels Fernando 7024 Sugano Nanae 6557
Sonkamble Poornima A. 7111	Spiking Joseph 7333	Stipic Tonci 7157 7306 7485 7526	Sukhonos Roman 6813 6833 7082 7087
Soomro Nisar 7423	Sreenivasan Sangeeth P. 7378	Stoehr Thomas 6899 6908 6909 6916 7142	Sultana Rehena 7493
Sorokina Olena 7062	Srinivasaiah Rajesha 6676	Stöhr Thomas 7058 7063	Sumathi S 7375
Sotiriou Aneas 6601	Srinivasan Ranganathan 7430		Sumie Makoto 6891
Sotošek Vlatka 6894	Srisothinathan Nimalan 7314		Sunaga Satoshi 6501

- Suñe Montse
7377
- Sungur Zerrin
7629
- Suslov Gennadii
6821
- Suslov Gennadiy
7271
- Suslov Oleksan
7082
7087
- Swinnen Walter
6828
7434
7567
- Sys Lien
6637
- Szabó Anás
7078
- Szabó András
7173
- Szabó Dominika
7173
- Szécsi Balázs
7173
- Székely Anea
7078
7173
- Szilagyi Istvan
6649
- Taboada Muñiz Manuel
6691
- Taccone Fabio Silvio
7496
- Tahar Ait Mouheb
6758
- Talman Andrew
6737
- Tamayo Gómez Eduardo
7198
- Tan Chin Wen
7493
- Tan Hon Sen
7493
- Tan Jacinth
7586
- Tanirgan Çabakli Gamze
7446
7448
- Tapia Blanca
7104
- Tarabrin Oleg
6813
7082
7087
- Tarasenko Sergii
6821
7271
- Tatjer Hernanz Irene
7029
- Tedoldi Thales Abreu
6994
- Teh Yen Yeen
7653
- Teijido Carlos Alberto
6662
- Teixeira Francisco
6663
6914
- Teixeira Joana
6624
- Teixeira Sara
7245
- Teixell Claudia
6651
- Tejedor Ana
6469
- Teles Ana Rita
7590
- Telo Margarida
7652
- Tena Jose
6565
- Teplova Iryna
7062
- Tercero Francisco Javier
6633
- Terrasa Sergio
6534
- Terreu Serrano María
7454
- Tesouro Ana
6723
- Teunissen Charlotte
6630
- Thakrar Sonali
6886
- Theiler Lorenz
6704
6705
- Theodoraki Kassiani
6510
6540
7134
7158
7329
- Theodorou Lydia
6865
- Theodosopoulou Polyxeni
7308
- Theunissen Maurice
7068
- Thiel Bram
6470
- Thirhalli Jagadisha
7374
- Thomas Diana
7624
- Thomas Preethi
7117
- Thudium Marcus
7506
BAPC-2 7122
- Tiago Barbosa
7464
- Tigano Stefano
6582
6584
6585
7065
7074
- Tijero Paramo Maria Teresa
7391
- Tileli Maria
7288
- Timmesfeld Nina
6561
- Ting Chien-Kun
7049
- Tinoco Joana
6513
6514
6515
6624
6720
6920
7085
- Tobar Izquierdo Milagros
7391
- Tobylbayeva Zaure
7414
7416
- Toleska Dimitrovska Natasha
7657
- Toleska Marija
7644
7648
7649
7657
- Tolga Saracoglu Kemal
7212
- Tolsgaard Martin
Grønnebæk
6542
- Tomara Eleni
7269
- Tomé Inês
7530
- Tomić Mahečić Tina
6794
- Tong Corey
6890
- Toral Toral Úrsula
6642
6818
- Torrejon Torres Rafael
7069
- Torres Machi María Luisa
6764
- Torres Marta
6633
- Torrinha Sofia
6942
- Tóth Krisztina
7078
7173
- Touihri Karim
7415

