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38th EACTAIC Annual Congress 2023
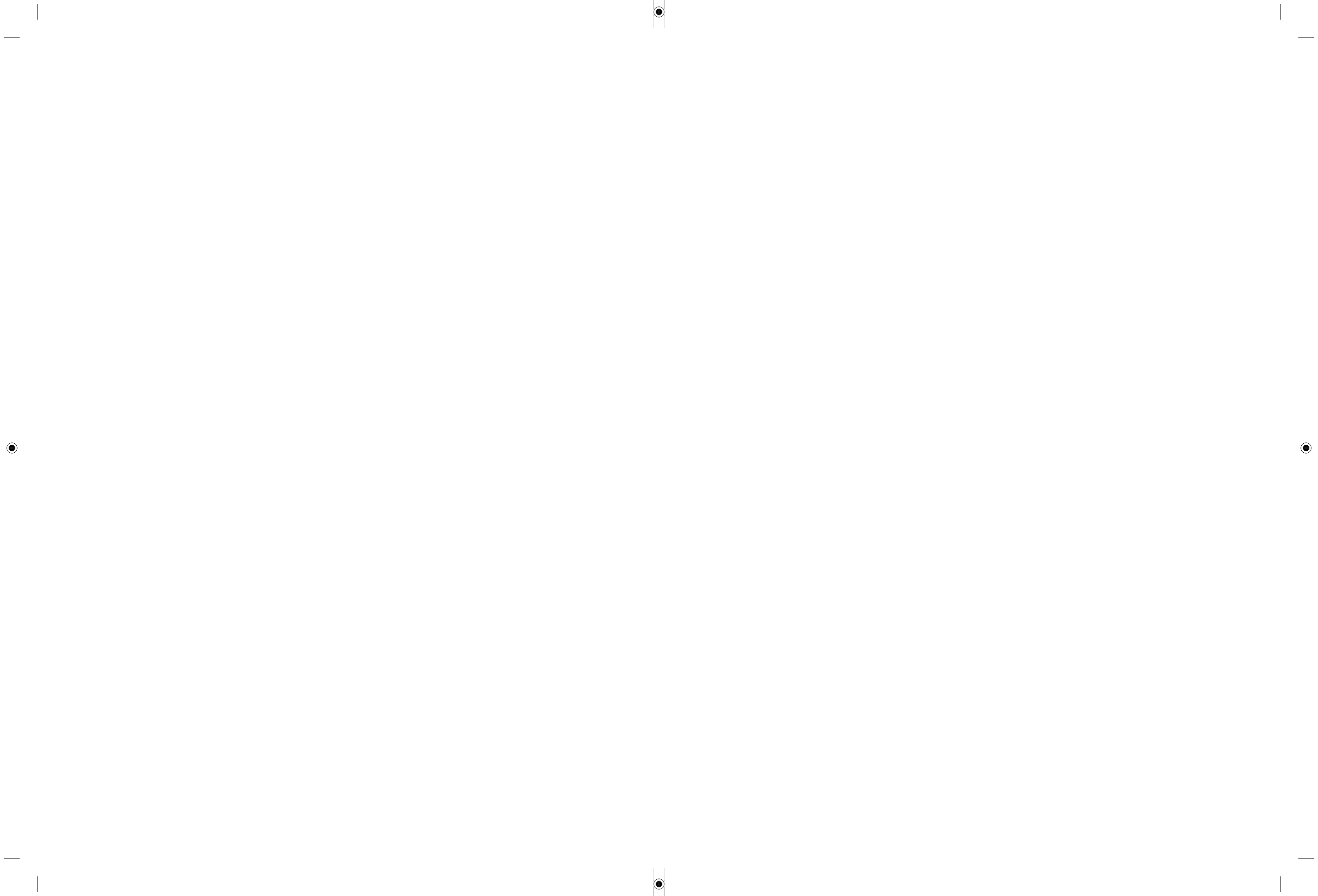
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Journal of Cardiothoracic and Vascular Anesthesia

Editorial Remarks

38th EACTAIC Annual Congress - "Challenges and Opportunities"
October 11-13, 2023 - Budapest, Hungary

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WELCOME MESSAGE

We are excited to invite you to the 38th Annual Congress of the European Association of Cardiothoracic Anaesthesiology and Intensive Care (EACTAIC), which will be held in Budapest, Hungary, on October 11-13, 2023.

The theme of this year's congress is "Challenges and Opportunities," which reflects the evolving role of cardiothoracic and vascular anaesthesia amidst the increasing complexity of cardiovascular diseases. As our specialty continues to become ever more sophisticated, there is a greater need for multidisciplinary collaboration and convergence between cardiology, cardiothoracic surgery, and cardiac anaesthesia, with regards to building on our shared knowledge base and overlapping skillsets.

The congress will feature a range of scientific sessions, including plenary lectures, symposia, teaching masterclasses and workshops, all designed to share the latest advances in research, clinical practice, and education in the field.

In addition to the scientific program, there will be ample opportunities for networking and collaboration, including a welcome reception, social events, and an exhibition hall showcasing the latest products and services in cardiothoracic anaesthesiology.

Budapest is a city that captivates visitors with its rich history, stunning architecture, and vibrant cultural scene. The city is known for its picturesque views of the Danube River, the magnificent Chain Bridge, and the grandeur of Buda Castle. Budapest is also famous for its thermal baths, offering a relaxing and rejuvenating experience for those who visit. The city is also renowned for its culinary and wine virtues, offering a wide array of Hungarian culinary delicacies in famous restaurants, coffee houses, and pastry shops.

We invite you to join us in Budapest from October 11-13, 2023, for a memorable and enriching experience. The congress promises to provide an excellent opportunity to expand your knowledge, connect with colleagues, and experience the vibrant city of Budapest.

We look forward to welcoming you to the 2023 EACTA Congress in Budapest.

Sincerely,

Andrea Székely
Head of Local Organizing Committee

Patrick Wouters
President of EACTAIC

Gianluca Paternoster
Annual Events Chair of EACTAIC

Journal of
Cardiothoracic and Vascular Anesthesia

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38th EACTAIC Annual Congress 2023

38th EACTAIC Annual Congress - "Challenges and Opportunities"
Budapest (Hungary), 11/10/2023 - 13/10/2023
Topic: 13 - Echocardiography

OC.01

Evaluation of Intraoperative Left Ventricular Diastolic Function by Myocardial Strain in Onpump Coronary Artery Bypass Surgery

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Introduction: Intraoperative diastolic strain-based measurements assessed by transesophageal echocardiography (TEE) showed strong correlation with LV relaxation, compliance and filling in cardiac surgery patients (1,2), but there are no reports about evaluation through the perioperative period. Therefore, we aim to explore the feasibility of this novel assessment tool in the entire intraoperative course and to describe the changes of LV diastolic function measured by myocardial strain as well as by conventional echocardiographic measures and common grading algorithms.

Methods: Thirty adult patients scheduled for isolated onpump coronary artery bypass grafting (CABG) surgery with preoperative preserved left and right ventricular function, and an uneventful intraoperative course were included into this prospective study. TEE was performed intraoperatively after induction of anesthesia (t1), after termination of cardiopulmonary bypass (t2), and after sternal closure (t3) using General Electric Vivid E95 echocardiography machines. All measurements were performed in stable hemodynamics, in sinus rhythm or atrial pacing, and without relevant vasoactive support. EchoPAC v204 software (GE healthcare) was used for analysis of strain-based measurements of peak longitudinal strain rate during isovolumetric relaxation (SR-IVR), and during early (SR-E) and late (SR-A) LV filling. Evaluation of conventional echocardiographic parameters included trans-mitral doppler measures of early (E) and late (A) LV filling, as well as of lateral tissue doppler velocity assessed during early (e) and late (a) LV filling. LVDD was graded according to recent guidelines (3) and additionally by a strain-based approach.

Results: Evaluation and grading of LVDD by myocardial strain was feasible in all included patients at all timepoints of assessment. Using conventional grading algorithms, however, a substantial part of patients could not be sufficiently graded, falling into an indeterminate zone, not reliably estimating LVDD (t1, 40%; t2, 33%; t3, 36%). There was significant impairment of LV diastolic function after bypass as measured by SR-IVR (t1 v t2, 0.28 s-1 (IQR 0.23;0.31) v 0.18 s-1 (IQR 0.14;0.22); p<0.001), SR-E (t1 v t2, 0.95 ± 0.34 s-1 v 1.28 ± 0.36 s-1; p<0.001), and E/SR-IVR (t1 v t2, 2.3 ± 1.0 m v 4.5 ± 2.1 m; p<0.001). Conventional echocardiographic measures remained unchanged during the same period (E/A t1 v t2, 1.27 (IQR 0.94;1.59) v 1.21 (IQR 1.03;1.47), p=1, and E/e′ t1 v t2, 7.0 (IQR 5.3;9.6) v 6.35 (IQR 5.7;9.9); p=0.9). There was no significant change in the values of SR-IVR, SR-E, SR-A, E/SR-IVR, E/A and E/e′ before and after sternal closure (t2 v t3).

Discussion: Intraoperative assessment of strain-based measurements of LV diastolic function and strain-based LVDD grading was feasible in our group of selected patients, while conventional parameters and recent algorithms failed to describe LVDD sufficiently in a substantial number of patients. Strain-based measurements showed impairment of LV relaxation and compliance after bypass, which was not detected by conventional echocardiographic parameters. Therefore, diastolic myocardial strain might be more sensitive in detecting myocardial diastolic dysfunction by TEE in the perioperative setting with its dynamic changes of loading conditions.

References:
(1) Ebrahimi F. et al., JCVA, 33(4); p1014-1021
(2) Ebrahimi F. et al., JCVA, 35(1); p216-221
(3) Nagueh, S.F. et al., JASE, 29(4); p277-314

Topic: 04 - Cardiopulmonary Bypass & ECMO

OC.02

The HEPDOSE pilot study: the use of the PRODOSE algorithm to reverse the effects of the administration of initial high dose unfractionated heparin.

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Introduction: Objectives: The use of the individualised, pharmacokinetic PRODOSE algorithm for reversing unfractionated heparin (UFH) after cardiopulmonary bypass (CPB) demonstrated a 36% protamine dose reduction compared with the standard regimen (1 mg protamine / 100U pre-CPB heparin) without increased bleeding (1). We aimed to investigate the validity of this algorithm when used on 3 different initial UFH doses.

Methods: Design: Prospective study

Setting: Tertiary care cardiac centre

Participants: 60 elective adult patients undergoing cardiac surgery on CPB

Interventions: After ethics approval, 60 well matched patients were allocated into three groups to receive an initial dose of 300, 400 or 500 IU per kilogram of UFH prior to the commencement of CPB. Sampling was performed after induction of anaesthesia, and after heparin reversal with protamine using the PRODOSE algorithm. Samples were analysed for the ratio of ROTEM CT INTEM / HEPTEM (I:H CT ratio) anti-Xa levels.

Results: Measurements and Main Results: The total mean administered heparin dose in the 300IU/kg, 400IU/kg and 500IU/kg groups were 39,975 (36,528-43,421) IU, 43,195 (36,940-49,449) IU and 47,900 (44,807-50,992) IU, respectively (p=0.039). There was no difference in baseline I:H CT ratio (p=0.16) or anti Xa levels (p=0.13) between the groups. The protamine:heparin ratio for reversal post CPB was 0.6 in all three groups. After reversal the I:H CT ratio was 0.997 (0.866-1.02) in the 300U/kg group, 1.038 (0.969-1.042) in the 400U/kg group and 1.03 (0.979-1.063) in the 500U/kg group (p=0.16). There was no statistically significant difference between pre-heparin and post-reversal I:H CT ratio in any of the groups. There was no significant difference in anti-Xa levels (p=0.270) between the groups. There was no difference in overall 24-hour blood loss (p=0.68) or packed red blood cell transfusion (p=0.922).

Discussion: Conclusion: A primary outcome of an I:H CT ratio of < 1.25 is indicative of complete heparin reversal after CPB. Our study shows that using the PRODOSE pharmacokinetic algorithm to calculate the required protamine dose is feasible and safe over a broad range of pre-CPB heparin doses. This is supported by the secondary outcomes of similar anti Xa levels, blood loss and blood usage in all three groups.

References:

1 Miles LF, Burt C, Arrowsmith J, McKie MA, Villar SS, Govender P, et al. Optimal protamine dosing after cardiopulmonary bypass: The PRODOSE adaptive randomised controlled trial. PLoS Med [Internet]. 2021;18(6):1−16. Available from: http://dx.doi.org/10.1371/journal.pmed.1003658

Topic: 02 - Perioperative & Intensive Care Medicine

OC.03

Enhanced Recovery after Elective Cardiac Surgery; a focus on Key Performance Indicators

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Introduction: Enhancing recovery after surgery (ERAS) programmes have been widely practised across surgical disciplines for >20 years (1), and recently the field of cardiac surgery has also benefitted from evidence-based ERAS recommendations (2). However, these broad guidelines do not provide a detailed, prescriptive account on managing immediate post-operative cardiac surgical patients in the intensive care unit (ICU), when several key milestones of the initial recovery phase take place. Swift progression through these milestones is essential to enhance recovery and hasten ICU discharge (3).

As part of the local ERAS protocol at Royal Papworth Hospital, UK's highest-volume centre for cardiac surgery, time-directed goals, based on the experience of senior cardiothoracic intensivists, are used to encourage swift movement of patients through the unit and onto the surgical ward. However, delays in this process have anecdotally been observed. Here we aim to quantify the duration and nature of these delays, by presenting monthly summary data from a three-month observation period.

2. Engelman DT, Ben Ali W, Williams JB, et al: Guidelines for Perioperative Care in Cardiac Surgery: Enhanced Recovery After Surgery Society Recommendations. JAMA Surg American Medical Association, 154:755−66, 2019

3. Ramos dos Santos PM, Aquaroni Ricci N, Aparecida Bordignon Suster, et al: Effects of early mobilisation in patients after cardiac surgery: a systematic review. Physiotherapy Elsevier, 103:1−12, 2017

Topic: 16 - Paediatric Cardiac Anaesthesia and ICU

OC.04

Comparison of post-thoracotomy pain management methods: direct intercostal local analgesia versus erector spinae plane block (ESP block)

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Introduction: To compare pain management methods after thoracotomy in congenital cardiac surgery, while promote the usage of pain scales in everyday practice

Methods: Patients undergoing congenital cardiac surgery with thoracotomy were enrolled in our ongoing study. Two groups were created, the first who received continuous infiltrative intercostal local analgesia through a cannula placed in the surgical wound, while the second received continuous erector spinae plane block infiltration through a cannula inserted postoperatively. Their pain was assessed using a variety of pain scales adjusted to their age. The efficacy of the different methods was measured via the necessity of additional pain relief medication, postoperative dyspnea and the presence of atelectasis.

Results: 29 patients have been enrolled so far, 10 of them received ESP block and the remaining patients had intercostal cannulae inserted. According to early results compared against the control group of previous cases, all the examined patients required less or no opioid pain medication, and low numbers of postoperative dyspnea and atelectasis were observed. Hardship was experienced in regard to the application of different pain scales, which required further adjustment during the study.

Discussion: Post-thoracotomy pain management is crucial for early rehabilitation. Proper pain relief not only elevates patients' quality of life but it also decreases the number of days spent in high-cost intensive care, thus shortening the hospital stay. Even though the study has not yet concluded it can

Methods: Since December 2022, ICU nurses filled a short electronic form for each post-operative patient, detailing: when a key performance indicator (KPI), (i.e. sedation turned off, spontaneous breathing noted, extubation, first successful oral intake, successful mobilisation, removal of surgical drains, deemed medically fit for ICU discharge, actually discharged to the ward) occurred; whether there was a delay in meeting each of these performance indicators, relative to local guidelines; and why such a delay occurred. A delay was considered as such if the time to meet a KPI exceeded the target (1,2,4,6,12,24 hours respectively) by >30 min.

Results: The total caseload over the three-month periods (Dec 22 − Feb 23) remained ~100 cases per month. None of the 8 KPIs were reliably met throughout the entire period, with median times to reach each KPI in excess of the desired targets. However, in Dec 22 and Jan 23, >50% of patients were medically fit for ICU discharge within 24 hrs of ICU admission.

In Feb 23, the most obvious pattern was drowsiness leading to delays in extubation (62%) and oral intake (73%). Excessive bleeding accounted for the majority of delays in surgical drain removal. Delays in ICU discharge were mostly attributed to the post-operative surgical ward being delayed in accepting patients.

Discussion: It is important to meet KPIs promptly to optimise recovery. In our setting, targeting patient drowsiness via altering anaesthetic protocols were instituted. The method described here will provide a useful way to continually monitor the effect of such ERAS interventions in the future, and could be emulated by any institution, to hone localised protocols.

References:

1. Ljungqvist O, Scott M, Fearon KC: Enhanced Recovery After Surgery: A Review. JAMA Surg American Medical Association, 152:292−8, 2017

be confidently said that both types of regional analgesia introduced are useful compared to our control group. It is more challenging for anaesthesiologists to introduce ESP block in younger patients, but if inserted correctly in both infants and older children its efficacy might surpass local surgically inserted cannulas. On the other hand, the time and experience required to surgically introduce the above-mentioned device is much less. The selected pain scales could be helpful, but especially in infants it is often hard to objectively quantify the severity of postoperative pain. To effectively use these pain scales the observers must have a great amount of experience in treating critically ill infants and children.

References:

1 Alfonso Fiorellia, Anna Cecilia Izzoa, Elisabetta Maria Frongilloa, Assunta Del Pretea, Giovanni Liguorib, Emilio Di Costanzoc, Giovanni Vicidominia and Mario Santini: Efficacy of wound analgesia for controlling post-thoracotomy pain: a randomized double-blind study

2 Fang-Fang Liu, Xiao-Ming Liu, Xiao-Yu Liu, Jun Tang, Li Jin, Wei-Yan Li, Li-Dong Zhang: Postoperative continuous wound infusion of ropivacaine has comparable analgesic effects and fewer complications as compared to traditional patient-controlled analgesia with sufentanil in patients undergoing non-cardiac thoracotomy

3 Alexandra Beltramini, MD; Kolia Milojevic, MD; and Dominique Pateron, PhD: Pain Assessment in Newborns, Infants, and Children

Topic: 13 - Echocardiography

OC.05

The characteristics of Left atrial longitudinal strain in patients with cryptogenic stroke using Speckle Tracking Echocardiography- A case control study

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Introduction: Background: A significant percentage of ischemic strokes classified as cryptogenic stroke (CS) where the definition is varied according to the type of classification used. Left atrial (LA) function has a role in determining the possible cardio-embolic source of stroke. Using speckle tracking transthoracic echocardiography (TTE) we can detect the early changes in left atrial function by measuring left atrial longitudinal strain (LALS)
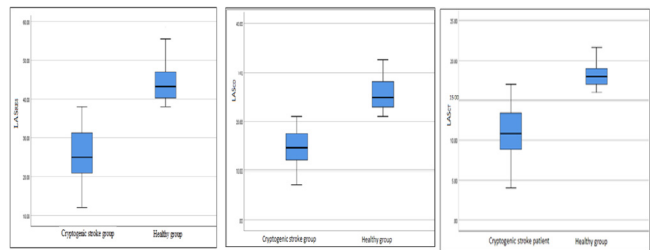
Aim: To evaluate the left atrial stain in patients with a cryptogenic stroke as compared to a healthy papulation

Methods: Method and results: We recruited 50 cryptogenic ischemic stroke patients with mean age of 44.7 years and 50 % were male who treated consecutively as for first CS, and 50 age-and sex-matched healthy stroke-free controls. Using Speckle tracking TTE analysis we measured the global, passive and active longitudinal LA strain corresponding to the reservoir (LASRES), conduit(LASCD), and contractile function (LASCT),respectively in addition to standard other LA parameters and filling pressure parameters of Left ventricle(LV) in both group. Data were compared using t-test and Mann-Whitney test.

Results: Cryptogenic stroke patients as compared with controls had significantly reduced value of all components of LALS [Mean value of LASRES, LASCD and LASCT in CS group versus control group were 25.15 ± 6.79 versus 43.95 ± 4.62 (P-value <0.01), 14.41 ± 3.53 versus 25.68 ± 3.30 (P-value <0.01), 10.73 ± 3.35 versus 18.28 ± 1.60 (P-value <0.01) respectively] (Figure 1). There were no significant diffrences in means of LA area and LA volume index in both groups (P value >0.05). Between parameters of LV filling pressures, it was noticed that early diastolic transmitral flow velocity (E) and early diastolic velocity at annulus (E') were statistically lower in CS patients as compared to control group (P-value <0.01). In addition the Cluster and Discriminant analysis used confirmed that LASRES, LASCD and LASCT were significantly lower in value in cryptogenic stroke patients in comparison to Control group which can be used to detect early LA dysfunction.

Discussion: Conclusion: LA longitudinal strain in all components were significantly impaired in patients with CS. Measuring LALS parameters can be useful in determining early LA dysfunction in cryptogenic stroke patients.

References:

Hindricks G, Potpara T, Dagres G, et al. 2020 ESC guidelines for the diagnosis and management of atrial fibrillation developed in collaboration with the European Association of Cardio-Thoracic Surgery. Eur Heart J. 2020;00:1−125.

Topic: 06 - Vascular Anaesthesia & Surgery

OC.06

The effect of carotid endarterectomy on cognitive function regarding cerebral hypoperfusion

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Introduction: There is no consensus in the literature regarding the effect of the change in cerebral oxygenisation 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.

Methods: From April 2020. to November 2021. we managed to enroll 88 patients undergoing carotid endarterectomy at Városmajor Heart and Vascular Center, Semmelweis University, Budapest. The surgeries were performed under general anaesthesia. Cerebral tissue saturation (rSO2) was monitored during the entire procedure by NIRS (Somanetics Invos 4000). The maximum desaturation during the clamping period (compared to the median of the 2-minute-long preclamping period) was calculated postoperatively. Patient's cognitive evaluation for general cognitive impairment detection included the Mini-Mental State Examination (MMSE) and Montreal Cognitive Assessment (MoCA) supervised by the same physician. Cognitive evaluation started preoperatively, the next survey was scheduled at three months after the surgery. A decrease or an increase in the test scores with a minimum of the standard deviation of the results of the preoperative test or more (MMSE: 1.79, MoCA: 2.28) was considered as a change in the cognitive function.

Results: All 88 patients (53 men, mean age of 70.18± 7.38 years, Vasc. Possum: 19.10±3.47, 53 EEA) were asymptomatic. Complications occurred in two patients, out of whom one developed postoperative bleeding requiring surgery and one developed neurological complication (TIA) during the postoperative hospitalization.

All the patients completed the MMSE (median 29,IQR: 27.25-30) and the MoCA tests (median 28, IQR:26-29) preoperatively. Three months after the operation 80 patients completed the tests (MMSE: median 29,IQR:28-30, MoCA: median 27, IQR:25-28).

The maximum cerebral desaturation correlated significantly with the change in the cognitive function, confirmed by the MoCA test (p:0.001, Spearman rho:-0.706.)

Analyzing the relation between the lowest rSO2 values and the change in the MoCA scores, we found statistically significant but weaker correlation (p: 0.001, R: 0.519).

According to ROC analysis we identified a cut-off of 15.94% decrease of regional cerebral tissue saturation as a threshold for potentially harmful degree of desaturation regarding cognitive function with the sensitivity of 84.4%, specificity of 79.2%.

Analysing the ROC curve in point of the cognitive improvement proved by the MoCA test, we found a cut-off of 12.65% with a sensitivity of 69.2%, specificity of 71.6%.

Using logistic regression there was a significant relation between the improvement of cognitive function proved by the MoCA test and the time of the cross-clamping period (p: 0,021), the lowest rSO2 values (p: 0,05) and the percentage change of cerebral tissue saturation (p:0,004).

Discussion: Our results confirm, that NIRS can have an important role in patient safety during carotid endarterectomy. Preventing remarkable desaturation has a crutial importance in point of the safety of cognition. These results suggest that the percentage change from a baseline has greater relevance than absolute values.

References:

M. Jonsson, D. Lindström, A. Wanhainen, K. Djavani Gidlund, P. Gillgren. Near Infrared Spectroscopy as a Predictor for Shunt Requirement During Carotid Endarterectomy. Eur J Vasc Endovasc Surg (2017) 53, 783e791

Topic: 01 - Anaesthesia Techniques

OC.07

PECS II BLOCK AS PART OF MULTIMODAL ANALGESIA FOR MINIMALLY INVASIVE CARDIAC SURGERY WITH CARDIOPULMONARY BYPASS – A TRIPLE-BLINDED, RANDOMIZED, CONTROLLED TRIAL

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Introduction: Minimally-invasive, on-bypass cardiac surgery (MIC) through a unilateral mini-thoracotomy is increasingly

popular but associated with high levels of postoperative pain, opioid consumption and opioid-associated side effects. Enhanced Recovery After Surgery (ERAS) protocols as multimodal, multidisciplinary perioperative care approaches are aimed to improveme clinical outcomes and cost savings.1 Opioid-sparing pain management by additional regional analgesia is a cornerstone of ERAS, but the evidence for its usage in cardiac surgery is scarce.2 The PECS II block a interfascial plane block, provides good analgesia to the hemithorax, by depositing involves depositing local anesthetics between (1) pectoralis major and pectoralis minor muscles and (2) pectoralis minor and serratus anterior muscles, at the levels of the third rib.3 This study aimed to elucidate whether adding a PECS II block to conventional multimodal analgesia improves opioid consumption, pain, and quality of recovery, and could therefore be part of an ERAS.

Methods: After approval by the ethics committee, patients scheduled for MIC were randomized between ultrasound-guided, preoperative unilateral PECS II block with ropivacaine 0.5% vs. placebo (saline). Patients, practitioners and data collectors were blinded to the intervention drug; a standardized multimodal analgesic protocol was applied to all patients. Numerical rating scores (NRS), analgesic consumption and the Overall Benefit of Analgesia Score (OBAS) were collected at different time points up to 24 hours postoperatively, and compared between groups.

Results: 57 patients were included (ropivacaine n=28, vs. placebo n=29). Block performance (after central venous access) took 5±2.5 minutes. Patients in the ropivacaine group had significantly lower morphine milligram equivalents (MME) during the first 24 hours after extubation (median (interquartile range): 4.2 (2.1-7.6) vs 8.3 (4.2-15.7) mg, p=0.016). NRS at extubation was lower in the ropivacaine group (0.0 (0.0-2.0) vs 1.5 (0.3-3.0), p=0.041). Non-opioid analgesic consumption was similar. The OBAS was, by trend, improved in the ropivacaine group (4.0 (3.0-6.0) vs. 7.0 (3.0-9.0), p=0.082). (Table 1)

Discussion: The addition of PECS II block to conventional, opioid-based multimodal analgesia protocols is a simple, yet effective measure to optimize opioid consumption, pain relief and side effect profile in patients undergoing minimal invasive cardiac surgery.

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1 Engelman DT, Ben Ali W, Williams JB, Perrault LP, Reddy VS, Arora RC, Roselli EE, Khoynezhad A, Gerdisch M, Levy JH, Lobdell K, Fletcher N, Kirsch M, Nelson G, Engelman RM, Gregory AJ, Boyle EM. Guidelines for Perioperative Care in Cardiac Surgery: Enhanced Recovery After Surgery Society Recommendations. JAMA Surg. 2019 Aug 1;154(8):755-766. doi: 10.1001/jamasurg.2019.1153. PMID: 31054241.
2 Kelava M, Alfirevic A, Bustamante S, Hargrave J, Marciniak D. Regional Anesthesia in Cardiac Surgery: An Overview of Fascial Plane Chest Wall Blocks. Anesth Analg. 2020 Jul;131(1):127-135. doi: 10.1213/ANE.0000000000004682. PMID: 32032103.
3 Hussain N, Brull R, McCartney CJL, Wong P, Kumar N, Essandoh M, Sawyer T, Sullivan T, Abdallah FW. Pectoralis-II Myofascial Block and Analgesia in Breast Cancer Surgery: A Systematic Review and Meta-analysis. Anesthesiology. 2019 Sep;131(3):630-648. doi: 10.1097/ALN.0000000000002822. PMID: 31408448.

Keywords: 11

Topic: 02 - Perioperative & Intensive Care Medicine

OC.08

Multimodal prehabilitation improves short-term post-transplant outcomes while not increasing costs for heart transplant recipients

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Characteristic	Group Assignment		
	Placebo, N = 29[1]	Ropivacain, N = 28[1]	p-value[2]
Milligrams of Morphine Equivalent after Extubation 0-24h (mg)	8.3 (4.2, 15.7)	4.2 (2.1, 7.6)	0.016
Numerical Rating Scale (NRS) at Extubation	1.5 (0.3, 3.0)	0.0 (0.0, 2.0)	0.041
NRS at 2h	1.0 (0.0, 2.8)	1.0 (0.0, 1.5)	0.3
NRS at 4h	1.0 (0.0, 2.5)	1.0 (0.0, 1.8)	0.8
NRS at 6h	1.0 (0.0, 2.2)	0.5 (0.0, 1.0)	0.090
NRS at 12h	1.0 (0.0, 2.5)	1.0 (0.0, 2.0)	0.5
NRS at 24h	3.0 (1.0, 4.0)	2.0 (1.3, 3.0)	0.7
Paracetamol 0-24h (mg)	2,000.0 (1,000.0, 2,000.0)	2,000.0 (1,000.0, 3,000.0)	0.6
Metamizole 0-24h (mg)	2,000.0 (1,000.0, 2,000.0)	2,000.0 (1,000.0, 2,000.0)	0.4
Overall Benefit of Analgesia Score (the lower, the better)	7.0 (3.0, 9.0)	4.0 (3.0, 6.0)	0.082

[1] Median (IQR)
[2] Wilcoxon rank sum test

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Introduction: Limited aerobic capacity, low exercise tolerance, and frailty are highly prevalent in patients awaiting heart transplantation (HT) and tightly related to negatively impacting postoperative outcomes and healthcare resource consumption. Prehabilitation (prehab) has shown efficacy in improving functional status and preventing postoperative complications in selected high-risk surgical populations. However, the implementation of these programs feasibility and efficacy has not been evaluated in advanced heart failure patients. Prehab could be health resource-consuming and represent an economic burden. This study aimed to investigate the impact of prehab on HT postoperative outcomes and to evaluate the cost-effectiveness of a multimodal prehab program for HT candidates.

Methods: Single-centre, ambispective cohort study including forty-six candidates for elective HT from 2017 to 2021 attending a multimodal prehab program (intervention) consisting of supervised exercise training, physical activity promotion, nutritional optimization, and psychological support. The postoperative outcomes and total cost of the prehab program (n=31) were compared with a group of twelve contemporaneous patients who did not join the program and those transplanted from 2014 to 2017 before the implementation of the program (n=51).

Main postoperative measured outcomes: Comprehensive Complication Index (CCI), mechanical ventilation time, total hospitalization and intensive care length-of-stay, destination at discharge (home vs. rehabilitation facility), hospital readmissions at 30 days, and mortality at 30-days, 3-months, and 1-year.

A prehab program cost analysis was performed. Healthcare use included HT surgical procedures, direct hospitalization (until discharge), and prehab costs. Data were obtained through micro-costing techniques according to resource use, combined with diagnostic-related centre-specific hospital fees. A bootstrapping approach was performed to control the skewness of the distribution.

Results: Thirty-one prehab patients underwent HT. Their postoperative outcomes were compared to the previously described control group.

Significant improvements were observed in functional capacity (endurance time: 293 vs. 632s, p<0.001) and quality-of-life (Minnesota score: 58 vs. 47, p=0.046) after prehab. No exercise-related events were registered. Five candidates were eventually removed from the waitlist due to significant functional capacity improvement after prehab.
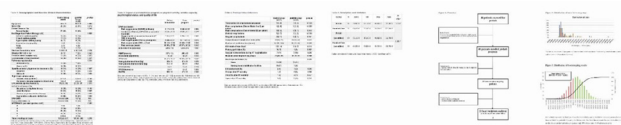
Prehab cohort showed a lower rate and severity of postoperative medical complications (CCI 37 vs. 31, p=0.033), lower mechanical ventilation time (37 vs. 20 hours, p=0.032), ICU stay (7 vs. 5 days, p=0.01), total hospitalization stay (23 vs. 18 days, p=0.008) and less need for transfer to nursing/rehabilitation facilities after hospital discharge (31% vs. 3%, p=0.009).

The mean cost per prehab program patient was 2,195€ mainly driven by supervised exercise training (1,971€). The healthcare-related mean cost for the HT index hospitalization, including the cost of the prehab program, did not show differences between groups (prehab: 56,503€ vs. control: 66,556€; p=0.12). The difference in costs was only statistically significant when removing the outliers from the analysis.

Discussion: Our findings support the beneficial impact of a multimodal prehabilitation intervention in the short-term postoperative outcomes of HT recipients without increasing direct healthcare costs, which may be interpreted as evidence of higher value for money (cost-effective intervention).

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Topic: 16 - Paediatric Cardiac Anaesthesia and ICU

OC.09

IMPROVING TRANSFER AND HANDOVER PROCESS OF INTUBATED PAEDIATRIC CARDIAC PATIENTS BETWEEN THE OPERATING THEATRE AND PAEDIATRIC INTENSIVE CARE UNIT PATIENTS - A QUALITY IMPROVEMENT PROJECT

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Introduction: Transfer and handover of intubated paediatric cardiac patients between the Operating theatre (OT) and Intensive Care Unit (PICU) is a highly complex process. Lack of transfer workflow and inadequate handover process can lead to many adverse events.

The aim of our quality improvement project was to standardize the transfer workflow and handover documentation process of intubated postoperative paediatric cardiac patients between the OT and PICU.

Methods: We registered the "Safe transfer and handover of intubated paediatric patients after cardiac surgery" as a Quality Improvement Program with the hospital.

Baseline data analysis over the past year at our hospital revealed inadequate documentation and lack of proper handover process resulting in two incidents of missing or duplication of medications. A baseline survey done among our Paediatric Cardiac OT and PICU staff revealed dissatisfaction over the transfer process and handover documentation.

The quality improvement team led by the Paediatric Cardiac Anaesthesiologist included doctors from Cardiac Surgery, PICU and Nurses from Anaesthesia, OT and PICU. The team audited the existing transfer and handover processes over one month (20-point Audit safety checklist). None of the handovers passed this audit. The team then brainstormed over several meetings and evaluated for possible causes of this suboptimal transfer and handover. A cause-and-effect Fishbone Diagram was used to analyse the various issues at staff, patient, system and equipment levels. The Pareto Chart revealed three main reasons for suboptimal handover: 1) Absence of a structured transfer process and standardized handover form 2) Absence of equipment checklist and 3) Lack of awareness of importance of safe handover among the staff. Specific intervention per cause was then introduced at monthly intervals and closely audited using the Plan Do Study Act (PDSA) cycle. Interventions included implementation of a standardized transfer workflow and handover form, an equipment checklist to ensure proper functioning of equipment while transferring and conduct of education sessions for equipment training and the new transfer workflow and handover process.

Results: Forty handovers were audited over the 6-month period. All the 4 patient handovers audited at baseline prior to introduction of the quality improvement project failed the 20-point audit checklist for a safe transfer and handover. Compliance to the transfer workflow and standardized handover documentation improved from 0 to 100% one month after implementation of the project. However, it dropped to 90.9% and 60 % in the 3rd and 4th month respectively. Implementation of vendor training for anaesthesia staff improved safe

Figure 1: Interventions during the Quality Improvement Program

PROBLEM	INTERVENTION
Lack of transfer workflow and handover checklist	Standardise Transfer workflow and Handover Form
Lack of Equipment Checklist	Equipment Checklist
Lack of awareness of importance of Handover	Conduct of Education sessions

Figure 3: Percentage of Safe Handovers between Operating Theatre and PICU

Figure 2:

PICU Handover Checklist (Cardiac)	
Patient info	Name
	IC
	Drug allergies
	Age
	Weight
	Isolation required
Medical History	Comorbids, preop echo,
Surgery	
Airway	ETT (size, marking at lip)
	Laryngoscopy grade
Ventilation	PIP
	PEEP
	FiO2
	RR
Lines	IV (size, site)
	IA (size, site)
	CVC (size, site)
	Others (Vascath/PAC)
Antibiotics	Drug (dose)
CPB	CPB time (min)
	AXC time (min)
	Circ arrest time (min)
	CPB issues if any
Pacing	Mode (VVI/DDD/AAI)
	Intrinsic rhythm
Intraop	Haemodynamics
	Arrhythmias
	Coagulopathies
Drug infusions	Adr/ Noradr/Dobut/Others Sedation /Analgesic
Blood products	PRBC (units)
	Blood products
Urine output	Pre-bypass (ml)
	Post-bypass (ml)
Intraop TEE if done	EF/valves/others
Others	IABP/iNO/chest open
	LVAD/ECMO
Vitals at transfer	BP/HR/Spo2
Surgical issues	Technical
	Expected ICU problems
	Trigger for surgeon
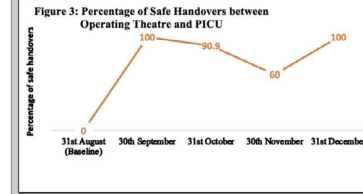
transfers and handovers to 100% in the subsequent months. The level of staff satisfaction improved from 48% to 90% after all interventions were instituted.

Discussion: Implementation of a transfer workflow and standardized handover forms are important to ensure staff compliance. It enables a safe transfer process and avoids any missing data during handover. It also improved staff satisfaction for transferring intubated paediatric patients between operating theatre and PICU.

References:

1 Alali H et al.Improving physician handover documentation process for patient transfer from paediatric intensive care unit to general ward. BMJ Open Quality 2020;9:e001020.

Topic: 10 - Haemostasis

OC.10

HEPARIN REVERSAL WITH TWO PROTAMINE-HEPARIN RATIOS AFTER CARDIOPULMONARY BYPASS. A RANDOMIZED CONTROLLED PILOT FEASIBILITY STUDY.

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Introduction: Protamine use for heparin reversal following cardiac surgery may be associated with adverse events, while protamine excess may have an additional anticoagulant effect.[1] There is no consensus on the appropriate protamine: heparin ratio despite the trend towards using a lower reversal ratio than 1:1.[2] The present pilot study aimed to compare the feasibility of using two low ratios (0.6:1 vs. 0.8:1) of total calculated heparin dose regarding the Activated Clotting Time (ACT), viscoelastic assays (Clot-Pro®), and clinical hemorrhage for the planned randomized controlled study.

Methods: Following ethical approval, 27 patients undergoing elective cardiac surgery with cardiopulmonary bypass were randomized to receive an initial protamine dose in a ratio of 0.6:1 (11 patients) or 0.8:1 (16 patients) of the total calculated heparin dose used. ACT value and Clot Pro® tests were recorded before surgery and after administering the initial and subsequent reversal doses. Subsequent 25mg boluses of protamine were administrated in case of ongoing clinical hemorrhage or identified heparin excess measured with plasma heparin concentration. Cumulative 24-hour blood loss, packed red blood cells (PRBCs), platelets (PLT), fresh frozen plasma (FFP), prothrombin concentrate complex (PCC), and fibrinogen administrated, guided by the Clot Pro® results, were recorded.

Results: Compared with the 0.8:1 ratio, patients in the 0.6:1 ratio group received less protamine and less PLT units intraoperatively (Table 1). The two groups were similar regarding the need for additional protamine (0% vs. 38%, p=0.07), heparin excess without clinical bleeding detected with Clot Pro® (18% vs. 44%, p=0.33), intraoperative and 24 postoperative hours in the transfused PRBCs, FFP, fibrinogen, and PPC (Table 1), postoperative ACT. One patient of the 06:1 group required re-operation for postoperative bleeding.

Discussion: Heparin reversal with a protamine: heparin ratio of 0.6:1 is feasible compared with a 0.8:1 ratio. Larger studies are needed to examine the efficacy and safety of the 0.6:1 ratio and the sensitivity and specificity of Clot Pro® 's compared with ACT.

References:

1 Boer C, Meesters MI, Veerhoek D, Vonk ABA. Anticoagulant and side-effects of protamine in cardiac surgery: a narrative review. Br J Anaesth. 2018;120(5):914-927.

Table 1. Perioperative data

	0.8:1 ratio (n=11)	0.6:1 ratio (n=16)	P value
Intraoperative transfusion requirements			
PRBC (Units)	2 [0 − 2]	1 [1 − 2]	0.816
FFP (Units)	0 [0 − 2]	0 [0 − 0]	0.493
PLT (Units)	5 [0 − 5]	0 [0 − 3]	**0.049**
Fibrinogen (gr)	2 [1 − 2]	0 [0 − 2]	0.09
PCC (n, %)	7 (63.64%)	13 (81.25%)	0.391
Total protamine (mg)	356.36(60.37)	285.93(71.35)	**0.013**
Viscoelastometry (ClotPro®)			
IN test CT 1 (n=27)	239.36(46.86)	218.37(40.17)	0.224
HI test CT 1 (n=27)	241.45(44.75)	217.12(36.25)	0.132
IN test CT 2 (n=4)	-	224.75(37.05)	-
HI test CT 2 (n=4)	-	226(41.57)	-
IN test CT 3 (n=1)	-	164	-
HI test CT 3 (n=1)	-	161	-
Postoperative 24-hour blood loss (ml)	420 [370 − 560]	350 [240 − 560]	0.265
Postoperative transfusion requirements (24-hour follow-up)			
PRBC (Units)	1 [1 − 2]	1 [0 − 2]	0.858
FFP (Units)	0 [0 − 1]	0 [0 − 0]	0.476
PLT (Units)	0 [0 − 1.5]	0 [0 − 0]	0.852
Fibrinogen (gr)	0 [0 − 0.5]	0 [0 − 0]	0.684
PCC (n, %)	2 (25%)	2 (14.29%)	0.602

Abbreviations: PRBC: packed red blood cells, FFP: fresh frozen plasma, PLT: platelets, PCC: prothrombin complex concentrate, CT: clotting time, IN test CT 1: after heparin H1, HI test CT 1: after heparin H1, IN test CT 2: after heparin H2, HI test CT 2: after heparin H2, IN test CT 3: after heparin H3, HI test CT 3: after heparin H3

2 Foubert R, Van Vaerenbergh G, Cammu G, Buys S, De Mey N, Lecomte P, Bouchez S, Rex S, Foubert L. Protamine titration to optimize heparin antagonization after cardiopulmonary bypass. Perfusion. 2022 Dec 11: 2676591221144702. doi: 10.1177/02676591221144702. Epub ahead of print

Topic: 05 - Thoracic Anaesthesia & Surgery

OC.11

Pulmonary artery wave intensity analysis in a pig model of lung resection

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Introduction: Increased afterload has been hypothesised as the cause for the decline in right ventricular (RV) function seen post-lung resection(1) . Our group's recent work using wave intensity analysis (WIA) has shown that there is evidence of increased wave reflection (a key component of pulsatile afterload) in the branch pulmonary arteries in patients post-lung resection(2). However, due to the limitations of cardio-vascular MRI (CMR) in this setting, the haemodynamic effects of these backward compression waves (BCWs) more proximally have yet to be established.

Methods: Data was collected from anaesthetised elderly pig during previous work undertaken at Cornell University, USA. Five control pigs had invasive haemodynamic data collected only and seven pigs underwent data collection three days after left upper lobectomy. Simultaneous pressure, flow and diameter data was collected using the Cardiometric Flocath (USA) from within the proximal pulmonary artery. WIA was performed post-hoc using Labchart software (ADInstruments, Australia).

WIA was conducted by calculating the product of the derivative of pulmonary artery pressure and velocity. Wave speed was calculated by the sum of squares method. The timing of peak forward compression wave (FCW), generated by the right ventricular contraction, and the peak reflected BCW were then identified. Wave reflection index (WRI (%)) was calculated as the ratio of the area of the BCW to the FCW. Groups were compared via Mann-Whitney test.

Results: One control subject was excluded from analysis due an artefactual pressure waveform prior to unblinding. One control subject did not exhibit a BCW. All times are divided by systolic time to allow comparison between subjects with differing heart rates and are expressed as mean (SD).

The timing of the BCW was earlier (0.37 (0.13) vs 0.70 (0.21), (p=0.03)) and the time between the FCW and BCW was reduced (0.26 (0.11) vs 0.60 (0.22), (p=0.02)) in subjects who underwent lobectomy compared with controls. However, WRI did not significantly differ between control and lobectomy groups 11.55% (12.24) vs 15.76% (11.27) respectively, (p=0.65).

Figure 1 -Box plot comparing the time to peak backward compression wave (BCW) divided by systolic time between lobectomy and control subjects.
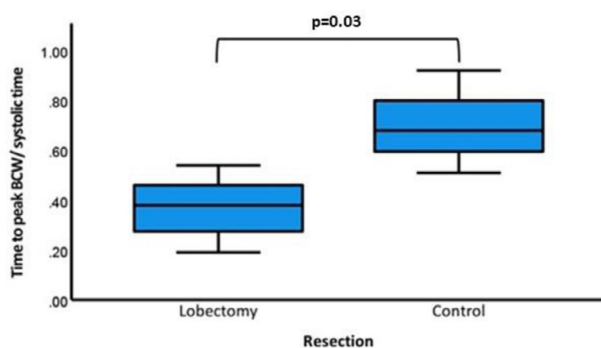
Discussion: In the main pulmonary artery of a pig model of lung resection there is evidence of the earlier arrival of wave reflection potentially from a more proximal reflection site. By combining CMR volume and flow measurements with same day invasive pressure data we now plan to investigate the effects of these waves on the RV function of post-operative patients with the aim of identifying targets for future preventative or therapeutic interventions.

References:

1 Shelley B, Glass A, Keast T et al. Br J Anaesth. 2023;130 (1):e66-e79.
2 Glass A, McCall P, Arthur A et al. Br J Anaesth. 2023;130 (1):e128-e36.

Topic: 07 - Heart and Lung Transplantation

OC.12

NEW ANESTHETIC CHALLENGES FOR NOVEL SURGI-CAL TECHNIQUE: INTRAOPERATIVE MANAGEMENT OF ROBOT-ASSISTED ONE LUNG TRANSPLANTATION.

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Introduction: Minimally invasive surgery has been gaining momentum lately. Amongst them, robot-assisted procedures have proved substantial benefits for the patients' recovery, however, they present important challenges for the anesthetic team. We present this case of a single lung transplantation completed under robot-assistance without thoracotomy. To our knowledge, this is the first ever case of such characteristics reported in the bibliography.

Methods: Our patient of 65-year-old with chronic end-stage idiopathic lung fibrosis was transplanted the right lung,

following our institution's protocol for lung transplantation under total intravenous anesthesia. The patient was placed in supine position, with an airbag under the right chest to facilitate chest exposure.

In preparing a multidisciplinary round, our team had decided to not go onto elective cardiopulmonary bypass (CPB) ab initio. Nevertheless, femoral artery and vein were dissecated in case of emergent requirement.

Results: The surgery could be completed without CPB or vasoactive drugs support. Furthermore, the receptor's diseased lung and the graft were removed and introduced respectively through a subxiphoid incision avoiding a thoracotomy, which significantly reduced the patient's perioperative analgesic requirements. At the end of an uneventful procedure, bronchus suture and vessel patency were assessed by bronchoscopy and transesophageal echocardiography respectively. The doble lumen tube was replaced with a single lumen one before transferring the patient to the ICU.

The patient was discharged from the hospital after 44 days. Remarkably, the absence of pain allowed effective pulmonary rehabilitation.

Discussion: Classical surgical approaches are not exempt from serious and even life-threatening complications. Clamshell incision, thoracotomies or medial sternotomy provide the surgeon with a good access to hilar structures; however, they are aggressive approaches with a high prevalence of wound complications such as delayed wound healing, acute and chronic pain, opioid abuse, or poor respiratory recovery. Moreover, in open surgery the heart and the superior vena cava must often be separated or compressed by the surgical team, which can cause hemodynamic alterations, lung congestion and cardiac arrythmias; thereby increasing the likelihood of needing extracorporeal circulatory support.

Robotic surgery, on the other hand, enhanced by subxiphoid access, can reduce these issues while enabling a better surgical view (through the robot-assisted retraction arm). This, in turn, minimizes hemodynamic instability. All of these advantages notwithstanding, from an anesthetic point of view it a clear strategy was required in order to prevent untoward events, in a situation where emergent central CPB instauration is impossible, hence the decision to dissect the groins in advance, and having large venous accesses. To conclude, if needed precautions are taken, this novel technique provides excellent hemodynamic stability, avoids the drawbacks of thoracotomies, and enables a more comfortable postoperative period for the patient.

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2 Jiao W, Yang R, Zhao Y, Ge N, Qiu T, Sun X, Liu Y, Li K, Li Z, Yu W, Qin Y, Liu A. Robot-assisted single lung transplantation. Chin Med J 2023;136:362−364.