- Touil Nassim
6508
- Tourais Isabel
7469
- Townsend Russell
7072
- Trajceska Ljubica
6737
- Treskatsch Sascha
7600
- Trieschmann Uwe
7404
- Trillo Urrutia Lourdes
6644
- Trindade Hugo
7435
- Trpkovic Slađana
7387
- Trujillo Morales Héctor
6764
- Tsapara Vaia
7164
- Tsaroucha Athanasia
7269
- Tse James
7680
7681
- Tsoutsou Maria
7283
- Tua Carl
7343
7632
- Tümer Murat
6612
6616
6623
6782
- Tun Han Oo
6657
- Tunç Lales
7338
- Tupper-Carey Darell
6657
6746
- Turan Akar Evrim Burcu
7094
- Turgut Namigar
7566
7665
- Turner Dan
7578
- Tympa Grigoriadou Aliko
7269
- Tzima Maria
6962
7052
- U. Adachi Yushi
6866
- ucker Alexana
6482
- Ulm Bernhard
7026
7361
7463
- Ulrichs Christoph
7404
- Umeh Uchenna
6890
- Umemura Celica
6557
- Umuroglu Tumay
6837
7446
- Umuroglu Tümay
7448
- Uncio Veyrat Jorge
7123
- Urwyler Albert
6466
- Usta Görkem
7645
- Usua Gemma
7024
- Uysal Damla
7048
- uzhyna Oleksan
6622
6638
- UZUMCUGIL FILIZ
7094
7655
- Üzümcügil Filiz
7557
- Uzun Şennur
6612
6782
- Vafek Vaclav
6487
- Vaghela Ashok
7575
- Vaithialingam Balaji
7374
- Vakaliuk Igor
7247
- Valadkhani Arman
6830
- Valbuena Isabel
6781
7032
- Valencia Sola Lucía
6764
6944
- Valente Elisabete
6938
7570
7583
- Valente Francisco
7399
- Valero Ricard
6633
6645
6783
6889
- Valete Elisabete
6929
- Vall María
6814
- Vallé Arnaud
7567
- Vallès Ariadna
6759
- Valsamidis Dimitrios
7158
- Vamecq Joseph
6600
7555
- Van Biesen Stefaan
7434
7567
- Van Boxem Koen
6928
6969
6973
6991
- Van Boxel Martin
BAPC-8 7199
- Van Den Heuvel Sander
7445
- Van Der Linden Philippe
6475
6653
- Van Der Schoot Marnix
6652
- Van Der Veeken Lennart
6552
- Van Dessel Eleni
6568
- Van Laake Linda
6652
- Van Lantschoot Astrid
6973
- Van Limmen Jurgen
6734
6902
- Van Loon Kathleen
6618
- Van Noyen Lotte
7068
- van Stijn Mireille
6703
- Van Tornout Michiel
7528
- Van Wyk Christopher
7453
7459
- Van Zundert Jan
6973
6991
- Vandenabeele Frank
7552
- Vandenbrande Jeroen
7528
- Vanhoeylandt Emily
6828
7434
- Vanmaele Hanne
6637

- Vanneste Thibaut
6973
6991
- Vanoverschelde Henk
6656
- Vanwijnsberghe Bram
6828
- Vardakis Panagiotis
6867
- Varela Nicolás
7028
- Varghese Mathew Gisha
6562
- Varghese Timothy
7513
- Varosyan Armen
7353
- Varudo Rita
6729
- Vasconcelos Alberto
7633
- Vasconcelos Liliana
7666
- Vasile Francesco
6584
- Vasiljeva Elvira
6602
- Vasilos Periklis
7155
- Vassalli Francesco
6977
- Vassallo Diana
7343
- Vassallo Diandra
7632
- Vasudev MI
7431
- Vaz Antunes Maria
7112
- Vaz Gomes Mariana
6855
6856
6859
- Vaz Mariana
7428
- Vaz Rodrigues Luisa
7676
- Vazquez Tojo Sara
6691
6762
6763
6822
6906
- Vázquez Tojo Sara
6917
- Vega Maria
7512
- Vega Victoria E.
7614
- Veglia Simona
6655
- Veiga Nuno
7471
- Veiras Del Río Sonia
6691
- Venmans Elisabeth
7457
- Verbist Jasmin
7344
- Verbrugge Anne-Marie
7309
- Verelst Sana
7204
- Verenkin Vladimir
BAPC-7 6570
- Verma Abhishek
7654
- Verougstraete Marilie
6828
6902
- Vertriest Rudolf
6528
- Vescovo Aníbal
6648
- Veses Alfani Oscar
7024
- Vestager Jensen Maria
6784
- Vested Matias
6580
- Vetter Christian Thomas
BAPC-6 6901
- Vettorazzo Amaral Luiza
6998
- Vettorazzo Luiza
6832
- Vicente Juan Manuel
6817
7166
- Vicente Orgaz Marta
7634
- Vicent-López Montserrat
6985
- Vico Manuel
7534
7595
- Vidailhet Pierre
7171
- Videnovic Jelena
7387
- Videnovic Nebojsa
7387
- Vieira Alves Catarina
7012
- Vieira Ana
7605
- Vieira Ana Luisa
7428
- Vieira Ana Luísa
6952
- Vieira Carlos Ricardo
7633
- Vieira Daniel
6941
- Vieira Inês
7635
- Vieira Lúgia Denise
Gonçalves de Sá
6492
- Vieito Baqueiro Carolina
6836
- Viguera Laura
6741
- Vilchez Monge Almudena
Lucia
7391
- Vildoza Santiago
7043
- Vilhena Isabel
7100
- Villaluna Christa
7681
- Villar Tania
6807
- Villares Da Costa Luiz Guil-
herme
6982
6994
6998
- Visharad T.
7342
- Vishwanath Padmini
7431
- Viskovic Anita
6680
- Vivekanand
7487
- Vives Santacana Marc
7606
- Vlastelica Munivrana Ivana
6791
- Voitenko Volodymyr
7271
- Volkov Dmitrii
6578
- Vollmer Ivan
6633
- Von Dossow Vera
6685
7140
- Von Siebenthal Michelle
6699
- Vos Jaap Jan
7517
- Vos Jaap Jan
7367
- Vossen Carine
BAPC-8 7199
- Vucemilovic Hrvoje
6791
- Vullo Paula Agostina
7137
- Vural Cagil
7069