Topic: 06 - Vascular Anaesthesia & Surgery

OC.13

Trends and outcomes in anaesthesia for peripheral vascular surgery in patients with known cardiac comorbidity in Denmark

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Introduction: Anaesthesia for infrainguinal vascular surgery comprises general anaesthesia (GA) and regional anaesthesia (RA), or a combination. RA seems to be associated with a better outcome, compared to GA.[1] This may be due to avoidance of positive pressure ventilation, hypotensive periods, and/or minimizing opioids and thus opioid related adverse events,[2] especially in patients with cardiac comorbidity. We expect most patients for peripheral vascular surgery to have cardiac comorbidity, but claudication may limit cardiac symptoms and lead to under-diagnosing in this group. We previously described the cohort of patients undergoing infrainguinal vascular surgery in Denmark from 1. January 2005 to 31. December 2017.[3] The aim of this retrospective secondary publication was to describe the trends in anaesthesia choice and corresponding outcome in the subgroup of patients with known cardiac comorbidity.

Methods: Patients were identified from the Danish Vascular Registry (DVR). Cardiac comorbidity was extracted from the National Patient Registry (NPR) and included valve disease, ischaemic heart disease, heart failure, arrythmias, and pulmonary hypertension. GA was defined as anaesthesia with mechanical ventilation. The type of anaesthesia was extracted from the Danish Anaesthesia Database, and anticoagulant medication data from the Danish National Database of Reimbursed Prescriptions. Outcome data was retrieved from DVR and NPR and included postoperative complications (cardiac, pulmonary, renal, and need of intensive care therapy) and 30-day mortality. The frequency of each anaesthesia method was depicted over time. The odds ratios (OR) of medical complications and 30-day mortality after GA vs RA were calculated using logistic regression models.

Results: We identified 4080 patients in the GA group and 2222 in the RA group. We found an increasing use of GA

Figure 1
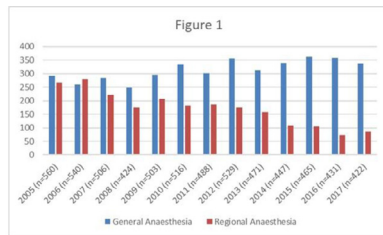
Table 1				
Variable	Level	General anaesthesia (n=4080)	Regional anaesthesia (n=2222)	p-value
Age	Median age [iqr]	73 [66, 79]	74 [68, 80]	< 0.001
Sex	Male (%)	2527 (61.9)	1415 (63.7)	0.018
ASA	ASA <3 (%)	1723 (42.2)	1166 (52.5)	< 0.001
Admission	Elective (%)	2604 (63.8)	1729 (77.8)	< 0.01
Cardiac comorbidity	Valvular disease (%)	465 (11.4)	217 (9.8)	0.051
	Pulmonary hypertension (%)	116 (2.8)	51 (2.3)	0.226
	Ischaemic heart disease (%)	1834 (45.0)	999 (45.0)	1.00
	Cardiac insufficiency (EF<50%) (%)	465 (11.4)	217 (9.8)	0.051
	Tachycardia (%)	182 (4.5)	85 (3.8)	0.258
	Bradycardia (%)	1070 (26.2)	536 (24.1)	0.071
Anticoagulation	Daily use of anticoagulation (%)	1870 (45.8)	630 (28.4)	< 0.001
Morbidity	One or more medical complications (%)	387 (9.7)	136 (6.2)	< 0.001
Mortality	30-day mortality (%)	244 (6.0)	75 (3.4)	< 0.001

during the 13-year period, and a corresponding decrease in the use of RA (Fig 1). Demographics and unadjusted outcome are presented in Table 1. After statistical adjusting for baseline differences, including use of anticoagulant medication and urgency of surgery, we found a significantly lower OR for medical complications (0.97 (0.95-0.98) and 30-day mortality (0.98 (0.97-0.99) after RA compared with GA.<FILE

Discussion: During the 13-year period, the use of GA for infrainguinal vascular surgery increased and RA declined. This may be caused by various factors, i.e., a general change of culture towards preferring GA, maybe due to a busy operating schedule. Based on the present results, we recommend reconsidering anaesthesia strategy, and using RA, when possible. Among patients with cardiac comorbidty, RA was associated with a lower incidence of medical complications as well as a lower 30-day mortality, compared with GA. The reason for this is unclear and should be evaluated in future large prospective trials.

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Topic: 04 - Cardiopulmonary Bypass & ECMO

OC.14

In-Vitro Investigation of Insulin Dynamics During Four Hours of Simulated Cardiopulmonary Bypass

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Introduction: Hyperglycaemia is common during cardiac surgery with cardiopulmonary bypass (CPB), both in patients with and without diabetes. Correction of hyperglycaemia with insulin administration reduces hospital complications and decreases mortality in cardiac surgery patients. Experience shows that more insulin is required while on CPB than in other surgeries with similar levels of metabolic stress. We hypothesize that intraoperative hyperglycaemia may be, at least partially, attributable to insulin deficiencies due to adhesion on CPB surfaces and/or degradation by haemolysis. Thus, we investigated in an in-vitro model how insulin levels change in an isolated running extracorporeal circulation (ECC) system.

Methods: In an in-vitro experiment, extracorporeal bypass pumps were running with red packed blood cells (PBC) and thawed fresh-frozen plasma (FFP) (n=12), the arterial and venous tubing were directly connected. PBC were washed before in a cell salvage system to remove haemolysis products. In six experiments, a mini-ECC (MiECC) with centrifugal pump was used, in six experiments we used a conventional ECC with roller pump. Additionally, we run one conventional ECC with FFP only. Before adding human insulin (Actrapid®), we verified no insulin was present in the blood using a human-insulin specific electrochemiluminescence immunoassay (Elecsys Insulin, Cobas 8000, Roche Diagnostics). The circuit was set to an output of 3.5L/min for 4h. The first hour was run at normothermia (36°C), followed by two hours of mild hypothermia (32°C), followed by a final hour of normothermia. Insulin levels were measured hourly, alongside with the estimation of haemolysis and compared to baseline. A haemolysis index (HI) of 100 (arbitrary units) approximately corresponds to 100 mg/dl haemoglobin.

Results: In the MiECC, insulin decreased from 315±72 mU/l measured ten minutes after start to 144±73 mU/l after 4h, which corresponds to a -63±11% (p<0.01) drop (figure). In the ECC insulin dropped from 249±45 mU/l ten minutes after start to 21±7 mU/l after 4h, corresponding to a 93±2% (p<0.01) decrease. Of note, the run only with FFP showed no decrease of insulin. HI in the MiECC increased from 53±13 to 76±16 after 4h (change=23±17, p=0.05). In the ECC HI changed from 145±69 to 192±71 after 4h, which corresponds
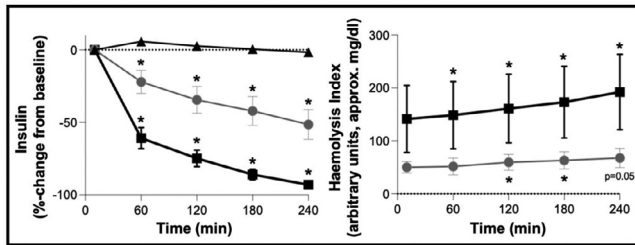
to an increase of 47±7 (p<0.01). HI and percent change of insulin showed an excellent relationship (r= -0.98, p<0.01).

Discussion: Preliminary in-vitro results show a decrease of insulin concentration over time in both ECC circuits. Our data suggests that the more pronounced loss of insulin in the conventional ECC circuit is likely caused by haemolysis rather than adhesion of insulin to the system. Our findings may have implications on glucose management while on CPB, as higher doses of insulin may be required in an ECC compared to a MiECC to correct hyperglycaemia.

Topic: 05 - Thoracic Anaesthesia & Surgery

OC.15

Feasibility of Right Ventricular Free Wall Longitudinal Strain Assessment of Contractile Reserve in Patients Undergoing Lung Resection

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Introduction: Lung cancer is the second most common cancer in the UK, frequently treated by lung resection. Lung resection is potentially curative, however it results in a burden of postoperative dyspnoea and functional limitation. Previous work by our group has shown that right ventricular (RV) function is impaired at day-2 and 2-months postoperatively [1]. Upon exercise, the normal physiological response is an increase in RV function; termed RV contractile reserve (CR). Previous studies using volumetric pulmonary-artery catheters

have suggested that RV-CR is impaired postoperatively and that this is associated with cardiopulmonary complications [2] (though their methodologies have since been challenged). RV free-wall longitudinal strain (RVFWLS) assessed by transthoracic echocardiography can identify subtle RV dysfunction and may be a superior non-invasive method of RV assessment. We examined the feasibility of RVFWLS assessment of RV-CR in patients undergoing exercise pre- and post-lung resection, hypothesising that RV-CR would be present preoperatively but impaired postoperatively.

Methods: With ethical approval (RECref 17/EE/0134) and informed consent, seven patients undergoing lung resection underwent exercise stress echocardiography (semi-supine cycle ergometer with incremental workload) preoperatively and 2-months postoperatively. To assess RV-CR, we examined the relationship between the percentage of predicted maximal heart rate (ppHRmax: a measure of exercise intensity) and RVFWLS, and RVFWLS-rate. Tolerability was defined as the patient's ability to physically complete exercise testing at a given workload. Technical feasibility was defined as the percentage of echocardiography scans with images of adequate quality for RVFWLS analysis. Overall feasibility combined patient tolerability and technical feasibility. To assess presence of RV-CR we examined the association between ppHRmax and RVFWLS / RVFWLS-rate using analysis of co-variance (ANCOVA) to account for within-subject correlation.

Results: Preoperatively all patients tolerated exercise testing up to 45W, however at 60W two patients withdrew due to dyspnoea and knee pain. Postoperatively 6/7 patients tolerated exercise at 45W, but only 3/7 tolerated 60W. Technical feasibility was higher preoperatively than postoperatively, with 86% technical feasibility up to 45W preoperatively. There was high overall feasibility preoperatively (>86% at each workload) up to 45W, falling to 57% at 60W. Overall feasibility was poorer postoperatively, falling to 29% at 60W. ppHRmax was not associated with RVFWLS pre- or postoperatively (r=0.02, p=0.95 and r=0.16, p=0.58 respectively). RV-CR was observed preoperatively (significant association between ppHRmax and RVFWLS-rate), which was abolished postoperatively (r=0.58, p=0.03, and r=0.05, p=0.87 respectively).

Discussion: RVFWLS assessment of RV-CR in lung resection patients is highly feasible preoperatively, and well tolerated up to 45W workload. It is less technically feasible and tolerable postoperatively. RVFWLS did not identify RV-CR pre- or postoperatively. RVFWLS-rate demonstrated the expected RV-CR response preoperatively which was abolished postoperatively, suggesting loss of RV-CR and shows promise as a minimally invasive technique for assessment of RV-CR in the lung resection population. Future research is needed to examine whether impaired RV-CR (assessed by RVFWLS-rate) is associated with postoperative complications and/or functional limitation in this population.

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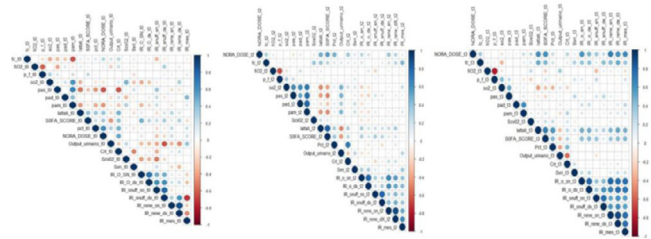
Topic: 02 - Perioperative & Intensive Care Medicine

OC.16

POLYDISTRECTUAL RESISTANCE INDEX EVALUATION IS AN ASSESSMENT OF VASCULAR COMPLIANCE IN PATIENTS WITH SEPTIC SHOCK TREATED WITH VASOPRESSIN

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Introduction: Surviving Sepsis Campaign recomends using Norepinephrine (NE) as the first-line vasopressor to restore mean arterial pressure. If mean arterial pressure remains inadeguate SSC suggests adding Vasopressin (VA).

Resistance Index (RI) is a Power Doppler ultrasound assessment of vascular compliance to detect organ perfusion.

Methods: Aim of this study is to compare RI in septic shock patients treated with NE (Group1),NE plus VA since the beginning of vasopressor therapy(Group2) and VA plus NE where VA is added if NE dosage was 20 mcg/min(Group3).

RI were measured in Renal Artery (ARE),Radial Artery (AR),Central Retinal Artery (CRA),Superior Mesenteric Artery (AMS) at three different time points (T0) before vasopressor therapy,(T1) at 1 hr,T2 at 24 hrs and T3 at 48hrs.

Results: 48 patients were divided into three groups.17 patients Group1;16 Group 2,15 Group3.

In Group 1 RI increased from T0 in CRA R[0,90 (0,57−1,12)] and ARE L[0,74(0,56-0,92) to T3 in CRA R [0,97(0,97−1,14)] and ARE L[0,96(0,82−1,17)]

In Group2 RI reduced in AMS, from T0[0,84(0.70,1.02)] to T3[0,75(0.59,0.81)],in CRA R, from T0[0,90(0.57,1.09)] to T3 [0,79(0.58, 0.87)],in CRA L,from T0[0,91(0.43,1.53)] to T3 [0,76(0.58, 0.89]and in ARE L,from T0[0,79(0.58, 0.92)] to T3[0,72(0.59, 0.83)].

In Group3 RI reduced in AMS, from t0[0,86(0.71,0.93)] to T3 [0,68(0.64,0.81)],in CRA R,from T0 [0,90(0.75,1.12)] to T3 [0,78(0.66,0.88)],in CRA L,from T0[0.96(0.76,1.33)] to T3 [0,96(0.76,1.33)],in ARE L,from T0[0.77(0.66, 0.99)]to T3 [0,67(0.61,0.85],in ARE R,from T0[0.82[0.64, 0.90)]to T3 [0.70(0.62,0.82)] and in AR R,from T0[1,10(0.81,1.30)] to T3 [0.87(0.64,1.22)].

Discussion: Resistence Index was singnificantly reduced in patients treated with early synergic administration of NE and VA .This strategy optimized multiorgan perfusion.

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Topic: 02 - Perioperative & Intensive Care Medicine

OC.17

ASSOCIATIONS OF INDIVIDUALIZED VERSUS CONVENTIONAL BLOOD GLUCOSE THRESHOLDS WITH ACUTE KIDNEY INJURY AFTER CARDIAC SURGERY: A RETROSPECTIVE OBSERVATIONAL STUDY

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Introduction: An adequate perioperative blood glucose target to optimize outcomes after cardiac surgery has not been

Table. Multivariable logistic regression analyses comparing the conventional and individualized blood glucose thresholds for defining intraoperative hyperglycemia

Figure. Box plots comparing intraoperative hyperglycemia metrics defined by conventional versus individualized blood glucose thresholds according to preoperative hemoglobin A1c level. (a) Area above the threshold, (b) Duration of hyperglycemia. Outliers were omitted from the plots.
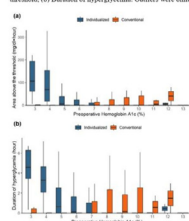
established. The aim of this study was to compare individualized versus conventional hyperglycemic thresholds in terms of the risk of acute kidney injury (AKI) after cardiac surgery.

Methods: This single-center observational study included adult patients who underwent cardiac surgery from January 2012 to November 2021. Two separate blood glucose thresholds were used to define intraoperative hyperglycemia. While the conventional hyperglycemic threshold (CHT) was 180 mg/dl in all patients, the individualized hyperglycemic threshold (IHT) was calculated based on preoperative hemoglobin A1c level in each patient: $28.7 \times$ HbA1c (%) $- 31.7$ (mg/dl). Various metrics of intraoperative hyperglycemia were calculated using these two thresholds: any hyperglycemic episode, duration of hyperglycemia, and area above the thresholds. To normalize the procedure time varied among patients, the duration of hyperglycemia and area above the blood glucose thresholds were divided by the time between the first and last intraoperative blood glucose measurements. The associations of the metrics defined based on the two thresholds with postoperative AKI were compared using a receiver operating characteristic curve and a multivariable logistic regression analysis. The primary outcome was AKI developed within seven days after surgery, which was defined based on the serum creatinine criteria of the Kidney Disease: Improving Global Outcomes criteria.

Results: Among 2,427 patients analyzed, 823 (33.9%) patients developed acute kidney injury after cardiac surgery. The c-statistics of IHT-defined metrics ($0.58-0.59$) were significantly higher than those of the CHT-defined metrics (all c-statistics, 0.54) in the DeLong's test (all P <0.001). Except for the presence of any hyperglycemic episode, the duration of hyperglycemia (adjusted odds ratio [OR], 1.10; 95% confidence interval [CI], $1.03-1.17$) and area above the threshold (adjusted OR, 1.003; 95% CI, $1.001-1.005$) defined based on the IHT were significantly associated with the risk of postoperative AKI. These two metrics defined using the IHT were still significantly associated with the risk of AKI after normalization to surgical procedure time (normalized duration: adjusted OR, 1.62; 95% CI, 1.11-2.37. normalized area: adjusted OR, 1.02; 95% CI, 1.01-1.03). However, none of the CHT-defined metrics were significantly associated with the risk of AKI.

Discussion: Individually defined intraoperative hyperglycemia better discriminated the development of AKI after cardiac surgery than universally defined hyperglycemia. Intraoperative hyperglycemia was significantly associated with the risk of postoperative AKI only when defined based on the IHT. Blood glucose target in patients undergoing cardiac surgery may need to be individualized according to preoperative glycemic status.

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Topic: 04 - Cardiopulmonary Bypass & ECMO

OC.18

A randomized comparison between two different CPB oxygenators in order to improve recovery from delirium and or cognitive decline in the elderly during cardiac surgery.

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Introduction: Previous studies reported that the type of oxygenating system used in extracorporeal circulation is directly involved in incidence of post-operative delirium and post-operative cognitive impairment (up to 30%-45% of elderly patients undergoing cardiac surgery) with a significant impact on quality of life, hospitalizations and short- and long-term mortality.

A multicenter, single blind randomized study was performed to determine if a new oxygenator, Remowell2, compared with current gold standard technologies, can reduce delirium and cognitive dysfunction in older patients undergoing cardiac surgery.

Methods: We randomized 175 elderly patients (age 65+) undergoing cardiac surgery (Coronary Artery Bypass Graft) to two different cardiopulmonary bypass (CPB) oxygenators (87 Inspire and 88 Remowell2) between september 2019 and march 2022.

Primary aim of the study was to assess incidence of intra hospital delirium (CAM scale evaluation) and any difference

between the two groups according to structural differences between the construction technologies of the two types of CPB oxygenators; secondary endpoints were evaluation of cognitive decline after 6 months (evaluated by neuropsychiatric tests and MoCa test). We also recorded incidence of AMI in the first 72 postoperative hours, ARDS during the entire intra hospital lenght of stay and 1 year incidence of deaths, cardio-vascular related deaths, cerebral stroke and re-hospitalization.

Results: No statstical difference were observed in baseline characteristics between the two randomized groups.

A statistical trend (p=0.093) was observed in favour of the Remowell2 (16.0%) group versus Inspire (26.0%) regarding the incidence of severe postoperative delirium (defined as 4+ positive CAM or need for delirium therapy), a predictable lower performance was observed in the delirium group in executing neuropsycological test at discharge and up to 6 months with a good recovery at one year. Marginal effect plots showed differences in enolase levels (p=0.049), white blood cells (p=0.006) and neutrophils (p=0.003) in favour of Remowell2.

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Plasmatic levels of pro-inflammatory markers were higher in the severe delirium group as well as the incidence of deaths (Log-Rank test p=0.022) and cerebrovascular events (p=0.012) at one year. No statistical difference between oxygenators was detected for AMI and ARDS events during the hospital stay.

Discussion: Using of novel and better construction tecnologies in CPB oxygenators devices is probably associated with a better outcome in the elderly population undergoing cardiac surgery especially regarding neurocognitive and neurological outcomes.

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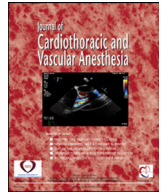
38th EACTAIC Annual Congress - "Challenges and Opportunities"

Budapest (Hungary), 11/10/2023 - 13/10/2023
Topic: 01 - Anaesthesia Techniques
EP.01

Comparison of the effectiveness of bilateral parasternal plane block as an adjunct for postoperative pain management in patients undergoing median sternotomy for cardiac surgery

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Introduction: Cardiac surgery is associated with significant pain and high intra- and postoperative opioid use. Ineffective pain management and the side effects of opioids can lead to increased perioperative complications and prolonged hospital stay. As part of a multimodal pain management, parasternal plane block has been shown to effectively reduce postoperative pain intensity and opioid requirements without complications in small randomized controlled trials [1].

Methods: We conducted a prospective, randomized, single-center study in elective cardiac surgery patients undergoing sternotomy who were expected to be extubated within 6 hours. Patients were randomly assigned to receive either parasternal plane block (PPB) or standard care. Postoperative pain management was standardized in both groups (regular analgesics and morphine PCA). In addition to demographic and historical data, pain intensity at rest and during coughing was assessed using visual analogue scale (VAS) and behavioral pain scale (BPS). Opioid consumption and the use of rescue analgesics were recorded at 1, 3, 6, 12, and 24 hours after the block. The primary endpoint was the opioid requirement in the first 24 hours, calculated as mg/kg body weight morphine equivalents. Secondary endpoints included mean and maximum VAS and BPS scores in the first 24 hours, average patient satisfaction, and the number of complications associated with PPB.

Results: At the time of abstract submission, 33 patients were enrolled in the study. While there were no significant differences at the interim analysis of the initial small sample size, we observed a trend towards lower rest and movement pain scores in the PPB group, and patient satisfaction was higher compared to the control group. Rescue analgesic administration was required more frequently in the control group. No complications were observed in either group. Our results may change as the number of cases increases.

Discussion: Parasternal plane block might be a promising method to increase the effectiveness of multimodal pain management and improve the postoperative comfort of patients undergoing cardiac surgery.

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Keywords: 11

Topic: 01 - Anaesthesia Techniques
EP.02

POSTOPERATIVE CHANGES IN SERUM LIPID LEVELS AFTER PROPOFOL 1% VS 2% INFUSION FOR MAINTENANCE OF ANAESTHESIA IN PATIENTS UNDERGOING CARDIAC SURGERY WITH CARDIOPULMONARY BYPASS

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Introduction: Dyslipidemia is a known risk factor for cardiovascular events. 1% Propofol, a commonly used anaesthetic drug, a lipid emulsion had shown hypertriglyceridemia on long-term sedation as well as maintenance of anaesthesia.(1) The formulation 2% propofol with half the lipid load has

reduced its occurrence. However, data related to cardiac surgery on cardiopulmonary bypass (CPB) is scarce. This study compared propofol 1% [Group 1] versus 2% [Group 2] infusion used for BIS guided maintenance of anaesthesia in patients undergoing cardiac surgery on cardiopulmonary bypass and the effect on serum triglycerides in postoperative period in cardiac ICU.

Methods: After institutional ethics committee clearance and informed consent, 70 patients were randomized into two Groups as per formulation of propofol used as maintenance of anaesthesia in this prospective, randomized, double-blind, study. Rest of intraoperative management was similar to all patients including heparinization dose and CPB management. Inclusion criteria were, male or female adult patients between 18 and 65 years age, NYHA grade 1 or 2 with single valvular heart disease without having arrhythmia or on lipid controlling drugs. Serum triglycerides were measured just before induction (Baseline sample 1) in OR and at 2-hours after cessation of propofol infusion (Sample 2) and after extubation (Sample 3) in postoperative period in ICU. The primary outcome was to compare the effect on serum triglycerides in both the groups. The data was presented as mean with SD or as median and analysed with appropriate statistical methods using statistical package (SPSS-23, IBM, Chicago, USA).

Results: 57 patients' complete data, Gr. 1(n=27) and Gr.2 (n=30) was analysed. Serum triglycerides decreased in all but significantly in Gr. 1 [Baseline 110.70 ± 55.4 mg/dl to 95.4 ± 42.3 mg/dl, p=0.05] as compared to Gr. 2 [Baseline 102.1 ± 50.0 mg/dl to 90.0 ± 45.5 mg/dl, p=0.059. There was no significant correlation of levels of serum triglycerides with either of volume of the propofol infused (Pearson correlation=-0.069, p=0.609) or amount of propofol infused (Pearson correlation=-0.053, p=0.693). Effect of gender was, the decrease in females was more and significant (107.9 ± 50.0 to 90.0 ± 45.5, p= 0.015) as compared to males. The sample 3 was taken at the time of extubation that ranged from 210 to 1200 minutes in ICU after cessation of propofol infusion. This data had non-normal distribution and hence comparing the median value of triglyceride levels showed significant reduction from baseline in both Gr.1 (median reduction 98 to 77mg/dl p=.001), and Gr.2 (median reduction 89 to 71 mg/dl p=.008). When the entire study group was analysed (n=57), the sample 3 (median=74 mg/dl) was significantly lower than sample 1(median=95 mg/dl p= 0.00) and sample 2(median=82 mg/dl p= 0.28).

Discussion: Serum triglyceride levels had significantly decreased in patients undergoing surgery on cardiac bypass irrespective of the formulation 1% LCT or 2% MCT of propofol used as maintenance of Anaesthesia. Heparin induced release of lipoprotein lipase primarily acts on VLDL and may decrease triglyceride levels. Haemodilution on CPB can be the other factor affecting it. The reduction was seen more in females as compared to males and may be due to accelerated clearance.

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Keywords:

**Topic: 01 - Anaesthesia Techniques
EP.03**

The Use of Pectoralis Type 2 Block (PECS II) for Awake Trans-Axillary Transcatheter Aortic Valve Implantation

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Introduction: Transcatheter aortic valve insertion (TAVI) is a minimally invasive procedure for the treatment of severe symptomatic aortic stenosis. Different approaches can be used for accessing the aortic valve: Transfemoral, Transapical, Trans-axillary, Trans-subclavian and other approaches include transcarotid, transaortic, and caval-aortic approaches.

We are presenting here the Use of Pectoralis Type 2 Block (PECS II) for Awake Trans-Axillary Transcatheter Aortic Valve Implantation. Written consent for publication was obtained from the patient.

Methods: A 72-year-old male patient (ASA 3) with severe symptomatic Aortic stenosis (AS) and mild Aortic regurgitation (AR) was scheduled to undergo a percutaneous approach TAVI via left axillary artery. Patient had multiple comorbidities including lung cancer (T1N0M0) with recent radiotherapy, peripheral vascular disease with previous fem-pop bypass, previous prostate cancer, hypertension and severe symptomatic AS: NYHA class III.

In cath lab theatres, the patient underwent AAGBI standard monitoring, consent was checked and a left PECSII block was performed. For the PECS II block, verbal consent was obtained, and aseptic technique was used. PECS block was done as described by Blanco et al. With the patient in the supine position, a linear ultrasound probe was positioned below the lateral third of the clavicle. The positions of the axillary artery and vein were confirmed, and the ultrasound probe was moved inferolateral until the pectoralis major, pectoralis minor, and the serratus anterior muscles were identified in one plane at the level between the third and fourth ribs. A 22-gauge, 100-mm SonoPlex Stim needle was advanced via in-plane approach under ultrasound guidance from the medial-to-lateral direction until it reached the interfacial plane between the pectoralis major and minor muscles. After the position of the needle tip was confirmed, 15 mL of 0.25% bupivacaine and 5 ml of 2% lignocaine were administered. The needle subsequently was advanced further until its tip was in the interfacial plane between the pectoralis minor and serratus anterior muscles, and an additional 15 mL of 0.25%

bupivacaine and 5 ml of 2% lignocaine were administered in this plane.

Conscious sedation was maintained with remifentanil TCI effect mode at 2-3 ng/ml and to maintain haemodynamic stability phenylephrine 100 micrograms/ml dilution was running at 5-7 ml/hr. Through the procedure supplemental oxygen, with face mask at a flow rate of 5 L/min was provided. Other medications used through the procedure included antibiotics as per protocol, heparin and protamine at the end of the procedure. Patient was also given 1 gram of iv paracetamol and 4 mg of ondansetron towards the end of the procedure.

At the end of the procedures, patient was transferred to the Coronary care unit for telemetry and he was comfortable after the procedure.

Results: NA

Discussion: We are reporting here a successful use of PECS II block with conscious sedation for trans-axillary TAVI procedure as an alternative to general anaesthesia. It provided good analgesia, without any major complications. Our patient was overall comfortable and satisfied with the care received. Further studies are warranted to see if this could become an established alternate method to the current practice.

References: NA
Keywords:

Topic: 01 - Anaesthesia Techniques
EP.04

Serratus anterior plane block for right axillary mini thoracotomy for aortic valve replacement: Surgery without scars without pain

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Introduction: A skin incision in the lateral chest is cosmetically superior to that in the fore chest when performing a surgery for aortic valve replacement. Usually the third interspace is used for a minimally invasive aortic valve surgery providing striking exposition of the aortic valve and resulting in superior cosmetics with nearly no visible scars. However the lateral region of the chest has rich innervation regarding the sternum region. Postoperative pain management is important, as pain remains an issue in thoracotomies with rib spreading. We report a case of 68 year old man who underwent AVR through 3rd right intercostal space under general anesthesia and serratrus anterior plane block-SAPB.

Methods: A 68-year-old man was admitted for severe aortic stenosis. Aortic valve was scheduled to be replaced through 3rd intercostal space at the anterior axillary line under general anaesthesia with SAPB.

Anesthesia was induced with midazolame 2mg, fentanyl 0.3mg, lidocaine 80mg and rocuronium 80mg. Propofol was adjusted to maintain BIS below 40 and fentanyl was administered according to patient vital signs. The block was performed under ultrasonography guidance. The needle was placed on the 3rd and 4th intercostal space between anterior serratus muscle and major thoracic muscle in order to block thoracodorsal and long thoracic nerve. The position of thoracodorsal artery was identified. A single injection of ropivacaine 0.5%-20ml in each space was given.

The surgical incision was made at the 3rd intercostal space. Deflation of the right lung and one lung ventilation was achieved by ez-blocker (Teleflex).

Postoperative experience of pain was measured using an analog pain scale (NRS-11 [Numeric Pain Scale]).

Results: Duration of anaesthesia was 270min and operation time was 195min. Aortic cross clamp time was 56min. The amount of the fentanyl that was administrated through all the procedure was 0,75mg. Extubation was achieved after 3 hour in the ICU. The patient reported no pain during the postoperative period. Until the 2nd postoperative day he did not experience any pain around the incision zone. He was discharged at the 6th postoperative day.

Discussion: Innervation of lateral chest is supplied mainly by long thoracic and thoracodorsal nerve. Patients undergoing aortic valve replacement with this access is essential not to experience any pain. SAPB is a quite recent technique for regional analgesia of the chest wall that provides not only free of pain procedure but also free of opioids anaesthesia preventing patients from experienced hyperalgesia. To our knowledge there is no other publication of SAPB performing for aortic valve replacement through right axillary line. Serratus anterior plane block provides effective intra and postoperative anaesthesia, facilitating not only early and smooth extubation but also quick recovery and early mobilisation.

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Topic: 02 - Perioperative & Intensive Care Medicine EP.05

MYOCARDIAL INFLAMMATION DRIVES RIGHT VENTRICULAR DYSFUNCTION FOLLOWING LUNG RESECTION SURGERY

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Introduction: Lung cancer is the third commonest cancer in the United Kingdom.1 After surgery, a reduction in cardio-respiratory function appears to influence patient reported functional capacity. Our research group have demonstrated a reduction in right ventricular (RV) function following lung resection with alterations in both pulmonary afterload and contractility.2-4 Animal models of pulmonary embolism, which are functionally analogous to lung resection surgery and one lung ventilation with transient clamping of the pulmonary artery, have widely described an RV inflammatory injury. We hypothesise RV inflammation also plays a key role in the pathophysiology of peri-operative myocardial injury and RV dysfunction following lung-resection. Cardiovascular magnetic resonance (CMR) offers the ability to assess myocardial inflammation using CMR T1-mapping techniques.

Methods: We conducted a single-centre, prospective, observational cohort study at a tertiary referral cardiothoracic centre. Fifteen patients undergoing lung-resection underwent serial CMR imaging. T1 mapping was performed both pre and post-contrast. T1 and extracellular volumes (ECV) were calculated using circle(cv142) software (Calgary, Canada). Changes in T1 and ECV over time were assessed using Friedman's test and appropriate pairwise comparisons. Association was sought between T1, ECV and CMR measures of RV function using analysis of covariance(ANCOVA).

Results: Thirty-eight pre-contrast and 39 post-contrast T1 maps were available for analysis. There was a significant rise in T1 at post-operative day two (POD2) from pre-operative values in both the RV insertion point (RVIP) (p=0.002, Figure 1) and septum (p=0.03) with no change in the left ventricle (p=0.64). There was a significant rise in RVIP ECV at POD2 from baseline (p=0.005). Both increased RVIP T1 and ECV were associated with a reduction in RVEF at POD2 (r = -0.91, p<0.001 and r= -0.77, p=0.008 respectively). Increased
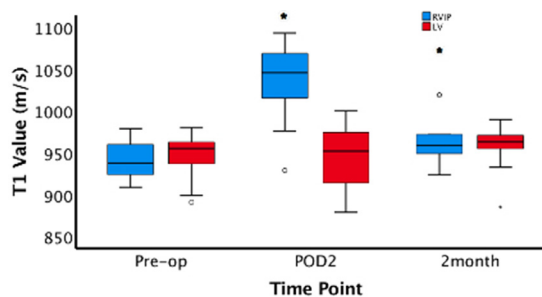
Figure 1 Right ventricular insertion point and left ventricular free wall T1 over time. Bar represents median (IQR). Comparisons made with pre-operative value using Wilcoxon Signed Rank test. * denotes p <0.01. Pre-op – pre-operative, POD2 – post-operative day two, 2month – two-months post-operatively. RVIP – right ventricular insertion point, LV – left ventricle.

ECV at two-months was associated with a reduction in RVEF at two-months (r=-0.82, p=0.004).

Discussion: This is the first study to demonstrate both T1 and ECV are markedly increased in the RVIPs and septum in the post-operative period in patients undergoing lung resection surgery. These changes suggest lung resection triggers an early inflammatory response within the myocardium in response to surgery. Increases in T1 in the early post-operative period suggests acute inflammation results in acute RV impairment whilst increases in ECV at two-months represents scarring of the myocardium resulting in chronic RV impairment. Better understanding of the pathophysiology of RV dysfunction following lung resection has the potential to identify and protect high-risk patients and ameliorate post-operative functional limitation.

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Keywords:

Topic: 02 - Perioperative & Intensive Care Medicine EP.06

Effect of a national guideline on postoperative troponin surveillance: A retrospective cohort study in a single institution in Canada

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Introduction: Myocardial Infarction (MI) is a rare but potentially fatal complication after non-cardiac surgery (1-2). Strategies to detect myocardial ischemia by troponin surveillance have been recommended (3-4). The 2017 Canadian Cardiovascular Society (CCS) guideline on perioperative cardiac risk assessment recommends measuring Brain Natriuretic Peptide (BNP) or N-terminal pro-BNP (NT-proBNP) preoperatively in patients 65 years or older, or 45-64 years old with significant cardiovascular disease (CVD), or who have at least one Revised Cardiac Risk Index factor. Postoperative troponin surveillance is recommended when BNP or NT-proBNP is elevated, or in all these patients when these results are not available (4).

We aimed to evaluate the effect of the 2017 CCS guideline on troponin surveillance and outcomes after non-cardiac surgery.

Methods: After approval from the institutional Research Ethics Board we conducted a single center (UHN) retrospective observational study. Patients aged 40 years or older undergoing intermediate- to high-risk elective non-cardiac surgery between 2016 and 2021 were included. We first compared the number and percentage of troponin tests ordered before and after the guideline was published and compared patient characteristics, specifically cardiovascular comorbidity, using Odds Ratio's (OR) with 95% Confidence Intervals (CI). Second, the occurrence of myocardial injury, MI, and in-hospital mortality before and after guideline publication were compared.

Results: The cohort included 36,386 patients. Median age was 63 years. According to the guideline, troponin surveillance was recommended in 20,807 (57%) patients, was actually ordered in 4,859 (13%) and elevated in 1,031 (2.8%). Between 2016-2018 troponin surveillance was done in 2,461 (13%) of the 19,046 patients, compared to 2,398 (14%) of the 17,340 patients who had surgery between 2019-2021 (OR 1.1, 95% CI: 1.0-1.2). Patients undergoing surgery in the second period had less CVD. Adding troponin surveillance according to the guideline to a regression model predicting MI did not have added value. Adding actual troponin ordering, however, was significantly associated with MI (OR 19, 95% CI: 11-34) and mortality (OR 5.7, 95% CI: 4.1-7.8).

Discussion: Publication of the CCS guidelines did not impact the number of troponin tests ordered. Surveillance according to the CCS guideline would have resulted in monitoring more than half of the population, without a significant increase in outcome detection rates.
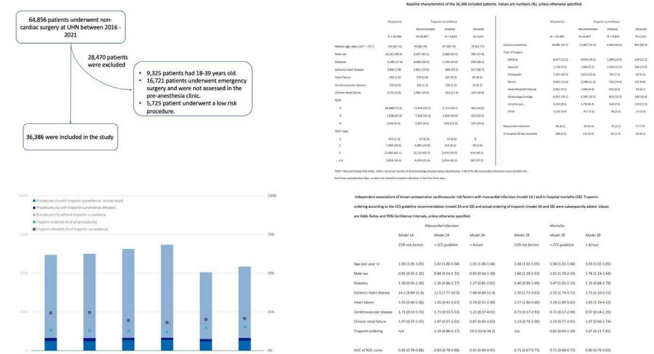
In conclusion, the CCS guidelines are not consistently applied in daily practice and detection of myocardial injury, MI and mortality did not change after publication. It seems best to perform postoperative troponin surveillance based on CVD, the interpretation of its severity, and perioperative context (5).

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Keywords:

Topic: 02 - Perioperative & Intensive Care Medicine EP.07

Role of positive chronotropic medications in management of symptomatic bradyarrythmias after cardiac surgery to avoid permanent pacemaker implantation. The road between Scylla and Charybdis

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Introduction: • Bradyarrythmias requiring pacemaker implantation are occasional complications after Cardiac surgery.

- Currently, bradycardia treatment is limited to permanent pacemaker (PM) implantation. No consensus exists as to its optimal medication regimen. However, Intravenous ß-stimulators (Dobutamine) are effective in the short term but are harmful over the long term because of their side effects, which include cardiotoxicity and arrhythmia, specially in the vulnerable phase direct after cardiac surgery.
- Implantation of a permanent PM is the first-line treatment for these patients. Although the efficacy and safety of permanent PM have been established, implantation and generator replacement are sometimes accompanied by complications such as infection or bleeding.
- Only few studies have previously dealt with this concern, and in our study, we investigated the effectiveness of dobutamine to increase heart rate and thus to avoid pacemaker implantation

Methods: • We performed a retrospective review of 2382 patients undergoing cardiac surgery between the years 2012 and 2020.
- Patients were 72,54 ± 17,26 years old, 75% male, 25% female.
- We included the patients diagnosed with symptomatic bradyarrythmias (after excluding patients with prior PM implantation), of whom 908 patients received Dobutamine (Dobutamine group) and 1288 patients did not receive any positive chronotropic medications (control group). Propensity score matching analysis was used and the groups were matched in a 1:1 ratio.
- The primary endpoint was the PM implantation rate in the initial postoperative hospital stay (7days±3).
- The secondary endpoint was the incidence rate of postoperative atrial fibrillation and ventricular tachycardia.

Results: Of 2196 patients, the PM implantation rate was lower in the control group than the dobutamine group (30,1 % vs. 42 %, respectively; p = 0.001).

In the subgroup analysis of symptomatic patients, the administration of Dobutamine was associated with higher incidence rate of postoperative ventricular tachycardia than in the control group (22,5 % vs. 11,5 %, respectively; p = 0.001).

Moreover, the administration of dobutamine wasnot associated with higher incidence rate of postoperative atrial fibrillation than in the control group (41,9 % vs. 43,8 %, respectively; p = 0.28).

Discussion: Dobutamine was not effective for the treatment of symptomatic bradyarrythmias to avoid PM implantation. The administration of dobutamine was associated with higher incidence rate of postoperative ventricular tachycardia than in the control group.

Further large-scale randomized controlled studies are needed to elucidate the role of the Intravenous ßstimulators (Dobutamine) in the management of postoperative bradyarrhythmias after cardiac surgery

Keywords:

**Topic: 02 - Perioperative & Intensive Care Medicine
EP.08**

ANEMIA AND THE IMPACT OF RED BLOOD CELL TRANSFUSION IN CARDIAC SURGERY

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Introduction: Preoperative anemia is associated with worse outcomes after cardiac surgery. However, it's still uncertain whether the impact of anemia is a consequence of low hemoglobin or related to blood transfusion. Our aim was to identify the prevalence of preoperative anemia and transfusion rates in patients undergoing cardiac surgery. We also aim to evaluate the effect on clinical outcomes.

Methods: This was a single center, retrospective, cohort study, performed in a university hospital. We evaluated every patient undergoing cardiac surgery for the presence of preoperative anemia and the number of packed red cells transfused in the perioperative period, between October and December 2022. Anemia was defined according to the World Health Organization as hemoglobin level <13 g/dL for men and <12 g/dL for women. Primary outcomes were intensive care unit (ICU) length of stay (LOS), hospital LOS and all cause 30-day mortality.

Results: A total of 178 patients were included. Preoperative anemia was present in 55 (30.9%) patients. Total transfusion rate of packed red blood cells was 10.1% in the intraoperative period and 20.8% in the postoperative period. Anemic patients had a significantly higher transfusion rate in the intraoperative period at 25.5% compared to 3.3% in non-anemic patients $\chi 2$ (1, N = 178) = 20.6 p < 0.001, and a significantly higher transfusion rate on the postoperative period at 41.8% compared to 11.4% in non-anemic patients $\chi 2$ (1, N = 178) = 21.4 p < 0.001. Anemic patients were 7.7 times more likely to be transfused in the intraoperative period and 3.6 times more likely to be transfused in the postoperative period.

We found no difference in ICU and hospital LOS between anemic and non-anemic patients (U = 2991, p = 0.207) (U = 2918, p = 0.137). Patients transfused in the intraoperative period had a longer ICU LOS (Mdn = 4, IQR = 5) than those not transfused (Mdn = 3, IQR = 2) (U = 1041, p = 0.049), and a longer hospital LOS (Mdn = 9, IQR = 8) than those not transfused (Mdn = 6, IQR = 3) (U = 1041, p = 0.008). Additionally, patients transfused in the postoperative period had a longer ICU LOS (Mdn = 6, IQR = 6) than those not transfused (Mdn = 3, IQR = 2) (U = 1026, p < 0.001), and a longer hospital LOS (Mdn = 9, IQR = 9) than those not transfused

Table 1 - Baseline characteristics of the participants.

	All (n=178)		CSA - AKI (n=46)		Without CSA - AKI (n=132)		p value
Demographics							
Age (years) - median (IQR)	66.0	(59.0-75.0)	68.5	(55.5-76.5)	69.0	(60.0-75.0)	0.68
Male - n (%)	118	(66.3)	32	(69.6)	86	(65.2)	0.58
BMI (kg/m2)- mean ± SD	27.7	± 4.66	27.8	± 5.63	27.6	± 4.29	0.87
Comorbidities							
HTN, n (%)	158	(88.8)	41	(89.1)	117	(88.6)	0.93
DM, n (%)	71	(39.9)	21	(45.7)	50	(37.9)	0.35
Smoker							0.92
- Current	25	(14.0)	7	(15.2)	18	(13.6)	
- Former	46	(25.8)	11	(23.9)	35	(26.5)	
- Never	107	(60.1)	28	(60.9)	79	(79.4)	
Preoperative analytical data							
Hemoglobin (g/dl) - mean ± SD	13.4	(1.8)	12.6	± 2.09	13.6	± 1.67	< 0.01
Serum Creatinine (mg/dl) - median (IQR)	1.15	(0.78-1.12)	1.08	(0.79-1.41)	0.9	(0.75-1.09)	0.037
LVEF - n (%)							0.59
< 20%	8	(4.9)	1	(2.2)	7	(5.3)	
20-40%	16	(9.0)	6	(13.0)	10	(7.6)	
40 - 54%	21	(11.8)	6	(13.0)	15	(11.4)	
> 54%	133	(74.7)	33	(71.7)	100	(75.8)	
EuroSCORE II (%) - median (IQR)	1.5	(0.8-2.6)	2.2	(1.8-4.6)	1.5	(0.87-2.7)	< 0.01
Type of surgery							0.57
Isolated CABG - n (%)	57	(32.0)	12	(26.1)	45	(34.1)	
Single valve - n (%)	73	(41.0)	19	(41.3)	54	(40.9)	
Combined procedures- n (%)	41	(23.0)	12	(26.1)	29	(22.0)	
Aortic surgery - n (%)	7	(7.0)	3	(6.5)	4	(3.0)	
On-pump surgery - n (%)	122	(69)	34	(73.9)	88	(66.7)	0.36
CPB time (mins) - median (IQR)	74.1	(47.0-91.5)	94	(61.8-120.8)	66	(46.0-81.8)	< 0.01

LVEF - Left ventricle ejection fraction; BMI - Body mass index; HTN - Hypertention; DM - Diabetes mellitus; CPB - cardiopulmonay bypass; IQR - Interquartile Range; SD - Standard deviation.

ROC Curve for Model — AUC = 0.655

(Mdn = 6, IQR = 2) (U = 1011, p <0.001). We found no differences in 30 days all cause mortality between anemic and non-anemic group (p = 0.53) and between transfused and not transfused groups (p = 0.46).

Discussion: In patients undergoing cardiac surgery, preoperative anemia significantly increases the likelihood of being transfused, which is associated with a longer ICU and hospital LOS.

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Keywords:

Topic: 02 - Perioperative & Intensive Care Medicine EP.09

INVESTIGATING THE PREDICTIVE VALUE OF URINARY BIOMARKERS IN CARDIAC SURGERY RELATED ACUTE KIDNEY INJURY: SYSTEMATIC REVIEW AND META-ANALYSIS

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Introduction: Cardiac surgery related acute kidney injury (CS-AKI) develops in 20-50% of patients undergoing cardiac surgery and is responsible for increased postoperative morbidity and mortality. Urinary biomarkers have been investigated to predict and thus prevent acute kidney injury in several critical condition, but their predictive value remains unclear in regards to cardiac surgery related postoperative renal failure. Our aim was to assess the predictive value of urinary biomarkers for prediction of cardiac surgery related acute kidney injury.

Methods: This study was registered in PROSPERO (CRD42022371166). We conducted our systematic search in 3 databases on 11.11. 2022 (MEDLINE, EMBASE, COCHRANE) without filters or restrictions. We included both randomised and non-randomised studies reporting diagnostic accuracy data. Our primary outcome was the predictive values of individual urinary biomarkers measured at different timepoints to identify patients developing acute kidney injury as per Kidney Disease Improving Global Outcomes (KDIGO) criteria and also calculated the performance of combination of urinary biomarkers. We collected the Area Under the Curve (AUC) values and their confidence intervals and performed a meta-analysis using random or mixed effects models. We fitted Summary Receiver Operating Characteristics (SROC) curves using 2×2 contingency tables extracted from the studies containing the true positive, false positive, false negative, and true negative values. Risk of bias was assessed by QUADAS-2.

Results: We screened 10763 records and included 92 articles in the analysis. Predictive value of individual biomarkers was at maximum fair; TIMP2xIGFBP7 measured in the intraoperative and early postoperative period AUC 0.73 (95% CI: 0.65-0.81) for prediction of KDIGO stage 2-3 acute kidney injury; L-FABP measured from 6h till 24h postoperatively AUC 0.75 (95% CI: 0.68-0.81) for prediction of all stages of CS-AKI. There was no significant difference between the AUC-ROC of urinary biomarkers (p=0.0655). Combination of urinary biomarker measurements yielded a good predictive value in identification of both total and only severe cases of acute kidney injury with AUCs 0.82 (95% CI: 0.75-0.88) and 0.85 (95% CI: 0.79-0.91) respectively. The combination of three biomarkers

Fig 1. Combination of urinary biomarkers to predict severe cardiac surgery related acute kidney injury
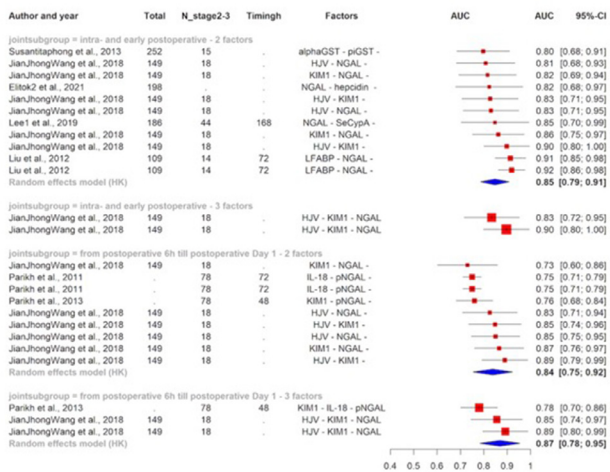
did not provide significant predictive value improvement (p=0.625) compared to the combination of two urinary biomarkers AUC 0.87 (95% CI: 0.78-0.95) vs 0.84 (95% CI: 0.75-0.92) in prediction of severe CS-AKI.