- Vyshynska Mariana
7163
- Vysotskyi Anii
7259
- Wadhwa Bharti
6745
- Wadhvani Ravina
6636
- Wahdan Amr
6730
6731
- Waje Niranjana
7047
- Walder Bernard
6626
- Waldhorn Martin
6662
7040
- Wallisch Christine
6724
- Wang Xuan
7294
7607
- Ward - van der Stam Vivian
7515
- Warle Michiel
7483
- Warlé Michiel C.
7563
- Warwick Eleanor
6636
- Watremez Christine
6508
6630
- Weber Nina C.
7393
BAPC-5 6880
- Weerasekara Tharindu
6766
- Weigand Markus A.
7114
7139
- Weigand Markus A.
7133
- Weinberg Laurence
6670
- Weingast Sabine
7463
- Weiniger Carolyn F.
6896
- Weiss Thomas
7312
- Weiss Yotam
6673
- Wendt Stefanie
7404
- Weng Rosa
7320
- Wenk Manuel
6512
7398
- Westwood Jennifer
7072
- Weyland Aneas
6579
- Weyland Julika
6579
- White Marion Jill
6626
- Wichelhaus Lisa-Marie
6561
- Wiegele Marion
6632
- Wilburn Caroline
7395
- Wilcox Holly
6601
- Williams Alejana
7488
7512
- Windels An
6682
6718
6780
- Winslow Luke
7586
- Wissler Jennifer
7026
- Witdouck Annemijn
6969
- Wittenstein Jakob
6904
7051
7223
7244
- Wolf Anna
7064
- Wong Gabriella
7453
- Wu Aihua
7480
- Wu Chuang Alejana
7010
- Wuethrich Patrick Y.
6586
6699
6851
- Wüthrich Patrick
6694
- Wyffels Piet
6734
6902
- Xambre Fátima
6996
- Xander Carla Aiana Sagrado
6982
- Xavier Célia
6526
7254
- Xiao Ying
7294
7607
- Xin Annie
6597
- Yadgarov Mikhail
6847
- Yahav Dana
6898
- Yahav-Shafir Dana
6776
- Yahya Maya Mazuwin
7550
- Yamaura Ken
6891
- Yaroslavskaya Svitlana
7678
- Yasmine Ellouze
6627
- Yassen Khaled
6518
- Yassin Hany Mahmoud
6547
- Yates David
7367
- Yefimova Olena
6821
7271
- Yegen Cumhuriyet
7446
- Yeo Kai Wen
7493
- Yeow Chia
6881
- Yepes Temiño María José
6808
- Yevsieieva Viktoriia
7268
- Yiapana Chloe
6852
- Yildirim Guclu Cigdem
7048
- Yildiz Canakci Merve Naz
7655
- Yorgun Hikmet
7338
- Youm Thomas
6890
- Young Bruce
7561
- Yüçetepe Sirin
7404
- Yun Phang Ye
7597
- Yurutkina Alina
7476
- Yus Haniff Wan Isa Wan
7551
- Zaballos Matilde
6817
6888
- Zac Lilach
6673
- Zafeiriadis Dimitrios
7052

Zahavi Guy
6907

Zahn Peter K.
6561

Zainal Abidin Huda
7550
7551
7597

Zaky Maryam
7561

Zamareev Alexander
6878

Zamora Trovisco Sofia
7627

Zamudio Diana
7232

Zaradzki Marcin
7114

Zarour Shiri
7267
7524

Zatsarynnyy Roman
7259

Zavkovic Ranko
7387

Zawadka Mateusz
7079
7088
7621

Zbede Amir
6776
6898
6907

Zdorik Nikita
7473

Zeillemaker-Hoekstra Miriam
7517

Zeiner Sebastian
6628
6724

Zembrana Paloma
6781

Zemou Sultana
6962

Zengin Ulgen
6837

Zhang Elizabeth
7284

Zhang Yingying
7051
7244

Zheng Shaokai
6699

Zhuk Aleh
6878

Zia Ashraf
7160

Zittermann Armin
6685
7140

Zitzmann Florian
6788
6870
7091
7213

Zubler Frédéric
7620

Zukin Valerii
7594

Zuurbier Coert J.
BAPC-5 6880

Zuzarte Daniela
6684

SUBJECT INDEX

KEYWORD	7473	Airway,pharynx	7284
Abstract ID	7480	7568	7355
		7648	7387
Acid[]{-}base	Airway,complications		7508
equilibrium,bicarbonate	6484	Airway,pressure	7548
6807	6505	6532	7595
7624	6597	6533	7674
	6646	6693	BAPC.3
Acid[]{-}base	6682	6990	BAPC-2
equilibrium,metabolic	6684	Allergy	
acidosis	6755	6584	Anaesthesia,geriatric
7083	6780	6766	6635
7506	6823		6670
	6834	Anaesthesia,audit	6677
Acid[]{-}base	6898	6814	6877
equilibrium,respiratory	6907	6967	6936
alkalosis	6915	7266	6998
6651	6938	7281	7043
	6942	7395	7083
Age factors	7001	7657	7487
6724	7030		7500
7206	7032	Anaesthesia,day-case	7503
7518	7085	7058	7506
7524	7117	7094	7518
	7184	7681	7524
Airway	7393		7529
6484	7413	Anaesthesia,dental	7566
6907	7418	7062	
6946	7434	Anaesthesia,depth	Anaesthesia,journals
6962	7448	6551	6714
7000	7454	7433	Anaesthesia,neurosurgical
7058	7468	7619	6676
7066	7488		6856
7117	7507	Anaesthesia,emergency	6889
7123	7511	service	6944
7148	7515	6549	7112
7369	7523	6640	BAPC-6
7387	7554	6663	
7456	7563	6769	Anaesthesia,neurosurgical
7471	7605	6814	6667
7534	7619	6898	6783
7536	7628	6952	
7546	7634	6953	Anaesthesia,obstetric
7559	7642	7035	6556
7595	7649	7092	6627
7609	7652	7361	6777
7620	7655	7375	7081
7652	7656	7413	7100
7655	7674	7463	7104
7663		7580	7132
7671	Airway,obstruction	7655	7152
7680	6726		7290
	6831	Anaesthesia,general	7336
Airway,anatomy	7001	6536	7373
6479	7099	6653	7403
6485	7121	6788	7423
6625	7434	6885	7493
6816	7534	6908	7531
6900	7546	7085	7538
7012	7621	7108	7554
7023	7663	7121	7594
7367		7271	7666
7446			

- 7676
 Anaesthesia,
 otolaryngological
 6831
 Anaesthesia,paediatric
 6479
 6487
 6488
 6490
 6515
 6581
 6606
 6734
 6808
 6816
 6819
 7027
 7062
 7094
 7105
 7210
 7246
 7254
 7313
 7324
 7358
 7378
 7404
 7553
 7578
 7586
 7587
 7598
 7646
 7652
 Anaesthetic
 techniques,conduction
 6702
 7353
 7561
 BAPC-7
 Anaesthetic
 techniques,drawover
 6865
 Anaesthetic
 techniques,extradural
 7423
 7531
 7594
 Anaesthetic
 techniques,fibreoptic
 6544
 7376
 7590
 7671
 Anaesthetic
 techniques,hypothermia
 7104
 7164
 Anaesthetic techniques,i.v.
 7586
 Anaesthetic
 techniques,induction
 6487
 6636
 6865
 6931
 7105
 7418
 Anaesthetic
 techniques,inhalaion
 7566
 7586
 7679
 Anaesthetic
 techniques,insufflation
 7374
 BAPC-7
 Anaesthetic
 techniques,laryngoscopy
 6541
 6582
 6962
 7318
 7456
 7471
 7521
 7522
 7537
 7543
 7648
 Anaesthetic
 techniques,preoxygenation
 7058
 7680
 Anaesthetic
 techniques,regional
 6513
 6693
 6742
 6908
 6931
 6941
 6953
 7040
 7045
 7077
 7094
 7132
 7211
 7228
 7271
 7335
 7339
 7398
 7472
 7476
 7492
 7533
 7633
 Anaesthetic
 techniques,subarachnoid
 6781
 7219
 7353
 7403
 7500
 7518
 7673
 Anaesthetic
 techniques,topical
 7568
 7648
 Anaesthetics gases
 6523
 6648
 Anaesthetics i.v.,ketamine
 7092
 7296
 7517
 7599
 Anaesthetics i.v.,propofol
 6725
 6959
 7052
 BAPC-1
 Anaesthetics local
 6859
 6894
 6973
 Anaesthetics
 volatile,atmospheric pollution
 7145
 7644
 Anaesthetist,activity
 7452
 7597
 7658
 7661
 Anaesthetist,risks
 6552
 6619
 6712
 7173
 Analgesia,obstetric
 6781
 7100
 7166
 7281
 7368
 7373
 7398
 7493
 7565
 Analgesia,paediatric
 6567
 7335
 Analgesia,patient-controlled
 6941
 7398
 7476
 Analgesia,postoperative
 6488
 6585
 6636
 6745
 6899
 6944
 6949
 6957
 6989
 7088
 7565
 7627
 7639
 Analgesia,pre-emptive
 7271
 7603
 Analgesic
 techniques,extradural
 6578
 Analgesic techniques,i.v.
 6580
 6867
 Analgesic
 techniques,infiltration
 6567
 6856
 6969
 Analgesic
 techniques,regional,i.a.
 6758
 6828
 Analgesic techniques,
 regional,interpleural
 6636
 6957
 Analgesic techniques,topical
 6761
 Analgesics
 6469
 6510
 6579
 6867
 6923
 7415
 Analgesics opioid
 6955
 7627
 Analgesics opioid,morphine
 6718
 7139