Discussion: Our study shows that biomarkers identified patients developing CS-AKI. Individual biomarkers performed with fair accuracy, while combination of two biomarkers improved the accuracy. However, combining more than two urinary biomarkers did not result in a better predictive value but it could increase costs unnecessarily.

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Keywords:

Topic: 02 - Perioperative & Intensive Care Medicine
EP.10

Ministernotomy versus full sternotomy: a retrospective study of opioid consumption in the first postoperative period after cardiac surgery

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Introduction: Cardiac surgery often involves full median sternotomy resulting in postoperative pain. Minimally invasive techniques, such as ministernotomy, have been developed to reduce pain and facilitate recovery. However, the benefits of ministernotomy in terms of postoperative pain have not yet been fully established[1]. The aim of this study was to investigate postoperative opioid consumption differed between full sternotomy and ministernotomy.

Methods: In this retrospective observational study, we aimed to compare opioid consumption after upper ministernotomy aortic valve replacement versus full sternotomy in patients undergoing aortic valve replacement or mitral valve replacement. All pre- and postoperative drug administrations were recorded in the electronic patient journal during admission.

Results: Baseline data were comparable except from a higher ejection fraction and a lower euroscore in the the ministernotomy group. Cross clamp time and drain blood loss were lower in this group. No statistically significant difference in postoperative opioid administrations was found. The highest doses were seen on postoperative day 1 (mean 43.3 mg after full sternotomy and 50.4 mg after ministernotomy, p=0.067).

Preoperative variables:		Sternotomy n = 206	Ministernotomy n = 151	Total n =357	p-value
Sex	Female, n (%)	64 (31%)	49 (33%)	113 (32%)	0.871
	Male, n (%)	142 (69%)	102 (67%)	244 (68%)	
Age (years), Median [IQR]		67.5 [58 - 74]	70.7 [65 - 75]	69.4 [60 - 75]	**0.017***
BMI (kg/m²), Median [IQR]		25.6 [23 - 30]	27.1 [25 - 30]	26.3 [24 - 30]	**0.017***
Ejection Fraction (%), Median [IQR]		60 [50 - 60]	60 [50 - 60]	60 [50 - 60]	0.055
EURO-score, Median [IQR]		6 [4 - 7]	6 [4 - 7]	6 [4 - 7]	0.066
NYHA-score, Median [IQR]		1 [1 - 3]	1 [1 - 3]	1 [1 - 3]	0.123
Diabetes mellitus, Median [IQR]		0 [0 - 0]	0 [0 - 0]	0 [0 - 0]	0.240
Preoperative opioid (MME), Median [IQR]		0 [0 - 0]	0 [0 - 0]	0 [0 - 0]	0.115
Preoperative paracetamol (g), Median [IQR]		0 [0 - 0]	0 [0 - 0]	0 [0 - 0]	0.735
Preoperative clonidine (mg), Median [IQR]		0 [0 - 0]	0 [0 - 0]	0 [0 - 0]	0.243
Preoperative ketorolac (mg), Median [IQR]		0 [0 - 0]	0 [0 - 0]	0 [0 - 0]	0.243
Preoperative gabapentin (mg), Median [IQR]		0 [0 - 0]	0 [0 - 0]	0 [0 - 0]	0.392

Perioperative variables:	Sternotomy n = 206	Ministernotomy n = 151	Total n =357	p-value
ECC time (minutes), Median [IQR]	114 [96 - 136]	119 [108 - 131]	117 [100 - 134]	0.085
Cross Clamp time (minutes), Median [IQR]	81 [68 - 103]	93 [81 - 105]	87 [73 - 104]	< 0.001
Arrest time (minutes), Median [IQR]	0 [0 - 0]	0 [0 - 0]	0 [0 - 0]	0.241
Lowest temperature (°C), Median [IQR]	36 [35.3 - 36.3]	36 [35.5 - 36.3]	36 [35.4 - 36.3]	0.548
Perioperative blood loss (ml), Median [IQR]	0 [0 - 0]	0 [0 - 0]	0 [0 - 0]	0.701
Postoperative blood loss (ml), Median [IQR]	455 [350 - 800]	400 [300 - 600]	425 [310 - 700]	< 0.001

Postoperative medicine consumption	Sternotomy n = 206	Ministernotomy n = 151	Total n =357	p-value
Opioid on day 1 (MME), Median [IQR]	37.5 [18 - 63]	45 [24 - 63]	41 [22 - 63]	0.115
Opioid on day 2 (MME), Median [IQR]	15 [0 - 30]	10 [5 - 25]	10 [5 - 25]	0.869
Opioid on day 3 (MME), Median [IQR]	0 [0 - 15]	0 [0 - 10]	0 [0 - 10]	0.504
Opioid on day 4 (MME), Median [IQR]	0 [0 - 6]	0 [0 - 6]	0 [0 - 6]	0.885
Opioid on day 5 (MME), Median [IQR]	0 [0 - 0]	0 [0 - 0]	0 [0 - 0]	0.714
Paracetamol on day 1 (g), Median [IQR]	3 [3 - 4]	3 [3 - 4]	3 [3 - 4]	**0.016***
Paracetamol on day 2 (g), Median [IQR]	4 [4 - 4]	4 [4 - 4]	4 [4 - 4]	0.402
Paracetamol on day 3 (g), Median [IQR]	4 [4 - 4]	4 [4 - 4]	4 [4 - 4]	0.155
Paracetamol on day 4 (g), Median [IQR]	4 [4 - 4]	4 [4 - 4]	4 [4 - 4]	0.657
Paracetamol on day 5 (g), Median [IQR]	4 [4 - 4]	4 [4 - 4]	4 [4 - 4]	0.646
NSAID on day 1 (g), Median [IQR]	0 [0 - 0]	0 [0 - 0]	0 [0 - 0]	0.481
NSAID on day 2 (g), Median [IQR]	0.8 [0 - 1.6]	1.6 [0.4 - 1.6]	1.2 [0 - 1.6]	**0.020***
NSAID on day 3 (g), Median [IQR]	1.6 [0 - 1.6]	1.6 [0 - 1.6]	1.6 [0 - 1.6]	**0.004***
NSAID on day 4 (g), Median [IQR]	1.2 [0 - 1.6]	1.6 [0 - 1.6]	1.6 [0 - 1.6]	**0.012***
NSAID on day 5 (g), Median [IQR]	0 [0 - 1.6]	0.8 [0 - 1.6]	0 [0 - 1.6]	**0.042***
Ketorolac on day 1 (mg), Median [IQR]	0 [0 - 30]	15 [0 - 30]	0 [0 - 30]	**0.002***
Ketorolac on day 2 (mg), Median [IQR]	0 [0 - 0]	0 [0 - 0]	0 [0 - 0]	0.067
Ketorolac on day 3 (mg), Median [IQR]	0 [0 - 0]	0 [0 - 0]	0 [0 - 0]	0.478
Ketorolac on day 4 (mg), Median [IQR]	0 [0 - 0]	0 [0 - 0]	0 [0 - 0]	0.478
Ketorolac on day 5 (mg), Median [IQR]	0 [0 - 0]	0 [0 - 0]	0 [0 - 0]	0.828

Ministernotomy patients received more non-opioid analgesics. Blood loss from drains was lower after ministernotomy.

Multiple linear regression model was calculated based on relevant variables with p<0.1 (Surgical technique, BMI, age, paracetamol at day 1 and NSAID on day 1. The model showed a significant effect of surgical technique on opioid consumption (p=0.01).

Discussion: Opioid consumption was not higher in the postoperative phase after upper ministernotomy, compared to full sternotomy. Non-opioid analgesic administrations, however, seemed to be higher after ministernotomy. When adjusted for age, BMI and non-opioid analgetics, full sternotomy had lower opioid consumption than ministernotomy on day one. We had no access to pain scores in the present material. Prospective studies should evaluate the effect of surgical technique on postoperative pain.

From this study we conclude, that the surgical approach has a minimal effect on postoperative analgesic consumption after cardiac surgery. Future studies may include both approaches in the evaluation of postoperative pain management regimes.

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Keywords:

Topic: 02 - Perioperative & Intensive Care Medicine EP.11

Central venous catheter related bloodstream infections - evaluation of possible measures of prevention

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Introduction: Central Venous catheters (CVC) account for 5-15% of all ICU related infections. We evaluated possible measures of prevention of CVC related infections.

Methods: We evaluated 84 patients(pts) undergoing cardiac surgery. All patients were inserted CVC following aseptic technique through internal jugular vein in the OR before the surgery. Samples of skin swabs after aseptic cleaning of the skin and before the CVC insertion and at the moment of CVC removal were collected, and microbiological samples of the catheter tip and hubs

Results: Infection developed in 23.81% of pts. Skin swab after aseptic preparation, prior CVC insertion was positive in 44%. At the moment of CVC removal, surrounding skin and CVC hubs were bacteriologically positive in 85% of patients. The CVC tip was positive in 27% of patients,out of which 83% had the same skin or hub bacteriological culture as the CVC tip. Positive CVC tip was found in 8/20 pts with clinical and lab signs of infection (p=0.24). All blood cultures were negative. CVC was placed up to 3 days in 47% of pts, out of which 5% developed infection. In 38% of pts that had CVC 4-5 days, 12% developed infection. Thirteen pts had CVC >5 days- 2 developed infection (p=0.001).

Discussion: To minimize CVC related infections it is necessary to follow guidelines of good clinical practice of aseptic insertion and aseptic management of CVC, properly educate all staff and evaluate knowledge and adherence to the updated protocols.

It is necessary to keep CVC in patients for the shortest time possible.

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Keywords: 11

Topic: 02 - Perioperative & Intensive Care Medicine EP.12

CARDIAC SURGERY PERIOPERATIVE PAIN MANAGEMENT BUNDLE

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Introduction: Cardiac surgery is performed mainly via a medium sternotomy, which causes significant postoperative pain. The aim of our study was to improve pain treatment in the postoperative period by implementing a perioperative pain management bundle for cardiac surgery pain.

Methods: As a part of PAIN OUT, this was a two-phased study. The initial phase involved data collection on existing pain management in the wards. In the post-interventional phase, we tested the effectiveness of the pain bundle implementation: information about pain therapy, the use of non-opioids in the maximal daily dose, surgical wound infiltration with a local anaesthetic (surgeons), and pain assessment, treatment, and reassessment (nurses).

Results: This study included 132 patients in the initial and 138 patients in the post-interventional phase on the first postoperative day after cardiac surgery. In the post-interventional phase, the worst pain and time spent in severe pain were significantly lower (Table 1), interference with coughing was less, and patients could mobilize more easily in- and out of bed (Table 2). Patient-reported higher satisfaction with pain treatment in the post-interventional phase, 9.4 ±1.0 vs. 8.4±2.3, P=0,002. We performed pain assessment in all patients during the post-interventional phase compared to none in the initial phase.
    <FILE IMAGE='42_20230501164815.jpg'>

Discussion: The essential elements of perioperative pain bundle, including education on pain therapy, administration of full daily doses of analgesics, multimodal analgesia and wound infiltration technique, as well as the assessment and re-assessment of pain intensity in the postoperative period, resulted in effective pain relief and high patients' satisfaction. Perioperative pain management is a teamwork.

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Keywords:

Topic: 02 - Perioperative & Intensive Care Medicine EP.13

Presepsin as a guide to antimicrobial therapy in cardiac surgery

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Introduction: Sepsis is the main cause of death in general ICUs at present day. About 19 million anually aquire sepsis worldwide and more than 30% dies. Only half of the septic patients is treated according to highest standards including west Europe. Biggest challange in treating sepsis is recognizing infection and timely initiation of antibiotic therapy. Biomarker with diagnostic, prognostic and therapeutic value could help topple this challenge. At the moment Presepsin was shown to have these values. Presepsin cut-off value for predicting sepsis is 600 pg/ml.

Methods: We present 2 cases where Presepsin helped in diagnosing Infection, Initiating antibiotic therapy and correction of antibiotic therapy.

Results: Case 1. Female patient, 64 years old, CABG surgery, developed sepsis during hospitalization. On a 4th postoperative day,patient developed chills, fever, WBC increased, PCT 22.5 ng/ml. Hemocultires were obtained. In cosultation with infectologist cefepime and teicoplanin was initiated. The following morning (5th postoperative day), Patient's condition deteriorated more, Presepsin was done (4262 pg/ml), Hemocultures obtained again. Antibiotic therapy was changed to Meropenem, Metronidazole, Teicoplanin. On a 6th postoperative day, patient improved, no fever, clinically stable. Presepsin on 7th postoperative day was 1216. Hemocultures came positive on 8th postoperative day (CNS, Serratia) sensitive to the ongoing antibiotic therapy, presepsin wa 678pg/ml. On 11th postoperative day, which was 8th day of triple antibiotic therapy Presepsin was 361pg/ml. Patient was on the triple antibiotic therapy for 10 days, sterile hemocultures came on 12th postoperative day. Patient was discharged in good clinical condition, infection free, 16 days after surgery. Case 2. Patient, male, 68 years old, EF-22%; CABG and aortic valve

replacement surgery, During hospitalization patient developed infection. Antibiotic therapy was initiated according to the blood culture results (Pseudomonas (Meropenem) and CNS (Vancomycin). This was followed by the subsiding of signs of infection, decrease in inflammatory parameters, and clinical improvement. In the mean time sputum culture came positive (Acinetobacter) which was sensitive only to Collistin. Presepin value was 242pg/ml and it was decided against initiation of Collistin. Patient was dischared in good clinical condition without laboratory and clinical signs of infection.

Discussion: Presepsin could be a reliable tool for early distinguishment of patients with the risk of infection, tool in treatment and prognosis of infection/sepsis in complicated cardiac surgery patients, where many factors can mask the presence of infection.

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Keywords: 11

Topic: 02 - Perioperative & Intensive Care Medicine EP.14

Perioperative and Anesthetic Management of Adult Pacients with Pulmonary Hypertension: A Narrative Review

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Introduction: Pulmonary Hypertension (PH) is a serious condition that constitutes a relevant risk factor for surgical morbimortality. Due to the higher incidence of complications in the perioperative period, it represents a challenge for the anesthesiologist. This review defines and classifies Pulmonary Hypertension, describes its epidemiology, pathophysiology,

diagnosis and treatment, and discusses current aspects of its perioperative and anesthetic management.

Methods: Article research was carried out in the PubMed, Google Scholar, Scielo and Cochrane databases from August to November 2022. Scientific articles in Portuguese and English with full text available, published between 2017 and 2021, addressing adult population with Pulmonary Hypertension undergoing surgery and anesthesia were included.

Results: After consulting the databases and applying search strategies with inclusion and exclusion criteria, 28 studies were selected for full text reading and included in the review (Figure 1). Another 152 articles were included by manual search for contextualizing.

Discussion: PH is defined as a Mean Pulmonary Arterial Pressure over 20 mmHg and Pulmonary Vascular Resistance (PVR) over 3 Wood Units. It is classified as Pre-Capillary or Post-Capillary, and its etiology is grouped into 5 groups. Reactive changes in the pulmonary vascular bed, endothelial dysfunction and vascular remodeling lead to increased PVR and right ventricular failure. It affects 55 million people, mainly individuals aged > 65 years, and its main causes are cardiopulmonary diseases. Diagnosis is based on history, physical examination, and complementary tests that identify comorbidities and establish etiology and severity. Treatment involves management of comorbidities seeking symptomatic relief, hemodynamic improvement and slower disease progression.

Perioperative management should be multidisciplinary. Comorbidities that increase surgical risk must be adequately compensated. Pulmonary vasodilators should be optimized and consider patient and surgical. Triggering factors for PH crisis must be prevented. Regional anesthesia helps preventing PH crisis and providing perioperative analgesia. General anesthesia is safe but anesthetic drugs affect PVR and right heart function. Standard monitoring includes cardioscopy; pulse oximetry; blood pressure and capnography. Invasive monitoring is guided by patient's comorbidities and surgical size. Hemodynamic management involves maintaining myocardial perfusion and RV function and preventing increases in PVR. Postoperative care in the intensive care unit is necessary for
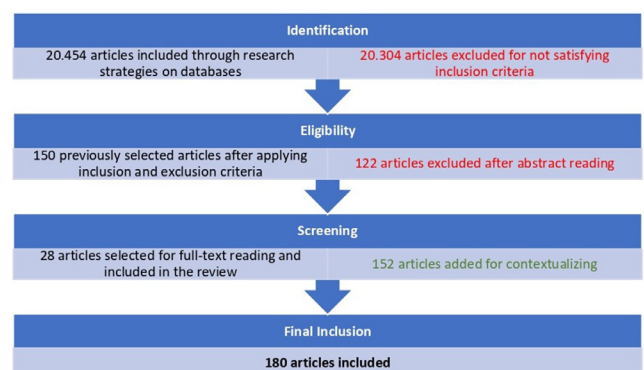
Figure 01 – Article Search strategy, according to the defined inclusion and exclusion criteria. Research period: January 2017 a December 2021.

serious patients and major surgeries and management includes pain control, maintenance of hemodynamic goals and protective ventilation strategies, and early extubation when safe.

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Keywords: 11

**Topic: 02 - Perioperative & Intensive Care Medicine
EP.15**

Incidence and determinants of self-extubation in a tertiary care surgical intensive care unit of Pakistan. A retrospective analysis

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Introduction: Self-extubation is reported as one of the most common events in the adult intensive care units worldwide. The aim of this study is to find out the incidence and determinants of self-extubation in a tertiary care surgical intensive care unit.

Methods: It was retrospective analysis data acquired from the hospital databases, who were self-extubated in surgical intensive care unit during six calendar years from January 1st, 2010, through December 31st, 2016. Data collection form was used to collect personal details, drugs used for sedation, sedation agitation score, pain score, nurse ratio and use of restrained at a time of extubation have been noted.

Results: Total of 618 patients were admitted to the SICU who required mechanical ventilation during the six calendar years. An overall 2.1% incidence of self-extubation was calculated with a documented thirteen self-extubation episodes. The mean age of patients was 38.46 ± 16.97 years with majority of them being males. Most of the patients at the time of self-extubation were not restrained 9(69.2%). Nurse to patient ratio was also found to be 1:1. Majority of patients 7(53.8%) were not on any sedative drug infusion and the mean sedation agitation score at that time was 4.46± 2.02 while mean pain score was 5.31 ± 2.72. Reintubation was performed in most patients 10 (76.9%) who had self-extubation.

Discussion: The incidence of self-extubation in ICU was 2.1%. This relatively low incidence can be elucidated by the optimal nurse-to-patient ratio in ourhospital. As nursing care is the major contributing factor that can increase the probability of self-extubation during the absence of bedside nurse. It was found that an ICU nurse with an experience of more than 4 yearscan decrease the incidence of self-extubation by 2.6%.

Among numerous risk factors, agitation is responsible for 50%-74% of the unplanned extubation, while in comparison to non-agitated patients, the self-extubation rate increases by 26%.

Other factors that increase the risk of self-extubation include male sex, older age, postsurgical and sedation given as per need rather than as a continuous infusion.

Self-extubation can compromise airway due to the sudden removal of inflated cuff endotracheal tube which could cause difficult reintubation,hypotension, arrhythmias, bronchospasm, aspiration, and laryngeal bleeding or edema.

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Table 1: Frequency of the Use of Restrain

Variable	Frequency (%)
Use of Restrain	
Yes	4 (30.8%)
No	9 (69.2%)

Keywords: 4

Topic: 03 - Cardiac Anaesthesia
EP.16

THE DOUBLE-CHAMBERED RIGHT VENTRICLE: A CASE REPORT IN AN ADULT PATIENT

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Introduction: The-double chambered right ventricle (DCRV) is a rare distinctive anatomic entity with both congenital and acquired components, wherein abnormally located or hypertrophied muscular bands divide the right ventricle into a proximal high-pressure and a distal lower pressure chambers - even to the point of mid-ventricular obstruction. As the DCRV is very often associated with other congenital cardiac defects, such as a perimembranous ventricular septal defect (PM-VSD), it is usually diagnosed in infancy and childhood. However, it may remained unrecognised until adulthood, when the patient presents with atypical symptoms mimicking common acquired cardiac diseases. In the current case report, we present an adult patient with DCRV that underwent a complex cardiac surgery, not only for the primary defect, but also for the coexisting cardiac pathologies.

Methods: A 63yr old female patient, with a known medical history of an uncorrected VSD, presented to our hospital with intense chest discomfort and dyspnea on minimal exertion (NYHA III). The laboratory exams showed mild troponin increase, whilst the TTE verified the presence of a VSD, but also revealed the existence of a DCRV with normal function and dimensions, a severely stenosed aortic valve, a severely regurgitant mitral valve and a left ventricle with preserved EF. After performing a coronary angiography that showed right coronary artery disease and common origin of the left and right coronary arteries from a single ostium, the patient was scheduled for surgery. Intraoperatively, the TOE examination showed a normally functioning hypertrophied RV, with abnormal muscular bands (AMB) that cross its cavity and cause nearly total RVOT obstruction and turbulent flow. The usage of a Swan-Ganz catheter verified the existence of two separate chambers with a pressure gradient of almost 100mmHg inside the RV and set the diagnosis of a DCRV. Furthermore, the known VSD was more specifically a PM-VSD with left to right flow between the LVOT and the proximal supra-systematic
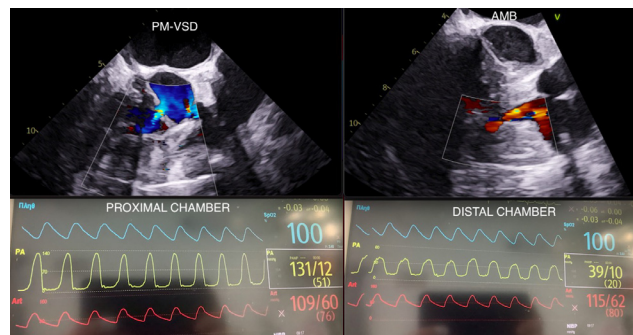
chamber of the RV, because of the simultaneous severe aortic valve stenosis.

Results: The patient underwent excision of the AMB through a small right ventriculotomy, mitral valve repair with an Alfieri stitch transaortically and aortic valve replacement with root enlargement. No graft was placed to the RCA because of the poor distal target. Despite the successful excision of the AMB and the release of the intracavitary obstruction, the separation from the CPB was very difficult due to biventricular, but mostly RV dysfunction. The patient was placed on V-A ECMO and transferred to the CICU.

Discussion: In this case report, we showed that a rare congenital cardiac disease (DCRV) can remain masked until adulthood, when the patient becomes finally symptomatic but with atypical symptoms. Definitive treatment is surgery and generally has an excellent prognosis. However, we should be very careful before attempting to derange the balances that the RV has set to itself until then.

References: Hong Kong Med J 2015 Feb;21(1):84.e1−2
Keywords:

Topic: 03 - Cardiac Anaesthesia
EP.17

NAPAR: EFFICACY AND SAFETY OF APROTININ IN CARDIAC SURGERY: COMPARISON BETWEEN DOSE REGIMEN

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Introduction: Withdrawn in the early 2000s, aprotinin marketing authorization was reinstated by European Medicines Agency with a restrictive indication (isolated coronary artery bypass graft surgery, iCABG) and a safety registry (NAPaR) (1). This regsitry intended to record the pattern of use of aprotinin and to determine patient safety. It was terminated without safety signals associated with the product (2). Two aprotinin regimens were allowed: full-dose (FD) and half-dose (HD). Our objective was to compare efficacy and safety of each regimen in patients undergoing cardiac surgery with cardiopulmonary bypass.