- | | | | |
|---|---|--|---|
| Anatomy,airway
6897 | Blood,coagulation
6499 | Brain,intracranial
haemorrhage
7119 | 6654
6766
6903 |
| Anatomy,extradural space
6929 | 6510
6982
6993 | 7134 | 7026
7086 |
| Antagonists
7224
7496 | 7108
7125
7133 | Brain,intracranial neoplas
6507 | 7186
7524
7639 |
| Antibiotics
6845
7041
7052
7665 | 7136
7204
7307
7345
7478
7618 | Brain,intracranial neoplasm
7112
7502
BAPC-6 | 7186
7524
7639
Complications,accidents
7395
7455
7676 |
| Arterial
pressure,hypertension
6581
7037
7098
7593 | Blood,flow,skin
7153
7177 | Brain,intracranial pressure
7176
7411 | Complications,adult
respiratory distress
syndrome
6656
6742
6990
6994
7089
7606 |
| Arterial pressure,hypotension
6547
6685
6705
6710
7140
7158
7295
7329
7571 | Blood,haemoglobin
7192
7218 | Burns
6996
7087
7530 | 6656
6742
6990
6994
7089
7606 |
| Arteries,aorta
6573
6793
7114
7512 | Blood,loss
6651
6977
7336 | Cancer
6680
6886
6899
6920
6979
7068
7071
7096
7148
7559 | 6680
6886
6899
6920
6979
7068
7071
7096
7148
7559
Complications,airway
obstruction
6484
6726
6755
6917
7375
7432
7635
7656 |
| Arteries,cannulation
6691
6866 | Blood,platelets
7224
7513 | Carbon
dioxide,extracorporeal
removal
6942
7259 | 6484
6726
6755
6917
7375
7432
7635
7656
Complications,airway
obstruction
6645
7418 |
| Arteries,cerebral
7119 | Blood,transfusion
6694
6697
6767
6837
6886
6960
6977
7063
7064
7080
7299 | Cardiorespiratory system
7438 | Complications,anaemia
6767
6837
6886
6914
7063
7136 |
| Assessment
6470
6534
6669
6705
7173
7402
BAPC.3 | Blood,volume
6694
7063
7189
7247 | Cerebrospinal fluid
6855
6929
7219 | 6886
6914
7063
7136 |
| Assessment, preanaesthetic
6962 | Brain,anatomy
6507
7664 | Chemotherapy,cancer
7037
7098
7598 | Complications,anaphylaxis
7457
7532 |
| Blood,anticoagulants
6475
6586
6632
7118
7163
7467 | Brain,electroencephalography
6528
6629 | Clinical trials
6509
6561
6633
6647
7010
7391 | Complications,aneurysm
6726
6894
7251
7425
BAPC-5
BAPC-7 |
| | Brain,injury
6630
6760 | Complications
6476
6479
6511
6590
6603
6627 | Complications,aortic rupture
6822
7049 |

- Complications,aortic valve disease
6565
6573
6624
6679
6778
6793
6906
7047
- Complications,arrhythmia
7288
7659
- Complications,arteriovenous malformation
6508
7664
- Complications,aspiration
6682
7327
- Complications,barotrauma
7525
7638
- Complications,bronchospasm
6682
7327
- Complications,burns
7176
7212
7453
7459
7469
- Complications,cardiac arrest
6507
6763
6836
6942
7025
7259
7308
7438
7613
7667
- Complications,catheter misplacement
6560
- Complications,cerebral ischaemia
6699
7110
- Complications,coagulopathy
6556
6671
6896
7154
7230
- 7334
- Complications,death
6584
6741
7204
- Complications,disseminated intravascular coagulation
7502
BAPC-8
- Complications,dural puncture
7538
- Complications,eclampsia
7160
7269
7317
7593
- Complications,embolism
6847
7252
7345
- Complications,emphysema
7523
7634
- Complications,haemorrhage
6791
6849
6914
7154
7294
7478
7605
7647
7662
- Complications,headache
7538
- Complications,hepatic
7077
- Complications,hypertension
7212
7336
7469
7626
- Complications,hyperthermia
6729
- Complications,hyponatraemia
7269
- Complications,hypotension
6667
6685
7532
BAPC-1
- Complications,hypothermia
6628
6760
7104
7212
7459
- Complications,hypovolaemia
6624
6904
- Complications,infections
6758
6830
7057
7111
7155
7289
7400
- Complications,intubation tracheal
6684
6900
7157
7402
7488
7523
7638
- Complications,liver disease
6762
- Complications,morbidity
6741
6896
6943
7078
7093
7226
7258
- Complications,muscular dystrophy
6985
- Complications,myasthenia gravis
7320
- Complications,myocardial infarctio
BAPC-4
- Complications,myocardial infarction
6802
- Complications,neurological
6547
6550
6629
6630
6685
6795
6912
6960
- BAPC-2
- Complications,neuropathy
6819
7038
- Complications,obesity
6549
6655
6657
6742
6802
6813
6833
7011
7025
7045
7073
7080
7093
7152
7184
7189
7223
7258
7289
7563
7626
- Complications,obstructive sleep apnoea
6966
7061
7184
- Complications,oedema
6938
- Complications,postoperative desaturation
6472
7443
- Complications,prolonged QT syndrome
BAPC-4
- Complications,pulmonary
6562
6647
6727
6764
6905
7015
7333
- Complications,pulmonary hypertension
6512
6618
6690
6971
7047
7606