Methods: Between February 2016 and August 2022, 6730 adult patients were treated with aprotinin across 9 European countries (Germany, Austria, Belgium, France, Ireland, Norway, United Kingdom and Sweden) and were included in the registry

Results: Among the 1549 patients treated on-label (iCABG), 643 (42%) received the FD regimen and 906 (58%) the HD. Less thromboembolic events (0,5% vs 2,8%; P<0,001) and fibrinogen transfusion, but more platelets and cryoprecipitate were reported in the FD group (Table) . Among the 5181 patients treated off-label (ascending aorta surgery, single or complex valves replacement, transplant), 2318 (45%) received the FD and 2863 (55%) the HD. Less mortality (5,4% vs 9,4%; P<0,001), thromboembolic events (1,4% vs 2,9%; P<0,001), renal events (14,8% vs 18,1%; P=0,002), reoperation for bleeding (5,2% vs 10,3%; P<0,001) and fibrinogen transfusion were reported in the FD group, in association with a rise in transfusion needs (platelets and cryoprecipitate).<FILE IMAGE='38_20230426164140.jpg'>

Discussion: Regardless of the surgery, the FD of aprotinin, in comparison with the HD regimen, was associated with less postoperative TEE. Concerning aprotinin use in off-label high bleeding risk surgery, FD regimen was also associated with a decrease in postoperative mortality, reoperation for bleeding and renal dysfunction. To confirm these results, a multivariate analysis will be carried out on propensity-matched sets of HD and FD treated subjects. A large multicenter randomized trial is expected to consolidate the potential benefits of routine use of FD aprotinin in cardiac surgery patients.

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Topic: 03 - Cardiac Anaesthesia
EP.18

PREDICTING ACUTE KIDNEY INJURY IN POST-OPERATIVE HYPERTROPHIC CARDIOMYOPATHY MYECTOMY PATIENTS AND ITS RELATION TO THE PHENOTYPE

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Introduction: Hypertrophic obstructive cardiomyopathy (HOCM) is a disease characterised by left ventricular hypertrophy and outflow tract obstruction (LVOTO). Symptomatic HOCM can be treated with surgical septal myectomy. Prior research has identified that cardiac surgery-associated acute kidney injury (CSA-AKI) is a common complication after cardiac surgery, associated with increased morbidity and mortality. There is limited information on the development of CSA-AKI after myectomy. Furthermore, the 'acute kidney injury following cardiac surgery' (AKICS) score, developed for patients undergoing coronary artery bypass grafting (CABG), has not been tested in myectomy patients. Therefore, the objectives are to (i) evaluate the prevalence of CSA-AKI in myectomy patients, (ii) identify surgical factors which may lead to CSA-AKI, and (iii) identify factors related to the phenotype which may contribute to CSA-AKI.

Methods: CSA-AKI was categorized according to the Kidney Disease: Improving Global Outcomes (KDIGO) guidelines. The patients were assessed based on their cardiac phenotype, and relevant intraoperative variables were examined to identify concomitant perioperative risk factors that might contribute to CSA-AKI development. Subsequently, multivariable logistic regression was employed to analyse significant results. A receiver operating characteristic curve (ROC) was used to evaluate the discriminative capacity of those significant findings

Results: Perioperative clinical data was available for 242 myectomy patients from a single centre between 2005-2022. A majority of HOCM patients were sarcomere-negative (69%). CSA-AKI developed in 45% of patients (55% KDIGO stage 1, 45% stage 2). The AKICS score was significantly higher in the

CSA-AKI group as opposed to the non-CSA-AKI group (p=0.02), with an effect size (h2) of 0.022. Genotype and cardiac parameters such as intraventricular septal thickness or LVOTO severity did not predict CSA-AKI development, neither did the operation duration or intra-operative blood loss. Arterial hypertension (34% in non-CSA-AKI vs. 39% in CSA-AKI, p=0.04), coronary artery disease (5% vs. 14%, p=0.02) and the use of beta blockers (70% vs. 87%, p=0.001) were more prevalent in the CSA-AKI cohort. Multivariable logistic regression was used to investigate the association between beta blockers and the incidence of CSA-AKI. This regression revealed a significant model ($X2(12)=34.521$, p<0.001), with a correct classification rate of 67%, explaining 22% (Nagelkerke R2) of the variance in CSA-AKI (Table 1). Interestingly, while beta blocker use was not found to be an independent predictor of CSA-AKI as shown in table 1, its use in addition to the other covariates in an ROC analysis revealed moderate discriminatory power with an area under the curve of 0.702 (standard error: 0.035, p<0.0001) (Figure 1).

Discussion: CSA-AKI occurred in 45% of patients after myectomy, but was transient and kidney function recovered in all patients. Even though the AKICS score was significantly higher in the CSA-AKI group, the effect size was very small, resulting in negligible discriminatory power. The sole use of beta-blockers was not related to the development of CSA-AKI, however, the model built did have a moderate discriminatory power. Further research is warranted to investigate the mechanisms and possible causal effects of CSA-AKI in this cohort, as it is associated with increased morbidity and mortality.

Table 1: Illustrates the odds ratio and p-value for each variable in the CSA-AKI predictive model.

Variables	All patients (242)	Non-AKI (133)	CSA-AKI (109)	Odds Ratio	95% CI*	P Value
Age	54.77 ± 13.77	53.55 ± 13.57	56.27 ± 13.92	1.031	1.00-1.06	0.031
Sex (Male)	148 (61)	83 (62)	65 (60)	0.415	0.19-0.89	0.024
Pre-op Creatinine (µmol/L)	85.13 ± 19.94	83.56 ± 19.43	87.05 ± 20.47	1.017	0.99-1.03	0.061
Hypertension	88 (36)	45 (34)	43 (39)	0.776	0.38-1.58	0.487
Atrial Fibrillation	49 (20)	22 (17)	27 (25)	2.456	1.07-5.60	0.033
Coronary artery disease	21 (9)	6 (5)	15 (14)	2.456	0.84-8.36	0.098
Cerebrovascular accident	5 (2)	3 (2)	2 (2)	1.132	0.28-4.50	0.860
CPB time (min)	149.27 ± 46.19	147.87 ± 35.21	150.97 ± 56.93	1.005	1.00-1.01	0.287
Combined surgery	218 (90)	121 (91)	97 (89)	0.459	0.13-1.63	0.229
Cell saver blood transfusion	648.13 ± 364.44	662.74 ± 413.72	630.09 ± 293.51	1.000	1.00-1.00	0.287
Beta blocker use	188 (78)	93 (70)	95 (87)	1.744	0.84-3.62	0.136

*Composite of CSA-AKI and pre-operative beta-blocker use adjusted for age, sex, pre-operative creatinine, hypertension, atrial fibrillation, coronary artery disease, cerebrovascular accident, CPB time, combined surgery and cell saver blood transfusion.
CPB, coronary pulmonary bypass; CSA-AKI, cardiac surgery-associated acute kidney injury

Figure 1: Illustrates a receiver operating characteristic (ROC) curve for a multivariable cardiac surgery-associated acute kidney injury (CSA-AKI) predictor model. (area under the curve 0.702, SE 0.035, P<0.0001.
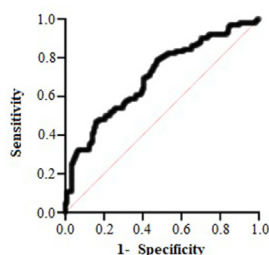
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Keywords:

**Topic: 03 - Cardiac Anaesthesia
EP.19**

Patient Blood Management in cardiac surgery: impact of an individualized strategy optimized by Erythropoietin and ferric carboxymaltose associated with ScvO2

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Introduction: Patient Blood Management (PBM) has been encouraged in cardiac surgery to prevent anemia- and transfusion-induced morbidity and mortality.(1) Preoperative anemia has an increasing prevalence due to an ageing population with more chronic diseases, and affects up to 20 to 40% of patients who are scheduled for cardiac surgery.(2) Preoperative anemia by its own is an independent factor of adverse outcome, but it is also an independent factor of allogenic red blood cell (RBC) transfusions, which are associated too with a higher mortality risk.(3) Therefore blood conservation strategy in cardiac surgery is aimed at reducing both risks.

Methods: This was a single-center, prospective, comparative, open label randomized trial. All patients signed a written informed consent. This trial protocol was approved by the local ethics committee (Sud Mediterrannée V 19.04.02.61948) and the French National Agency of Security of Drugs (ANSM) and was registered online at ClinicalTrails.gov (NCT04141631). An independent trial safety committee monitored trial benefit/risk ratio and safety for the entire duration of the study.

In the control group, postoperative RBC transfusion was performed if hemoglobin (Hb) <= 8g/dL; if Hb >8g/dL two administrations of oxide ferric sucrose (Venofer®, Viforpharma) were performed. In the STOP group (Optimisation Transfusion Strategy), EPO and CMF were administered if Hb <13g/dL the day before or at ICU admission the day of surgery; postoperative RBC transfusion was performed in case of Hb <8g/dL associated with ScvO2 <65%. The primary endpoint was the proportion of patients transfused with RBC units after surgery, during the ICU stay up to hospital discharge or postoperative day 28, whatever came first

Results: From January 2020 to August 2022, 128 patients were randomized: 63 in the control group and 65 in the STOP group with no statistical difference in demographic, pre- and intraoperative characteristics. The mean preoperative Hb was 12.9

Figure 2. Hemoglobin values during hospital stay
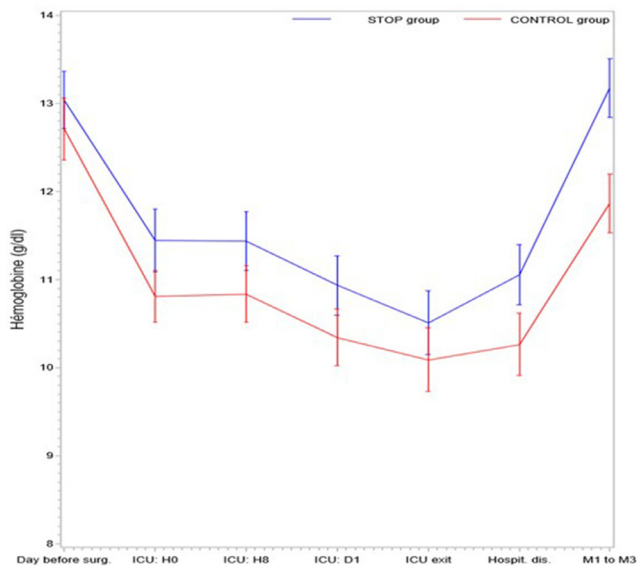
±1.3 g/dL. Postoperative erythrocyte transfusion incidence was significantly lower in STOP group: 14.52% vs 31.15%, respectively (p < 0.03) with RR 0.466 ([95% CI: 0.2291-0.9479] (Figure 1). In STOP group, all transfusions respected the ScVO2 threshold < 65% with a mean of 54.84 ±7.51%. Hb values were significantly higher in STOP group versus control Group from the first postoperative day to hospital discharge and one month after discharge, respectively (p<0.01) (Figure 2). There were no statistically significant differences between the 2 groups for the ICU or the hospital lengths of stay, or mortality. There were no significant difference between the 2 groups for any postoperative complications.

Discussion: In this study, an optimized and individualized PBM strategy with preoperative EPO and FCM the day associated with ScvO2 to guide postoperative erythrocyte transfusion reduced the incidence of transfusion by 50% and increased postoperative Hb concentrations at short and medium term.

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Keywords: 4

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EP.20

Comparison of ARISCAT risk score and LAS VEGUS risk score for post-operative pulmonary complications after open heart surgery. A Cross-sectional study

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Introduction: Postoperative pulmonary complications (PPCs) could lead to morbidity, mortality, and prolong hospital stay. This study has conducted to determine the risk factors and assess the incidence of PPC. The main objective of this study to compare the diagnostic accuracy of ARISCAT risk index score and LAS VEGAS risk score in prediction of PPCs taking pulmonary complication as gold standard in open heart surgery.

Methods: It is Cross-sectional study with consecutive sampling technique. Total 181 patients were included. Quantitative data is presented as simple descriptive statistics giving mean and standard deviation and qualitative variables are presented as frequency and percentages. Sensitivity, specificity, positive and negative predictive values, and diagnostic accuracies are also calculated.

Results: 181 post cardiac surgery patients were analyzed. Their Mean age, duration of surgery, height, weight, and BMI in our study was 51.32±10.61 years, 7.89±3.21 hours, 28.42±3.74 kg/m2, 153.4±10.85 cm and 69.9±6.87 kg. 127 (70.2%) were male and 54 (29.8%) were female. Sensitivity, specificity, positive predictive value, negative predictive value, and diagnostic accuracy of ARISCAT and Las Vegas scores for the prediction of postoperative pulmonary complication by taking development of postoperative PPC as gold standard. There was (94.9%, 4.65%, 76.1%, 22.9% and 73.4%) and (97.1%, 4.65%, 76.5%, 33.3% and 75.1%) respectively.

Discussion: Both ARISCAT and Las Vegas scores are a sensitive risk scoring tool for the prediction of postoperative pulmonary complications (PPC) undergoing open heart surgery with acceptable accuracy. Both scoring systems could be useful for identifying individual patients at a high risk. Both scoring tools are appropriate to use as a screening tool to predict PPC in patients after cardiac surgery.

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Keywords:

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Diagnostic significance of highly sensitive troponins in cardiac surgery

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Introduction: The level of troponins after cardiac surgery always exceeds the reference values, however, the interpretation of these changes is difficult. Aim: to determine the relationship between high-sensitivity cardiac troponin I and troponin T levels and the risk of developing heart failure (HF) within 24 hours after heart surgery.

Methods: A prospective, observational, single-center study included 70 patients undergoing elective heart surgery. Patients were retrospectively divided into two groups based on the development of HF in the first 12 hours after surgery.

Results: The levels of highly sensitive Troponin I (HsTI) in patients who underwent elective heart surgery without complications (n=57) were 61 times higher than the upper reference limit, with HF (n=13) - 111 times higher than the upper reference limit. The levels of highly sensitive Troponin T (HsTT) are 25.5 and 51 times higher, respectively. The level of HsTI at the end of the surgery can be a predictor of the development of HF, regardless of the use of cardiopulmonary bypass (threshold value 1483 ng/l), as well as a predictor of the need for inotropic support for 2 days or more, regardless of the type of operation (threshold value 1573 ng/l). There was a direct moderate correlation of HsTI at the end of the operation and 6 hours after the operation with cumulative hemohydrobalance for 24 hours, which was 60% higher in patients with HF than in patients without complications.

Discussion: In this study, we conducted a comparative assessment of troponin concentration with and without CVI. The HsTI levels in patients who underwent elective heart surgery without complications were 61 times higher than the upper limit of normal, whereas with CVI development, these were 111 times higher than the upper limit of normal, and the HsTT levels were 25.5 and 51 times higher, respectively.

Threshold values for the prognosis of CVI after heart surgery (with/without CPB) is perhaps the level of HsTI of 1483 ng/L at the end of surgery and the HsTT level of 178 pg/mL 24 h after surgery with CPB. Elevated HsTI level predicts the need for catecholamine support and the probability of a complicated postoperative period earlier than HsTT.

In the present study, we revealed the predictive ability of HsTI at the end of surgery and 6 and 24 h after surgery in determining the risk of CVI development and the need for inotropic support for 2 days or more.

In the present study, in addition to trying to determine the "signal" level of troponin in cardiac surgery, we identified factors associated with an increase in troponin level and CVI development postoperatively, namely, CPB duration and perioperative infusion volume.

Given the relationship between the rise in troponin levels and CPB duration, but not the period of myocardial ischemia, the systemic inflammatory response may influence the level of troponins. A factor in the increase in troponins was a significant positive perioperative hemohydrobalance.

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Keywords:

EP.22

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**Topic: 03 - Cardiac Anaesthesia
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Could plasma viscosity play a role in cardiac-surgery associated acute kidney injury?

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Introduction: Plasma viscosity (PV) regulates microcirculatory flow resistance and capillary perfusion during hemodilution. Low PV may reduce renal functional capillary density and contribute to cardiac surgery-associated acute kidney injury (CSA-AKI). The main objective of this study was to explore the asssociation between PV and CSA-AKI in patients undergoing CS with cardio-pulmonary by-pass (CPB).
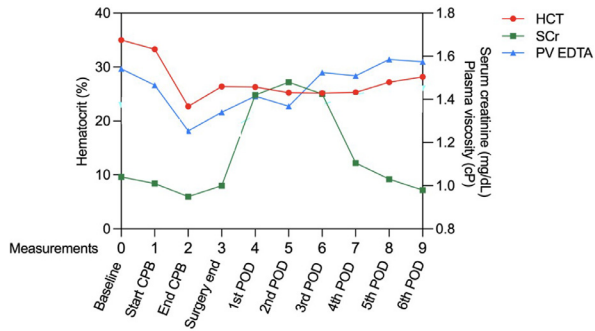
Figure 1. Time dependent perioperative trajectories of PV, hematocrit and serum creatinine on 17 patients with CSA-AKI.

Table 1. Risk factors for CSA-AKI (binary logistic regression)

	Univariate		Multivariate	
	OR (95% CI)	p	OR (95%CI)	p
BMI, kg/m²	1.15 (1.00-1.32)	0.04	1.26 (1.03-1.54)	0.02
CKD	5.45 (1.15-25.66)	0.03	9.71 (1.08-86.59)	0.04
Haemoglobin, g/dL	0.61 (0.41-0.91)	0.01	0.10 (0.01-0.93)	0.04
Baseline PV, cP	2.00 (0.05-78.00)	0.7		
End CPB PV, cP	2.38 (0.05-104.96)	0.6		

Methods: Prospective, single centre, observational study including 50 adult patients undergoing CS with CPB between February 1, 2020 and May 31, 2021. Clinical perioperative characteristics, short-term outcome, blood analysis and plasma viscosity were recorded at ten time points: before surgery, before and after CPB, at surgery end and on postoperative days 1-6. The CPB circuit was primed with crystalloid and succinylated gelatin, with a priming mix viscosity of 0.75 cP. During CPB, pump flow optimization rather than vasoactive therapy was used to achieve a target mean arterial pressure of 65 mmHg. CSA-AKI was defined according to KDIGO AKI criteria.

Results: The study population included 50 patients with a median age of 64 years and 80% male patients. The most common comorbidities were dyslipidemia (88%), arterial hypertension (82%), diabetes (30%) and chronic kidney disease (CKD) (18%). The median EuroSCORE II was 1.7, the median CPB duration was 110 minutes and hemofiltration was performed in 60% of cases. The average ICU admission SOFA was 6.4 ± 2 and the length of ICU stay had a median of 4 (IQR 3-6) days. CSA-AKI was observed in 17 patients (34%), with the following distribution of severity: 12 patients (24%) had AKI stage 1, 1 patient (2%) had AKI stage 2 and 4 patients (8%) had AKI stage 3. 88% of the patients developed CSA-AKI in the first 48 hours postoperatively. At baseline, patients who developed CSA-AKI had higher BMI (kg/ m2), more frequent CKD (%) and lower hematocrit levels (%) compared to those who maintained normal renal function (29.7 versus 27.1, p=0.04, 35% versus 9%, p=0.02 and 35 versus 39.5, p=0.007). There was no significant difference in PV (cP) between patients with CSA-AKI and those with normal renal function, both at baseline (1.54 versus 1.46, p=0.3) and at 48 hours postoperatively (1.41 versus 1.42, p=0.6). However, a significant decrease in PV (cP) was observed in CSA-AKI patients following intraoperative CPB hemodilution compared to baseline (1.54 versus 1.38, p<0.001). The time dependent PV, serum

creatinine and hematocrit in patients with CSA-AKI are represented in Figure 1. In binary logistic regression analysis, with CSA-AKI as the dependent variable, PV measured at baseline and at end of CPB did not demonstrate a significant relationship with CSA-AKI. Increased BMI, lower hemoglobin levels and pre-existing CKD were independent risk factors for CSA-AKI within the first 48 hours postoperatively (Table 1).

Discussion: The study found no significant association between PV and CSA-AKI. This could be explained by the exploratory design and the lack of statistical power. Further studies should address the relation between PV, microcirculatory alterations and organ dysfunction (1).

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Keywords: 11

Topic: 03 - Cardiac Anaesthesia
EP.24

Tubular and not glomerular damage affects cardiac surgery associated acute kidney injury

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Introduction: Cardiac surgery associated acute kidney injury (CSA-AKI) is a major complication associated with a high mortality.(1) Early prediction of AKI using biomarkers has become increasingly popular in recent years.(2) The localisation of the damage in the kidney has not yet been investigated. Hence, we aim to differentiate whether the damage is glomerular or tubular using two brand new biomarkers: Podocin(3), a biomarker that selectively reflects glomerular damage, and Nephrin, which reflects both glomerular and tubular damage. (4)

Methods: In this prospective cohort study, we analysed 63 patients who underwent elective cardiac surgery on cardiopulmonary bypass (CPB) at the Medical University of Vienna.

Urine samples were collected at the beginning of the operation, 30 min after start of CPB, at the end of surgery and on postoperative day 1 (POD1).
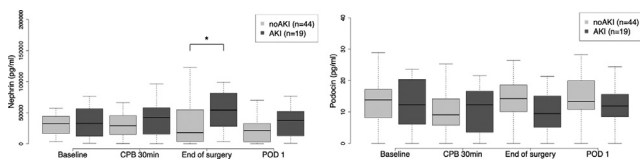
Quantitative measurement of Podocin as well as Nephrin was performed by an enzyme-linked immunosorbent assay (ELISA) with a 96-well plate human Podocin ELISA (Human Podocin ELISA Kit, Abcam, Cambridge, UK) and human Nephrin ELISA (Nephrin ELISA Kit, Lifespan Biosciences, Seattle, USA). Patients were grouped in two groups: patients without postoperative AKI and with AKI (noAKI, AKI) according to KDIGO-criteria.(5) Differences between groups were analysed using a student's t-test.

Results: We report 63 patients (25 female), with a mean age of 67.1±11,6 years. In 12.7% (n=8) CABG, in 57.1% (n=36) a valve, in 28.6% (n=18) a combined procedure and in one case (1.6%) a Bentall procedure was performed. According to the KDIGO-criteria 5, 19 patients (30.2%) suffered from acute kidney injury, none of them needed renal replacement therapy. The time on CPB was not significantly different (150.75± 55.91min for noAKI vs. 153.47±58.27min for AKI, p=0.8642). The SAPS3-Score tended to be higher in patients with AKI (45.74±10.76) than in patients without AKI (42.53±7.63), but the difference was not significant (p=0.2513).

The baseline of Podocin was 25.57±76.10pg/ml vs. 12.99± 8.20pg/ml (noAKI vs. AKI). For Podocin, we did not find any significant difference between groups at any timepoint.

The baseline of Nephrin was 31146.8±16602.52 pg/ml vs. 34786.3±24489 pg/ml (noAKI vs. AKI). For Nephrin, there were no significant differences between the two groups at baseline, 30min after start of the CPB or on POD1, but we found a significant difference at the end of the surgery (32356.6±34226,7 pg/ml for noAKI vs. 54120.5±33725.2pg/ml for AKI; p=0.02515).

Discussion: As there is only a difference in Nephrin-levels but not in Podocin-levels between patients with AKI and without AKI, our data suggests that patients with CSA-AKI have a damage to the renal tubule and not to the glomerulum.

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Keywords:

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EP.25

HYBRID CORONARY ARTERY REVASCULARIZATION BEFORE LIVER TRANSPLANTATION: A CASE REPORT

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Introduction: Patients undergoing liver transplantation (LT) commonly suffer from coronary artery disease (CAD) risk factors. Severe CAD requiring coronary artery bypass (CAB) has traditionally been a contraindication to LT, as cardiac surgery in end-stage liver disease (ESLD) is associated with poor outcomes and complications related to ESLD. In this case report, we present a patient who underwent LT successfully following Hybrid coronary revascularization (HCR) for critical multivessel CAD.

Methods: A 62-year-old male with ESLD secondary alcoholic cirrhosis and hepatocellular carcinoma (MELD-Na score 20, Child-Pugh Score C) was listed for LT. Coronary angiogram showed calcified multivessel CAD with severe stenosis in proximal left anterior descending artery (LAD), proximal ramus intermedius (RI) and circumflex artery with normal right coronary. Echocardiogram showed normal biventricular function with no valve pathology.

A multidisciplinary team discussed the case and coronary revascularization was necessary prior to LT. Percutaneous coronary intervention (PCI) of LAD would require multiple long stents with an elevated risk of thrombosis without dual antiplatelet therapy (DAPT) for 6 months. Conversely, non-LAD vessels could be treatable with short stents requiring 1 month of DAPT. Therefore, HCR (minimally invasive surgical revascularization of the LAD followed by PCI of the non-LAD vessels) would shorten the time of DAPT to 1 month, thereby reducing the LT waiting period.