- | | | | |
|--|---|---|--|
| Ethics
6779 | Heart,cardiopulmonary
bypass
6559 | Heart,ventricles
6562
6723
6724
7275 | Infection,nosocomial
7041
7096
7106
7665 |
| Fatigue
7406 | 6561
6642
6782 | | |
| Fluid balance
6512
6578
7177 | 6982
7528 | Hormones,adrenal
6581 | Infection,pulmonary
6555
6623
7224
7519 |
| Fluids,i.v.
6518
6603
7158 | Heart,catheterization
7047
7338 | Hormones,aldosterone
7287
7600 | Intensive care
6525
6527
6549
6602
6640
6663
6693
6744
6784
6788
6811
6870
6878
6943
6987
6996
7089
7091
7106
7160
7161
7172
7213
7226
7267 |
| Fluids,i.v.,
Monitoring,intensive care
6467 | Heart,congenital defects
6644
6795
6807
7206
7251 | Hormones,oestrogen
6759
7464
Hormones,somatostatin
6920
7029 | |
| Fluids,oral
7578 | 7624
7641 | Hypertrophic obstructive
cardiomyopathy
6723 | 6744
6784
6788
6811
6870
6878
6943
6987
6996
7089
7091
7106
7160
7161
7172
7213
7226
7267 |
| Gastrointestinal tract
7272 | Heart,coronary artery bypass
6622
6638 | Hypothermia
6836
7268
7294
7497
7633 | |
| Gastrointestinal
tract,emptying
7578 | Heart,coronary occlusion
6778 | | |
| Gastrointestinal
tract,endoscopy
6463
7354 | Heart,heart rate
6626
6760
7659 | Hypoxaemia
6971
7200
7563
7606 | |
| Gastrointestinal tract,pH
7603 | Heart,ischaemia
6626 | | |
| Genetic factors
6745
6828
6893
7358
7365
7508 | Heart,myocardial function
6754
7275
7379 | Hypoxia
6514
6618
7424 | |
| Heart,arrhythmia
6752
7081
7246
7283
7284
7338
7551
7583 | Heart,myocardial
preservation technique
6626
6731 | Immune response
6657
6877
7268
7483
7485 | |
| Heart,arrhythmia,
electroversion
7245 | Heart,resuscitation
6836
7066
7264
7294
7307
7308
7388
7438
7573 | | Intensive care,audit
6653
6850
7226
7288
7513
7632 |
| Heart,cardiac massage
7264 | Heart,transplantation
6642
6662
6994
7550 | Induction,anaesthesia
6487
7355 | |
| Heart,cardiac output
6499 | | Infection,bacterial
7057 | |
| | | Infection,central nervous
system
6845
7052 | Intensive care,infections
6526
6553
6623
6845
7089
7106
7314
7519
7665 |
| | | Infection,control
6619
6817
7166
7634 | |

- Intensive care, sedation
6959
7134
7142
7214
7459
7469
7496
- Intubation endobronchial
7092
7517
- Intubation nasotracheal, technique
6625
7377
- Intubation tracheal
6582
6744
6946
7066
7079
7387
7545
7581
7585
- Intubation tracheal, difficult
6544
6597
6612
6669
6893
6907
7000
7011
7012
7137
7210
7234
7365
7377
7391
7468
7530
7536
7541
7638
7645
7671
- Intubation tracheal, extubation
7494
- Intubation tracheal, technique
6612
7377
7471
7623
- Ions, calcium
6490
7204
7300
- Ions, potassium
6921
7061
- Ions, sodium
6921
7061
- Kidney, failure
6545
6974
7087
7091
7140
7176
7317
7343
7571
- Kidney, function
6509
6559
6744
7037
7091
- Kidney, transplantation
7605
7649
- Larynx, vocal cords
7433
- Liver, cirrhosis
7057
7111
- Liver, transplantation
6562
6723
7133
7154
7218
- Lung, adult respiratory distress syndrome
6568
6623
6640
6655
6811
6850
7015
7051
7103
- Lung, atelectasis
7297
7443
7607
7620
- Lung, atelectasis
6704
- Lung, damage
7051
- Lung, hypoxia
7200
- Lung, mechanics
7223
7357
7570
- Lung, oedema
6677
7014
7085
7515
- Lung, physiotherapy
7297
7607
- Lung, pleural pressure
7357
7592
- Lung, respiratory distress syndrome
6647
7214
7496
- Lung, transplantation
6523
6524
6525
6648
6661
6662
6701
6832
6955
7118
- Malignant hyperthermia
7457
7673
- Measurement techniques, - cardiac output
7614
- Measurement techniques, coagulation
7230
- Measurement techniques, Doppler echocardiography
7313
- Measurement techniques, electrodes, impedance
6704
- Measurement techniques, fiberoptic
6893
- Measurement techniques, oximeters
7654
- Measurement techniques, plethysmography
6518
6648
- Measurement techniques, spectral analysis
7528
- Measurement techniques, thrombelastography
6762
6813
6833
7073
7080
7082
7136
- Measurement techniques, ultrasound
6655
7011
7024
7368
7468
7594
- Measurement techniques, ventilation volumes
7155
7244
- Metabolism, endocrine
6644
6697
6746
7078
- Metabolism, fasting
6703
6890
7027
7164
7247
7603
- Metabolism, insulin
6657
6746
6840
6905
- Metabolism, lactate
7172
7325
- Methaemoglobinaemia
7308
7424

- | | | | |
|---|--|--|--|
| Microcirculation
7153
7177 | Monitoring,temperature
6515
7352 | Operating rooms,personnel
6616
7187
7550 | 6989
7020
7028
7031
7203 |
| Model,computer simulation
6818
6898
7171
7365 | Monitoring,ultrasound
7247
7526
BAPC-2 | Oxygen,cyanosis
7030
7480 | 7272
7406
7501
7533 |
| Model,neuropathy
7225 | Monitoring,ventilation
6720
7244 | Oxygen,inspired
concentration
7321
7592 | Pain,mechanism
6526
6821
7068 |
| Model,statistical
6628
6635
6669 | Muscle cardiac
7227
7287
7526
7600 | Oxygen,measurement
6794 | Pain,neuropathic
6761
6835
6855
6859
6888
6909
6928
6973
6991
7272 |
| Monitoring,anaesthetist
activity
6770
6835
6889
7268
7497 | Muscle respiratory
6736
7432 | Oxygen,therapy
7321 | Pain,paediatric
6770
6835
7404 |
| Monitoring,carbon dioxide
7069
7507 | Muscle skeletal
6501
6815
6902
6971
7203
7552 | Oxygen,tissue
6792
7528
Pain
6852
6913
6922
6947
7368
7415
7501 | Pain,postoperative
6745
6828
6841
6879
6888
6899
6928
6949
6989
7020
7068
7335
7493
7533 |
| Monitoring,depth of
anaesthesia
6752
7338 | Muscle
vascular,pharmacology
6618 | Pain,acute
6469
6483
6531
6841
6852
6855
6856
6891
6922
6941
6944
6949
6969
7031
7232
7428
7430
7492
7565 | Pain,postoperative
6745
6828
6841
6879
6888
6899
6928
6949
6989
7020
7068
7335
7493
7533 |
| Monitoring,echocardiography
6631
6724
6754
6906
7171
7275
7288
7379
7644
7659 | Myasthenia gravis
6737
7320 | Pain,chronic
6513
6526
6649
6758
6761
6817
6821
6830
6879
6908
6909
6922
6947 | Perioperative Medicine
7618 |
| Monitoring,
electrocardiography
7246
7283
7551 | Neonates
6485
6817
7254
7376
7536
7628
7654 | Pain,chronic
6513
6526
6649
6758
6761
6817
6821
6830
6879
6908
6909
6922
6947 | Pharmacokinetics
7134
7142 |
| Monitoring,intensive care
6807
7614 | Nerve,damage
(postoperative)
7488
7634 | Pain,chronic
6513
6526
6649
6758
6761
6817
6821
6830
6879
6908
6909
6922
6947 | Pharmacology,
benzodiazepines
BAPC-1 |
| Monitoring,intraoperative
6579
6794
7072
7431 | neuromuscular block
7496 | Pain,chronic
6513
6526
6649
6758
6761
6817
6821
6830
6879
6908
6909
6922
6947 | Physics,fluid dynamics
7456 |
| Monitoring,radiological
6680 | non-opioid
6469
6531
6579
6867
6923
7415 | Operating rooms,exhaust
systems
7145 | |