Results: Standard ASA cardiac surgery monitoring was used. After induction, left lung isolation was performed. Fresh frozen plasma was transfused before surgery started. Mean arterial pressures were maintained > 65 mmHg with low-dose vasopressin infusion. A left anterior small thoracotomy was performed, left internal thoracic artery was anastomosed to LAD without cardiopulmonary bypass. Total blood loss was 500 ml with no transfusion. The patient was extubated one hour after surgery, pain was managed with morphine and an intercostal catheter with ropivacaine 0.2% infusion.

Five days after surgery, PCI of the RI with a Resolute Onyx Zotarolimus Eluting Stent was placed and DAPT was prescribed for 1 month.

After two months LT was performed, complicated by severe reperfusion syndrome and coagulopathy requiring massive blood transfusion. The patient remained intubated in Intensive Care Unit (ICU) with an open abdomen for 24 hours. After 4 days, the patient was extubated and discharged from ICU 3 days later. Following 28 days in rehabilitation, the patient went home. After 8 months, the patient remains well with excellent graft function and no cardiovascular complications.

Discussion: Severe CAD is considered a contraindication for LT. Conventional CAB in ESLD patients is associated with a prohibitively high risk of periprocedural mortality. Current advances in minimally invasive techniques of coronary revascularization can alter the trajectory of these patients, enabling their candidacy for LT. Patients, who's CAD cannot be treated with multi-vessel PCI or are not deemed healthy enough to tolerate a long wait period for LT due to prolonged DAPT necessary following complex PCI can benefit from HCR that can offer complete coronary revascularization with short-term DAPT. HCR can certainly broaden the spectrum of treatment options for patients with ESLD and CAD requiring LT.

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Keywords:

Topic: 03 - Cardiac Anaesthesia
EP.26

Our anesthetic experiences in patients undergoing pulmonary endarterectomy: A short-term anesthetic evaluation from a single center

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Introduction: Chronic thromboembolic pulmonary hypertension (CTEPH), occuring as persistent mechanical obstruction of the pulmonary arteries by thromboembolism can be treated surgically using pulmonary endarterectomy (PEA) (1). Perioperative management of these patients is an anesthetic challenge due to right ventricular failure, total circulatory arrest, reperfusion injury, residual pulmonary hypertension, and severe airway bleeding leading to the use of extracorporeal membrane oxygenation (ECMO). In this study, we aimed to share a sample from our institutional anesthesia practice under the robust evidence gathered in a short time.

Methods: Eighteen patients with severe, symptomatic CTEPH, who had undergone PEA under general anesthesia between November 2018 and April 2022 (8 male, 10 female; mean age: 55.44±18,62 years) were retrospectively evaluated in terms of anesthetic management.

Results: 55.5 % of the 18 patients undergoing PEA was NYHA Class III (New York Heart Association). All had anesthesia induction with a combination of benzodiazepine (midazolam) and fentanyl after invasive arterial blood pressure monitoring. Desflurane and fentanyl were used for maintenance of anesthesia. Muscle relaxation was achieved with vecuronium. Beyond standard monitorization, a central venous catheter and pulmonary arterial catheter were inserted in the right internal jugular vein. Preoperative and postoperative pulmonary artery pressure measurements were 88.7±23.3 and 48.3±21.0 mmHg, respectively. The mean duration of the surgery and anesthesia was 360±90.15 mins and 405±86.09 min, respectively. The median extubation time was 23 hours. Length of stay in the intensive care unit was 13 days, whereas it was 22 days for hospital stay. Eight patients died 6 months after the procedure.

Discussion: PEA is quite difficult for anesthesiologists because of the procedure itself and the population on which the procedure is performed. The primary aim of anesthesia management is to provide hemodynamic stability. The preoperative preparation and anesthesia methods should be the same as for patients undergoing open cardiac surgery. It is reported that as the experience regarding this procedure increases, success of the procedure increases, with better hemodynamic stability, less inotropic and vasopressor requirement and shorter length of hospital stay.

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Keywords:

Topic: 03 - Cardiac Anaesthesia
EP.27

Congenital Absence of left atrial appendage: A case report

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Introduction: The left atrial appendage (LAA) is one of the most common sites for thrombus formation in patients with atrial fibrillation (AF). Congenital absence of left atrial appendage (LAA) is an extremely rare cardiac condition and it is likely a congenital anatomical variation. We want to report a rare case of congenital absence of LAA diagnosed by transesophageal echocardiography evaluations before AF ablation procedure.

Methods: A 75-year-old man presented with a history of hypertension and drug resistant paroxysmal AF/ atypical flutter was admitted to the Cath lab for arrhythmia ablation. As part of the pre-procedure evaluation for an elective ablation, the patient underwent transesophageal echocardiography (TEE) to exclude LAA thrombus. The TEE imaging at multiple acquisition angles, the LAA could not be visualized and an absence of the LAA was suspected and confirmed by cardiac computed tomography (CT), which included 3D reconstruction. Both modalities showed no apparent intracardiac thrombus, and then he followed in having catheter ablation. Prior to pulmonary vein (PV) isolation, LA electroanatomic reconstruction with HDGrid catheter and Ensite X system (Abbot Medical, USA) was performed and the LAA was also not visualized around the usual root location of the LAA. The catheter ablation was finished successfully, and he has continued to do well with sinus rhythm.

Results: Within the first 4 weeks of embryonic life, the LAA develops from the primordial LA, which is formed through the adsorption of the primordial pulmonary veins. The LAA shows a finger- like structure arising from the anterolateral site of the main LA. The role of the LAA has not been elucidated sufficiently, but it has been suggested that the LAA assists LA contractile function and prevents an increase in LA pressure because of the LAA being more flexible than the main LA. Likewise, the LAA has considerable clinical importance as the most common site of thrombus formation leading to thromboembolic events. Such a clot may embolize peripherally, resulting in ischemic insult to the brain, kidneys and other organs supplied by the systemic circulation. It is therefore imperative to ensure the absence of any LAA thrombus before a patient with AF can be cleared for cardioversion or ablation. In most cases, such abnormal conditions are found incidentally during TEE or CT prior to catheter ablation for atrial fibrillation. A few cases were accompanied by persistent left superior vena cava as another congenital cardiac association documented by CT angiography.

Discussion: Congenital absence of LAA is an extremely rare cardiac anomaly and only a few cases have been reported so
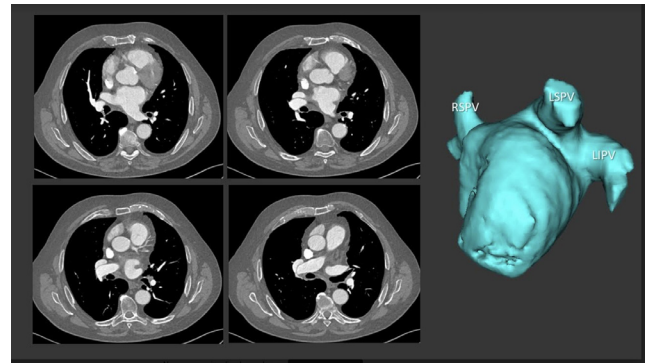
far. We have reported this case found by pre-procedure evaluation for an elective ablation. This entity was confirmed by 3D CT. Most of the previous cases similar to ours described a truly absent LAA, implying an influence on decision-making for anticoagulation treatment and LAA interventions. Multimodality imaging may be necessary to do a differential diagnosis.

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Keywords: 3

**Topic: 03 - Cardiac Anaesthesia
EP.28**

Association Between Extubation Time and ICU and Hospital Length of Stay in Cardiac Surgery

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Introduction: With the backlog of surgical care needed, improving hospital efficiency while optimising patient care is an ongoing health priority. This retrospective study aims to explore the association between time until patient extubation following cardiac surgery and intensive care unit (ICU) and hospital length of stay.

Methods: A national database was accessed to collect data from patients admitted to a tertiary ICU in 2022 following cardiac surgery requiring cardiopulmonary bypass. Patient demographics and clinical data including time to extubation following ICU admission, ICU length of stay, and hospital length of stay were collected. Preliminary descriptive statistics have been completed. Further inferential statistical analyses remain ongoing, including subgroup analyses and multiple regression analyses.

Results: Data from 437 patients were collected. Most patients were male (80.3%) with a median age of 63 (IQR 16). The median time to extubation was 9.6 hours (IQR 10.3), with a median ICU length of stay of 23.8 hours (IQR 22.8) and a total hospital length of stay of 6 days (IQR 4.4). Most patients were extubated after more than six hours (76.7%; n = 335) following ICU admission, with the minority extubated within six hours (23.3%; n = 102). Initial analyses found a longer extubation was significantly associated with ICU length of stay ($\rho = 0.537$, p <0.001) and hospital length of stay ($\rho = 0.481$, p <0.001).

Discussion: The findings of this study aim to describe the associations between extubation time and ICU and hospital length of stay in a sample of cardiac surgery patients at a tertiary hospital. Exploring associations will aid in assessing the potential effect on outcomes of early extubation after cardiac surgery.

References: .
Keywords: 11

Topic: 04 - Cardiopulmonary Bypass & ECMO
EP.29

RESULTS OF ANTEROGRADE NORMOTHERMIC REGIONAL CEREBRAL PERFUSION AND "BEATING HEART" TECHNIQUE IN NEONATAL AORTIC ARCH RECONSTRUCTION

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Introduction: We assessed the results of the anterograde normothermic regional cerebral perfusion combined with selective coronary perfusion ("beating heart" technique) in neonatal aortic arch reconstruction.

Methods: After obtaining the approval of the local ethics committee, we prospectively analyzed the results of neonatal aortic arch reconstruction in our clinic since July 2015 till 2022. In this period of time we performed 63 surgeries for hypoplastic aortic arch reconstruction in newborns. All the procedures were performed in antegrade normothermic regional cerebral perfusion and coronary perfusion. We used transcranial doppler, NIRS and ECG to assess perfusion efficacy.

Results: Median age was 11 [IQR 8.0;14.0] days, mean weight − 3292 (95% CI 3161 - 3424) g. Median perfusion time was 54 [IQR 46.0;72.0] minutes, median selective perfusion (anterograde regional cerebral and coronary) time was 26.5 [IQR 20.3;31.0] minutes. In all procedures body temperature was above 34 degrees Celsius. Prolonged sternotomy was required in 11 patients (17.5%). Median lactate level was 3.15 [IQR 2.8;4.3] mmol/L in 6 hours after the procedure. Mean lactate level in 24 hours was 3.52 (95% CI 3.08-3.96) mmol/L and in 48 hours it was 2.41 (95% CI 2.16 - 2.67) mmol/L. All the patients regained consciousness with no neurologic deficiency. Median ventilation time was 4.0 [IQR 3.0;6.0] days, median ICU discharge time was 5.0 [IQR 4.0;7.0] days. Six (24%) patients developed sepsis which required peritoneal dialysis. Thirteen patients (20.6%) had acute renal injure which required renal replacement therapy (peritoneal dialysis). There was no hospital mortality.

Discussion: Anterograde normothermic regional cerebral perfusion with coronary perfusion is a safe and decent technique in neonatal aortic arch reconstruction. It allows avoiding such detrimental risk factors as circulatory arrest, hypothermia, extensive perfusion and cardioplegia.

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Keywords:

Topic: 04 - Cardiopulmonary Bypass & ECMO
EP.30

RESULTS OF WHOLE BODY PERFUSION STRATEGY FOR AORTIC ARCH REPAIR UNDER NORMOTERMIA AND BEATING HEART TECHNIQUE IN PEDIATRIC PATIENTS

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Introduction: Based on our experience of normothermic perfusion for aortic arch obstruction correction in newborn, in 2019 we started to perform whole body normothermic perfusion strategy in children. Arch obstruction was a result of previous operations or, rarely, was primary disease.
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Methods: After local ethics committee approval we started prospective survey in patients with obstructive aortic arch

lesions. All patients were operatid in our hospital since October 2019 till December 2022. We performed 12 aortic arch reconstructions in normothermic selective cerebral, myocardial and lower body perfusion. We used transcranial Doppler, deep cerebral and renal oxymetry ans ECG.

Results: Patients median age was 5 [1,8;9,5] years, mean weight 23±4.9 kg. Mean perfusion time was 77±7 minutes. Selective perfusion time was 44±3.5 minuts. Temperature was 36C. Perfusion flow was 102.5 [76;125] ml/kg/min. ECG and cerebral oxymetry parameters were stable through the whole perfusion. Haemodynamics was stable through postoperavive course and LVEF was 71.7±2.7%. In 6 hours after the operation lactate was 1.96 [1.4;2.4] mmol/l, creatine phosphokinase-MB was 29 [19;34] U/l. In 24 hours creatinine was 52.8 [36;68] μmol/l. Median ventilation time was 5.5 [3;21] hours. Median ICU stay was 25 [24;52] hours. No neurologic deficiency was detected. Hospital stay was 14±1.45 days. We had no mortality.

Discussion: Based on our data we conclude that normothermic whole body perfusion was safe and effective for aortic arch reconstruction in children. This method has to be thoroughly monitored. This method allowed us to refuse from circulatory arrest, hypothermia, cardioplegia and prolonged perfusion.

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Keywords:

**Topic: 04 - Cardiopulmonary Bypass & ECMO
EP.31**

Awake Ecmella in Cardiogenic Shock: a Case Report

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Introduction: V-A ECMO support for patients affected by cardiogenic shock is burdened with a high rate of complications related to mechanical ventilation and prolonged sedation. The awake strategy has resulted in improved oral nutrition, reduced ICU delirium, and a lower incidence of post-ICU syndrome. Nevertheless, the V-A ECMO-related increase in afterload, combined with a reduction in Left Ventricular Ejection Fraction (LVEF), can cause pulmonary oedema. LV unloading is essential for patients' spontaneous breathing, and this could be obtained by implanting IMPELLA.

Methods: We describe a case report of a 68-year-old man with NSTEMI Acute Coronary Syndrome who was scheduled for elective surgical revascularization due to critical three-vessel coronary artery disease with a reduced LVEF of 42% and a normal right ventricular function. However the patient underwent emergency CABG (LAD and MO), due to worsening conditions and evidence of pulmonary oedema and cardiogenyc shock. Cause of the impossibility to wean from circulatory bypass VA-ECMO was adopted in surgical room as a bridge to recovery for the critical condition of the LV function.

The first day during our daily echo monitoring we observed a severe ventricular dilation and worsening of LV filling pressure connected to augmentation of intraventricular pressure. This increase of diastolic pressure caused implementation of intrapulmonary water and pulmonary edema. So we decided to implant IMPELLA 5.0 to unload the LV.

Results: The third day, due to improved lung function and resolution of pulmonary edema, we decided to extubate and wean the patient from mechanical ventilation while maintaining MAP consistently above 65 mmHg, supported by AV-ECMO at 4.2 L/min, IMPELLA at 1.8 L/min. In this way, The patient began to meet his relatives and gradually started a semi-solid diet. n

Contextually we worked to prepare ventricle to wean from ECMO; in this prospective view we decided to start levosimendan and landioblock in order to a rate control and inotropic strategy. We focused our goal on the best ventricle coupling.

On the ninth day, we transitioned from biventricular assistance to LV assistance only using IMPELLA 5.0 at 4.4 L/min. In this situation we decided to stop landioblock and start epinephrine.

Discussion: On 14th day, there was a recovery of LVEF to 35% and partial recovery of the basal and middle segments of the anterior wall of the left ventricle. This resulted in an improvement in diastolic dysfunction, a reduction in moderate to mild mitral and tricuspid regurgitation, and an improvement in estimated PAPs (32 mmHg). As a result, the IMPELLA support was discontinued and

pharmacological support with epinephrine and norepinephrine was continued.

References: Finally, after 18 days in the ICU, the patient was transferred to the cardiac surgery ward.
On the 30th day follow-up, the patient was alive and in good general condition.
Keywords:

Topic: 04 - Cardiopulmonary Bypass & ECMO
EP.32

LOW-RANGE HEPARIN AND PROTAMINE DETECTION – A SINGLE-CENTER PROSPECTIVE DIAGNOSTIC STUDY

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Introduction: Reliable detection of low-range heparin activity is essential to correctly assess heparin reversal after cardiopulmonary bypass. Current parameters are either not available point-of-care (anti-Xa), unspecific (aPTT), insensitive (kaolin ACT, kACT), or expensive (ROTEM). We aimed to assess the effects of low-dose heparin, protamine and their interaction on six parameters, including our previously proposed novel Sonoclot-derived parameter: the slope-45. It is determined by assessing the inclination between the manufacturer-reported activated clotting time point, and the point on the curve 45 seconds later (figure 1, beta version of custom-made application available in Shinyapps).

Methods: Blood samples were drawn from healthy volunteers (n = 10), and treated ex vivo with incremental low doses of heparin, protamine or their combination. Dilution was accounted for. We compared six parameters: anti-Xa activity (aXa, chromogenic method, Stago), aPTT time (STA-R MAX, Stago), kACT (iSTAT, Abbott), ROTEM HEPTEM over INTEM clotting time ratio (Sigma, Werfen) and gbACT and the novel slope-45 (Sonoclot, Sienco). Data were processed in R: we applied paired t-testing and performed ROC curve analysis for low-dose heparin, protamine and their combination.

Results: For the heparin cycles, obtained aXa levels were 0.032, 0.096 and 0.141 iu.ml-1 (D1-3), and for the combination cycles 0.099 and 0.0125 iu.ml-1 (D1-2) (Figure 2). In heparin-spiked blood, all parameters except iSTAT (AUC 0.74)
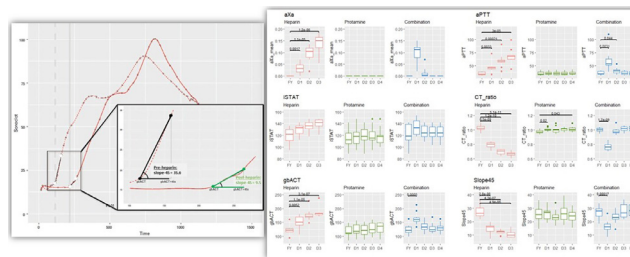
were able to reliably detect low heparin activity: ROC-AUC aXa 0.93, aPTT 0.94, ROTEM 0.94, gbACT 0.86, Slope45 0.91. Protamine independently did not affect the aXa, aPTT, kACT or Sonoclot-derived parameters, but mildly influenced ROTEM's clotting time ratio.

Discussion: We confirmed that the novel proposed measurement, the Sonoclot slope-45, has a high sensitivity for low dose heparin, which is retained in the setting of interacting protamine. It was insensitive to protamine in itself. We confirmed kACT's low sensitivity for low-dose heparin detection.

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Fig 1 - Sonoclot slope-45 determination
Red dotted Sonoclot curve: pre-heparin, red full Sonoclot curve: low-range heparin. In the zoomed image, black (pre-heparin) and green (post-heparin) lines connect the ACT point and the point on the curves 45 seconds later. The angle is termed the slope-45. gbACT, glass-bead activated clotting time.
Fig 2 - Boxplot of the six parameters
For each parameter, the incremental heparin (left), protamine (mid) and their combination (right) is plotted. Significant p-value changes to baseline (FY) are marked (paired t-testing). Heparin: FY, baseline; D1-3: incremental doses. Protamine: FY, baseline; D1-D4: incremental doses. Combination: FY: baseline, D1-D4: 25%, 62.5%, 100% and 200% reversal respectively.
Keywords:

Topic: 04 - Cardiopulmonary Bypass & ECMO
EP.33

Multicenter National survey on Cardiopulmonary bypass (CPB) Perfusion Practices during adult cardiac surgery

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Introduction: Objective: To describe the multicenter variations in perfusionist practices, which persists nationally, and to highlight the non-evidence based practice variations.

Study Design: Multicenter National web-based survey.

Place and Duration of Study: Multicenter National adult cardiac surgical units. The study was conducted from July 2018 till January 2019.

Methods: Patients and Method: The web-based questionnaire of the survey was sent to 24 adult cardiac anesthesiologists working in different cardiac centers nationally.

Results: The response rate was 62.5% (15/24). Sixty percent of the respondents were practicing in heart centers. The survey demonstrated that 66.6% (10/15) of the respondents used goal directed perfusion during CPB, with more than 80% (13/15) of the perfusionists used aseptic measures during handling CPB machine, consulted with the cardiac anesthesiologist in critical decision making and treatment of complications, and used protocol for trouble shooting during CPB. Sixty percent (9/15) perfusionists did not monitor continuous arterial blood gases and acid base balance. About 73% (11/15) monitor serum Lactate level while most of perfusionists did not monitor the continuous venous and cerebral oxygen saturation.

Discussion: The aim of this first ever conducted CPB Perfusion practices national study was to describe the multicenter variations in perfusion practices and to highlight the non-evidence based practice variations in context of the study results. We focused on multiple aspects regarding stan-dard operating procedures (SOPs) during CPB, monitoring or management standards during CPB, anti-coagulation management, cardioplegia solution details, transfusion triggers, pharmaco-logical interventions during CPB and CPB circuitry or pump details.

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Keywords:

Topic: 05 - Thoracic Anaesthesia & Surgery
EP.34

IMPACT OF ANAESTHESIA ON PERIOPERATIVE INFLAMMATION IN PATIENTS UNDERGOING LUNG CANCER RESECTION

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Introduction: New concepts in oncoanaesthesia suggest an evolving paradigm that the type of anaesthesia may influence postoperative complications and ultimate cancer recurrence in part through modulating immunological pathways. However, significant controversy remains regarding the molecular mechanisms involved. We hypothesised that higher sevoflurane exposure (taking into account duration and/or concentration) might affect the inflammatory responses reflected by routinely measured clinical inflammatory markers or pro- and anti-inflammatory cytokines and their balance following thoracic surgery. As secondary objectives we also investigated the influence of regional analgesia (epidural vs. paravertebral block (PVB)) and opioid pain management (fentanyl vs. morphine patient-controlled analgesia (PCA)) on perioperative inflammation.

Methods: Clinical data for 41 patients undergoing lung resection surgery for non-small cell lung cancer (NSCLC) from 2018 to 2020 were enrolled into the CICATRIx clinical study evaluating the clinical utility of liquid biopsies in thoracic surgery (IRAS ID: 198179). The current post hoc analysis includes clinical inflammatory markers (C-Reactive Protein (CRP) and Neutrophil-to-Lymphocyte Ratio (NLR)), selected cytokine panel (IL-6, IL-10, IL-17, IL-1B, TNF-B, and TNF-a) and a measure of cytokine balance (IL-6/IL-10 ratio), as outcome measures. Cytokine levels were measured using a human cytokine/chemokine magnetic bead panel. Data distribution and group comparisons and correlation analysis were performed with appropriate statistical analysis using SPSS (Version 28). $P < 0.05$ was accepted for statistical significance. Data are reported as mean+/-Standard Deviation.

Results: Proinflammatory markers CRP, NLR and IL-6 levels increased significantly (12-, 2.4- and 2.3 fold respectively) following surgery but no such changes were seen with IL-17, IL-1B and TNF-a. The levels of the anti-inflammatory cytokine IL-10 also increased by 13% resulting in higher IL-6/IL10

ratio (0.9±0.2 vs. 1.5±1.1, P=0.027) following lung resection. Sevoflurane exposure (average % concentration of 2 MAC and range of duration of 100-300 minutes had no statistically significant effect on inflammatory markers although there was a weak positive correlation with post-operative CRP, IL-6, and IL-10 levels (r=0.75; 0.15; 0.38; P=0.321;0.3; and 0.09, respectively); a negative correlation coefficient with postoperative NLR (r=-.04, P=0.381) and between sevoflurane exposure and cytokine ratio levels (r=-0.2, P=0.2).

Regarding regional analgesia, patients receiving epidural (n=3) had significantly increased post-operative CRP levels (214±106 mg/l, p=0.017) compared to the PVB (n=34, 106.7±79 mg/l). For the PCA analysis, 25 patients had morphine PCA whereas 9 patients had fentanyl PCA. There was no significant difference between fentanyl and morphine groups on post-operative CRP (149.5±105.6 vs.110± 88.5 mg/l, respectively, P=0.5) and NLR levels (12.6± 4.5 vs.14±7.9, respectively, P=0.28).

Discussion: The current study explored the potential influence of 3 different components of anaesthesia regimes on inflammatory aspects of lung cancer resections. Our data confirm a significant inflammatory response to surgery but most of these parameters were not influenced by the duration or concentrations of sevoflurane use, or the type of regional analgesia or difference between morphine and fentanyl-based PCA. Our observations also highlight the importance of considering both pro and anti-inflammatory events such as cytokine balance. Further clinical and molecular studies are needed to delineate the exact immune effects of anaesthetics in larger cohorts of thoracic surgical patients.