- | | | | |
|-----------------------------------|-------------------------|----------------------------|---------------------------|
| Physiotherapy | 7065 | 6889 | Stress |
| 7411 | 7074 | 6917 | 6616 |
| | 7110 | 6920 | 7035 |
| Position, effects | 7111 | 7069 | 7062 |
| 6904 | 7358 | 7187 | 7324 |
| 7112 | 7487 | 7254 | 7553 |
| | 7503 | 7373 | 7625 |
| Position, intubation | 7529 | 7375 | |
| 7609 | 7555 | 7452 | Surgery, abdominal |
| Position, prone | 7566 | 7455 | 6511 |
| 6557 | 7678 | 7567 | 6767 |
| 7613 | | 7661 | 6974 |
| | Recovery, neurologic | | 7211 |
| Potency, anaesthetic, age factors | 6851 | Safety, Anaesthesia, audit | |
| 6551 | | 6601 | Surgery, aneurysm |
| 7486 | Recovery, neurological | | 6573 |
| | 7074 | Safety, drug | 6794 |
| preanaesthetic | 7214 | 6718 | |
| 6470 | 7485 | 7040 | Surgery, cardiovascular |
| 6669 | | 7327 | 6512 |
| 6712 | Recovery, postoperative | | 6578 |
| 7173 | 6476 | Safety, equipment | 6590 |
| 7402 | 6488 | 6823 | 6629 |
| BAPC.3 | 6511 | 6837 | 6630 |
| | 6540 | 6915 | 6642 |
| | 6603 | 7032 | 6677 |
| Pregnancy | 6673 | 7072 | 6697 |
| 6482 | 6710 | 7431 | 6712 |
| 6540 | 6759 | | 6731 |
| 7245 | 6782 | Safety, techniques | 6734 |
| 7355 | 6890 | 6482 | 6754 |
| 7554 | 7074 | 6646 | 6763 |
| 7626 | 7342 | 6823 | 6982 |
| | 7344 | | 6994 |
| Premedication | 7483 | Screening | 6998 |
| 6466 | 7494 | 6673 | 7014 |
| 7297 | 7506 | 6966 | 7064 |
| 7553 | 7512 | 7086 | 7078 |
| 7587 | 7560 | 7503 | 7173 |
| | 7639 | | 7198 |
| Protein, human serum albumin | 7646 | Sedation | 7206 |
| 7227 | | 6463 | 7313 |
| 7526 | Recovery, psychomotor | 6544 | 7342 |
| | 6851 | 6704 | 7611 |
| | | 7032 | 7664 |
| Protein, metabolism | Research, anaesthesia | 7069 | |
| 6736 | 7262 | 7099 | Surgery, craniotomy |
| 7432 | 7445 | 7324 | 6865 |
| | | 7376 | 7502 |
| Psychological responses | Research, animal | 7393 | |
| 6474 | 7142 | 7433 | Surgery, day-case |
| 6913 | | 7507 | 7262 |
| 7406 | Risk | 7620 | |
| 7616 | 6998 | 7681 | Surgery, endarterectomy |
| | 7079 | | 6701 |
| Records, anaesthesia | 7500 | Skin, blood flow | 7110 |
| 6702 | 7616 | 7318 | |
| 7561 | | 7456 | Surgery, gastrointestinal |
| | Safety | | 6921 |
| Recovery, cognitive | 6466 | Sleep | 7228 |
| 6501 | 6552 | 7055 | 7339 |
| 6590 | 6602 | | |
| 6600 | 6619 | Sleep apnoea | Surgery, hepatic |
| 6673 | 6633 | 7234 | 6518 |
| 6730 | 6776 | 7583 | 7088 |
| 6912 | 6779 | | |
| 6979 | 6783 | | |

Surgery,hormonal response 6770	7198 7325 7430	Surgery,vascular 6782 6822 7512	Veins,cannulation 6536 6817 7251 7587 7662
Surgery,laparoscopy 6764 6905 7232 7483 7599	7624 7629 7634	Sympathetic nervous system 7531	Veins,subclavian 6995
Surgery,laparotomy 7618	Surgery,preoperative period 6470 6482 6531 6540 6584	Sympathetic nervous system,adrenergic block 6644 6795	Ventilation,airway pressure 6950
Surgery,non-cardiac 6765 7026 7098 7551	6654 6694 6703 6769 6885 6966 7232	Sympathetic nervous system,dexmedetomidine 7234 7262 7570	Ventilation,apnoea 6881
Surgery,orthopaedic 6475 6670 6912 6923 7043 7065 7152 7228 7252 7258 7299 7467 7476 7492 7646	7339 7445	Sympathetic nervous system,ganglia 7600	Ventilation,continuous positive pressure 6633 7123 7391 7559 7680
	Surgery,spina 6667	Sympathetic nervous system,ganglion block 7203	Ventilation,dead-space 7357 7595
	Surgery,spinal 7345 7415 7647	Sympathetic nervous system,noradrenaline 7158 7287 7329 7573	Ventilation,failure 6831 7259 7434
	Surgery,thoracic 6550 6585 6634 6688 6720 6737 6759 6791 6792 6821 6867 6931 7320 7410 7464 7560	Sympathetic nervous system,phenylephrine 7329	Ventilation,high frequency jet 6881 7435
Surgery,otolaryngological 6881 7435		Temperature,body 6557 7305 7497	Ventilation,mechanical 6498 6509 6532 6561 6568 6736 6777 6990 6999 7038 7051 7103 7155 7157 7223 7244 7321 7511 7570 7592
Surgery,paediatric 6567 7192 7598		Toxicity,local anaesthetics 7040 7393	
Surgery,plastic 7148		Transfusion 6524 6586 6651 6661 6916 6977 7618 7672	
Surgery,post{-} transplantation 6524 6525	Surgery,thyroidectomy 6490	Transfusion,autotransfusion 7489	Ventilation,mechanics 6519 6533 6568 7010 7525
Surgery,postoperative period 6469 6475 6523 6556 6670 6741 6877 6903 6957 7065 7153 7161 7164	Surgery,tracheotomy 6612 6645 7099 7123 7534 7656	Transfusion,complications 6791 7294 7489 7672	
	Surgery,urological 6586 6849 6916 7048		

Ventilation,obstruction
6688

Ventilation,one-lung
6565
6580
6679
6727
6904
7014

Ventilation,postoperative
6764
7026

Ventilation,ventilation-
perfusion
6727

Vomiting,nausea,anaesthetic
factors
6710
6890

M
M

04 ▶ 06
JUNE

MIL
AN

euro
anaes
thesia
2022

www.esaic.org
www.Euroanaesthesia2022.org