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Keywords:

Topic: 05 - Thoracic Anaesthesia & Surgery
EP.35

ANATOMICAL AND RADIOLOGICAL EVALUATION OF RADIOCONTRAST DYE SPREAD IN THE PARAVERTEBRAL SPACE IN CADAVERS. THE PIG-TAIL CATHETER, EPIDURAL CATHETER AND ONE-SHOT NEEDLE TECHNIQUE COMPARISON

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Introduction: The paravertebral block is a technique of regional anaesthesia widely used to relieve pain after thoracic surgeries. In clinical practice its variable and often unpredictable analgesic effect does not fully satisfy patients even if ultrasound-guided blockade is done. The above observation prompted us to evaluate the extent of spread of radiocontrast dye mixture in the paravertebral space in human cadaver, depending on the injection method (single shot through the Tuohy needle versus epidural catheter versus pig-tail catheter) using ultrasound-guided saggital oblique approach.

Methods: A prospective descriptive study was conducted in 2021−2022. Each of the 34 fresh frozen human cadavers enrolled to the study was subjected to bilateral paravertebral space puncture with Tuohy needle at the 5th thoracic spine segment under ultrasound guidance with linear probe in saggital oblique position. Each cadaver was prone during intervention. The distal needle orifice direction was always cephalad and in-line needle visualisation was applied. 20ml of metylene blue-iopromidum dye contrast was administered. It was done through Touhy needle on the one side in each cadaver and on the contralateral side, in 17 cadavers injectate was given through epidural catheter and in the other 17 via pig-tail catheter. The spread pattern was assessed by CT scan and further dissection.

Results: Radiocontrast dye was visible in all analyzed cadaver in each group in paravertebral space with the median (range) cephalo-caudad spread of contrast dye counting 4 segments (3-8) regardless of the administration method.

The median cephalad spread from the site of injection in 5th paravertebral space was one thoracic segment (no difference between the groups), and the median caudad spread was 3 segments for Touhy needle and 2 segments if epidural and pig-tail catheter are concerned with no statistical significance among methods used. The mediastinal (prevertebral) spread of dye was less frequent while performing injection through the pig-tail catheter versus Tuohy needle and epidural catheter. The contrast was more likely to remain in the site of administration in paravertebral space when pig-tail catheter was used. The radiocontrast solution was present in the intercostal space almost as frequently as in paravertebral space with no difference among interventions. The median ([IQR], range) spread to intervertebral foramina was 2([3], 0-5) for Tuohy needle injection, 3([2], 0-5) for epidural catheter and 0([1], 0-4) for
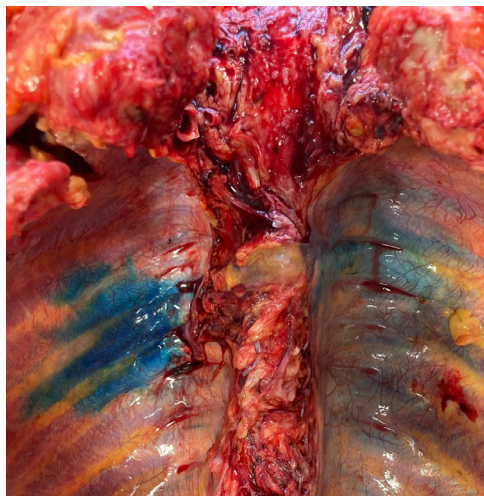
pig-tail catheter and was statistically significant (p=0.001). Radiocontrast was visible in epidural space only in 3 cases of epidural catheter administration

Discussion: Our study showed that ultrasound-guided saggital oblique approach to the paravertebral space is a reliable way to obtain multi-level spread of radiocontrast solution. However, its range is highly variable from and does not depend on the method of administration used. Moreover, contrast dye does not spread evenly in both directions from the injection site. All above may contribute to inadequate anesthesia in the clinical conditions.

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Keywords: 11

EP.36

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TOTAL INTRAVENOUS ANAESTHESIA VERSUS INHALATIONAL ANAESTHESIA AND INFLUENCE ON ACUTE POSTOPERATIVE PAIN AFTER THORACIC SURGERY

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Introduction: As the influence of total intravenous anaesthesia (TIVA) on acute postoperative pain has been predominantly studied in general surgeries, there is only limited data on thoracic procedures. Moreover, the selection of TIVA versus inhalational anaesthesia (VA) in thoracic procedures has been debated due to its effect on one lung ventilation (OLV) and the overall role remains unclear. Therefore, the objective of this study was to review postoperative pain intensity and analgesic consumption in post anaesthetic care unit (PACU) on postoperative day 0 (POD 0), postoperative day 1 and 2 (POD 1, 2) following thoracic surgical intervention (1, 2).

Methods: Following institutional approval, a retrospective observational study with prospective data collection was performed in a single tertiary cardiothoracic centre. Primary outcomes were postoperative numerical rating scale pain scores (NRS) at rest and movement in PACU and POD 1, 2, intraoperative analgesic requirements and postoperative morphine equianalgesic doses between TIVA and VA groups.

Results: A total of 70 patients were identified for the study, 11 were excluded due to incomplete data. Therefore, total patients included were n=59; TIVA (n = 31) and VA (n = 28). Both groups had similar characteristics in terms of age, gender, and ASA group. All patients received paravertebral block infusion and opioid based patient-controlled analgesia (PCA) postoperatively. Intraoperatively there was significantly higher usage of Clonidine 69 mcg vs 36 mcg (p = 0.005), and Ketamine 36 mg vs 23 mg (p < 0.001) in TIVA vs VA group respectively. The immediate postoperative NRS values (PACU) of the TIVA and VA groups were 5.3 ± 3.4 and 3.6 ± 3, respectively (p = 0.07), with no significant difference in between groups on POD 1, 2 (Figure 1). There was no difference in NRS on movement on any of the studied days (p = 0.543). Postoperative morphine consumption was similar in TIVA and VA group at PACU (POD 0) and on POD 1, 2 (p = 0.581) (Figure 2).

Discussion: Adequate postoperative analgesia remains challenging in thoracic procedures. TIVA did not improve postoperative analgesia or reduced postoperative opioid consumption significantly. Further larger study is required to establish benefit of these anaesthetic modalities in term of acute pain management.

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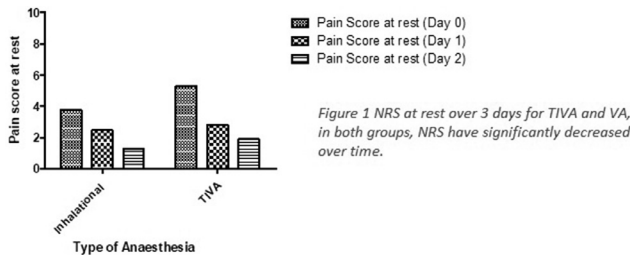
Figure 1 NRS at rest over 3 days for TIVA and VA, in both groups, NRS have significantly decreased over time.
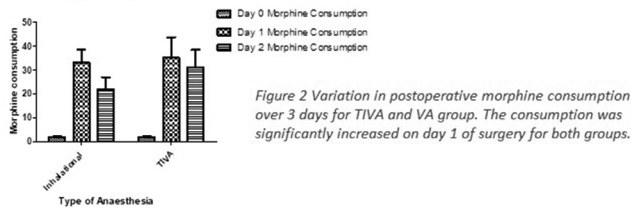
Figure 2 Variation in postoperative morphine consumption over 3 days for TIVA and VA group. The consumption was significantly increased on day 1 of surgery for both groups.

Keywords:

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CAN WE PREDICT THORACIC ADMISSION TO OUR INTENSIVE CARE UNIT?

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Introduction: There is currently no established guideline or scoring to predict thoracic intensive care unit (ICU) admissions. Our study aimed to screen all thoracic patients admitted to cardiothoracic ICU in order to determine cause of admission, identify high risk patients and review whether we adhere to our local guidelines.

Methods: This retrospective data collection included all thoracic surgical patients over a period of 7 months. Data was collected on pre-operative baseline characteristics and investigations, any intra-operative surgical events and reason for ICU admission. Our planned elective criteria for admission are all patients with pneumonectomy, sternotomy and myasthenia gravis, as there is no high dependency unit (HDU) on the surgical ward.

Results: There were a total of 315 thoracic surgeries and from this 44 patients (14%) were admitted to ICU. 5 patients were excluded due to their notes being unavailable and the remaining 39 patients were included in the data analysis. The most common procedure was lobectomy (31%, n=12), followed by lung decortication (23%, n=9) as shown in figure 1. The baseline characteristics are outlined in table 1. From the admission to ICU, 49% (n=19/39) were planned and 51% (n=20/39) were unplanned pre-operatively with 13% (n=5/39) re-admissions from the ward after surgery. All patients who fulfilled the local guidelines were admitted to ICU, however this only accounted for 39% (n=7/19) of the planned admissions. The most common reason for ICU admission was single inotrope (41%, n=16), acute respiratory failure (21%, n=12) and lastly bleeding/coagulopathy (13%, n=5).

Discussion: Overall, the data suggests the following characteristics as high risk for ICU admission: smoking history, respiratory or cardiac co-morbidity, older age, extremes of BMI, ASA 3 or more and complex surgery. Early identification of these high-risk patients allows for pre-operative optimisation and prioritising theatre lists. Notably, the most common reason for admission was brief use of an inotrope or non-invasive respiratory support. Since January 2023, we have staffed recovery with skilled ICU nurses that can accept level 2 patients with continuous monitoring and re-assessment. At the end of the day, there is a team discussion based on the patient's best interest as to whether ICU admission is required, and it will be interesting to re-analyse the effects of this on thoracic ICU admission.
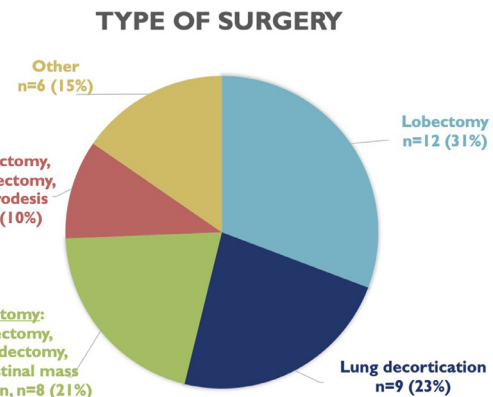
Figure 1: shows the procedure breakdown of the thoracic patients admitted to ICU

Baseline characteristic	Number of patients (n)	Percentage (%)
Body Mass Index (BMI) >25 (overweight/obese)	21	54%
ASA ≥ 3	28	72%
Respiratory co-morbidity	18	46%
Smoking Hx	27	70%
Cardiac co-morbidity	16	40%

Table 1: shows the baseline characteristics of the ICU admissions

References:
Keywords:

Topic: 05 - Thoracic Anaesthesia & Surgery
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RETROSPECTIVE OBSERVATIONAL STUDY OF PERI-OPERATIVE ANAESTHESIA MANAGEMENT AND OUT-COMES IN PATIENTS UNDERGOING PNEUMONECTOMY FOR LUNG CANCER IN A TER-TIARY CARE CANCER CENTRE

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Introduction: Patients undergoing pneumonectomy are at high risk of perioperative morbidity and mortality, both from respiratory and cardiovascular causes [1]. Therefore, they require more intensive perioperative management. Strategies such as lung protective ventilation and fluid optimization are recommended for better outcomes. The aim of the audit was to understand our current practice of perioperative management of pneumonectomy and its association with outcomes.

Methods: METHODS
After IEC approval, a prospectively maintained database of all patients who underwent pneumonectomy for cancer surgery in our hospital from Jan 2016 to October 2019 was analysed. . Primary objective of the study was to assess the incidence of intraoperative and postoperative complications in patients undergoing pneumonectomy. The secondary objective was to study the association of in-hospital mortality, respiratory and /or cardiac complications with perioperative factors. Waiver of consent was granted for the study. Data was collected from the electronic medical record and thoracic anaesthesia database maintained by Department of Anaesthesiology, Critical care and Pain. Data was entered into and analysed by statistical software-SPSS version 22.0

Results: RESULTS: 109 patients underwent pneumonectomy over the 4-year study period. The mean age of the patients was 44yrs. All patients received protective lung ventilation with mean tidal volume of 5 ml /kg ideal body weight. The median IV fluid administration intraoperatively was 1500 ml with median net fluid balance of 450ml at the end of surgery. 81 % of patients had epidural analgesia. The mortality rate was 6.4%. The morbidity observed were pneumonia (16.5 %), septic shock (11%), acute kidney injury (8%), atrial fibrillation (7.4%), bronchopleural fistula (6%) and myocardial infarction (1%). Mortality was higher in extrapleural pneumonectomy than standard pneumonectomy though not in right pneumonectomy when compared to left pneumonectomy. Deaths were observed in

patients with primary respiratory complications while none of patients with primary cardiovascular complications died.

We found significant correlation between mortality and composite morbidity endpoint and age>40yrs (p=0.041); intraoperative blood loss> 2000ml (p=0.017); and duration of surgery (p=0.015) on univariate analysis. Volume of intravenous fluid administration and net fluid balance did not show correlation with mortality, nor did the predicted postoperative FEV1. Mortality was high in patients with broncho pleural fistula, pneumonia, patients needing vasopressor infusion or mechanical ventilation following surgery

Discussion: Discussion
The mortality and morbidity in pneumonectomy was high but comparable to that described in literature[1,2]. Though our sample size was modest, it appeared that mortality and morbidity was primarily related to surgical complexity. Cardiovascular events were low and not associated with mortality in our patients. Younger patients in our cohort could have led to this observation.

CONCLUSION: Pneumonectomy is associated with high morbidity and mortality rates. Meticulous postoperative respiratory care and prevention of respiratory infections could help in reducing the complications.

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Keywords:

Topic: 05 - Thoracic Anaesthesia & Surgery
EP.40

Video-assisted thoracoscopic surgery (VATS) and multimodal anaesthetic approach in non-intubated patients

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Introduction: Video-assisted thoracoscopic surgery (VATS) has revolutionized the approach toward minimally invasive thoracic surgery. It is equally important to adopt an anesthetic approach that further reduces invasiveness. Currently, there is no correlating clear anesthetic guideline and therefore these specific recommendations are based on a combination of literature sources and clinical practice. Fundamentally this approach allows for non-intubated spontaneous breathing via a

laryngeal mask (LMA/I-Gel) with a multimodal analgesic pain management

Methods: These recommendations are for minimally invasive procedures such as pleural biopsy, indwelling pleural catheter insertion, bullectomy, or small wedge resection. This guidance is for short-selected procedures discussed and agreed upon with the surgical team. Using an LMA or I-Gel instead of a double-lumen endotracheal tube or bronchial blocker has many advantages including reduced airway trauma from direct laryngoscopy and the requirement of no muscle paralysis. The use of total intravenous anesthesia (TIVA) allows for target-controlled infusions with short-acting drugs (such as remifentanil and propofol) and the depth of anesthesia is monitored with continuous bispectral index (BIS) monitoring. The aim is to reduce perioperative opioid consumption and instead use a more novel approach with a single paravertebral block or erector spinae block pre-emptively. The analgesic approach is completed with intravenous administration of Paracetamol 1g before knife to skin, Ketorolac 30mg and Magnesium sulfate 2g before the end of surgery for best post-operative outcomes.

Results: We have been applying this approach for 6 months. There are 25 cases done using this technique and the preliminary results show promising results.

Discussion: Implementation of a multimodal approach in minimally invasive thoracic procedures is now the gold standard. These recommendations are associated with improved clinical outcomes, reduced pain and complications as well as overall enhance recovery with shorter hospital stay and better patient satisfaction

"Near awake" anesthesia for thoracic procedures

Dr Sali Urovi Consultant anaesthetist CTC Basildon UK
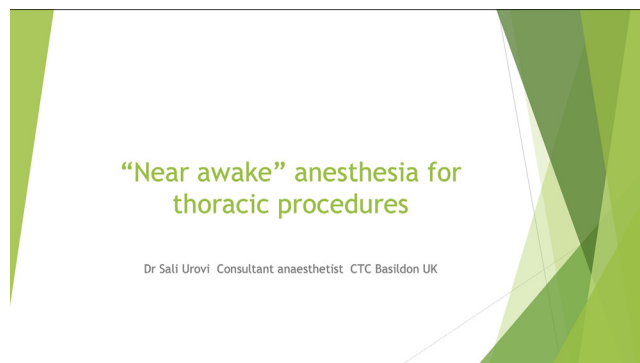
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Keywords:

Topic: 05 - Thoracic Anaesthesia & Surgery
EP.41

Video-assisted thoracoscopic surgery for thymectomy in myasthenia gravis patients, one year single centre experience

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Introduction: Objective of our study was to analyse the incidence of complications after thymectomy in patients with myasthenia gravis (MG).

Methods: Video-assisted thoracoscopic surgery were performed in twenty patients under general anaesthesia and mechanical one-lung ventilation (OLV) with a double-lumen tube (DLT) was used. Rocuronium bromide was administrated

in all patients and quantitative neuromuscular monitoring (TOF) was used. Sugammadex was used for the reversal of neuromuscular blockade in all patients.

Results: Twenty patients with myasthenia gravis underwent surgical thymectomy in the period between May 2022 and April 2023; mean age was 45 ± 17 years and majority were women (65%). The average duration of the operation was 159 ± 53 minutes. Postoperative complications were registered in five patients: two patients required postoperative non-invasive mechanical ventilation due to pneumonia, and 3 patients had wound infection and dehiscence. Spearman's correlation test showed that body weight (p-0,045), duration of illness in years (p-0.009) and the dose of prednisone (p-0.000) have influenced the occurrence of complications, in contrast to the dose of pyridostigmine and the intraoperative dose of rocuronium, where no statistically significant difference ware registered.

Discussion: Conclusions: Thymectomy is a part of multidisciplinary treatment of patients with MG. The post-operative complication rate is low and based on our results, the average dose of prednisone is the most important factor influencing the occurrence of complications.

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Keywords: 11

Topic: 06 - Vascular Anaesthesia & Surgery
EP.42

Customary paradigm in anesthetic management of carotid endarterectomy patients shifts in Covid 19 outbreak: experiences of an advanced practice centre

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Introduction: The limited capacities of healthcare providers and facilities in hospitals during the global threat Coronavirus disease-2019 (COVID-19) have resulted in postponing of surgeries in the order of priority. However, carotid endarterectomy (CEA), is a vascular surgical urgency. In this study, we discussed the modifications we had experienced in anesthetic management in our centre due to COVID-19 pandemic with advantages and disadvantages of the anesthesia techniques.

Methods: After Ethics Committee approval (KA22/396), the patients who underwent CEA procedure between May 2019-Jan 2020 by cervical plexus block and May 2020-Jan 2021 by general anesthesia were retrospectively evaluated according to the procedure dates. The demographic, intraoperative and postoperative data with regard to anesthetic management were recorded.

Results: This retrospective analysis included 69 patients undergoing CAE between May 2019- Jan 2021, at the same center. The first 37 patients had regional anesthesia (RA) and the last 32 had general anesthesia (GA). There was no difference in the aspect of demographic and operative data between the groups. The patients in the GA group had significantly higher ASA scores (p <0.001). There was no difference in length of stay in intensive care unit (ICU) and hospital, and 30 days' mortality rate.

Discussion: Baskent University Cardiovascular Surgery and Anesthesiology Departments had achieved 483 CEA operations under cervical (deep and superficial) plexus block from 2003 to January 2020 (1). Except for possible complications like; paroxysmal coughing, anxiety, shortness of breath, airway obstruction, dysphagia and need for emergent oratracheal intubation, cervical plexus block is a good and safe anesthetic practice for neurologic and motor function assessment, in these patients. However; we had to change our accustomed practice to general anesthesia after COVID-19 outbreak with regard to the generation of aerosols, droplets, and environmental contamination from exhalation, coughing, and sneezing, to lower the risks to team members. We not only had to manage airway patency with lower spread of aerosols and droplets, but also provide a complete emergence with adequate masking to prevent spreading contamination to other patients and the environment. The safety and success of intubated CEA patients in GA depends on adequate preparation, monitorization of cerebral oxygenation by near infrared spectroscopy, skill, and experience of the team. Considering the current evidence on the risks of COVID-19 transmission in the operating rooms, we suggest implementing radical changes and modifications to the anesthetic planning and perioperative management, even in regional anesthesia experienced cardiac teams, without any postoperative complications.

Indeed, COVID-19 has affected the practice of medicine in many ways. The shift in the customary paradigm at our center is one of these examples.

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Keywords:

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EP.43

Relationship between risk stratification scores and sublingual microcirculatory monitoring in major vascular surgery patients: preliminary results

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Introduction: Risk stratification is important in high-risk vascular surgical patients given the risk of the presence of various comorbidities, such as ischaemic heart disease. Analysis of microcirculatory variables and their correlation with morbidity and mortality scores could possibly give supplementary information about how to manage these patients in the perioperative setting.

The purpose of this study is to investigate the relationship between risk stratification scores and microcirculatory variables following aortic (A) and lower extremity bypass (LEB) surgery.
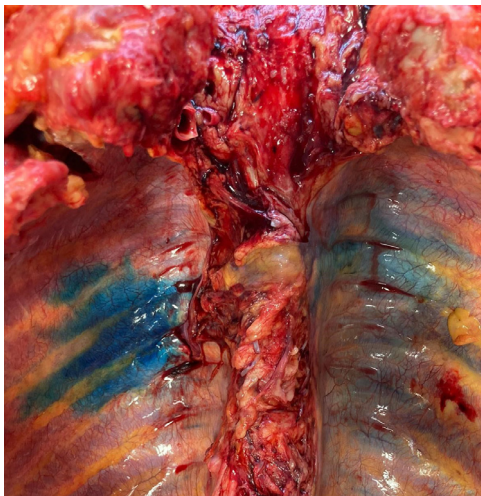
Methods: This retrospective observational study included patients scheduled for A or LEB surgery under general anesthesia at the Universitair Ziekenhuis Brussels between August 2021 and March 2022.

All patients underwent general anesthesia with desflurane in combination with remifentanil TIVA. Sublingual microcirculation was measured using the Cytocam-IDF apparatus (Braedius, The Netherlands) twice: 30 minutes before surgery (T1) and 60 minutes following surgery (T2). Measurements were made of the perfused vessel density (PVD) (mm/mm2), the total vascular density (TVD) (mm/mm2), and the microcirculatory flow index (MFI) (AU). Heart rate, arterial blood pressure, and lactate levels were monitored simultaneously. The amount of administered fluids, 24-hour diuresis, as well as the requirement for vasopressors and inotropes during surgery were noted. Subsequently, the Portsmouth Physiological and Operative Severity Score for the enUmeration of Mortality and morbidity (= P-Possum) and the Vascular Study Group of New England Cardiac Risk Index (= VSG-CRI) were established for each patient.

Results: The distribution of both study groups proved to be statistically homogenous. No statistically significant correlation could be established between the risk stratification scores (P-possum and VSG-CRI) and the preoperative microcirculatory variables (TVD 1, PVD 1, and MFI 1). Additional findings are displayed in the tables below.

Discussion: The shown correlations are weak, possibly due to the low number of patients enrolled. Our findings lead us to the conclusion that the postoperative TVD and PVD are correlated to mortality and morbidity, respectively, though a larger subset of patients needs to be investigated. In turn, the VSG-CRI appears to be related to the physiology, morbidity, and mortality scores, but not with the P-Possum's operational severity score.

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Topic: 06 - Vascular Anaesthesia & Surgery
EP.44

OPEN CONVERSION ABDOMINAL AORTIC ENDOGRAFT IN THORACIC EPIDURAL ANESTHESIA ALONE IN PATIENT WITH SEVERE COPD: A CASE REPORT OF SURGERY IN AWAKE PATIENT

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Introduction: A 79-year-old male was referred, with open abdomen surgical indication, for an asymptomatic iuxtarenal abdominal aortic aneurysm and type I endoleak with distal migration of an endovascular aortic − bisiliac prosthesis, after an endovascular correction done eight years before. This patient has severe COPD (Stage IV and oxygen dependent), new onset of renal failure (G4 KDIGO CKD classification), systemic arterial hypertension and severe peripheral vasculopathy. General anesthesia is not safe, because of the elevated perioperative risks of severe respiratory complications. We have decided for an awake surgery with an epidural anesthesia. Operative risks were assessed with the patient who accepted intervention.

Methods: Anesthesiologic Management

Patient has been conducted in operating room, where 2 large bore peripheral vein have been placed. Arterial catheter and advance cardiac output monitoring through radial artery has been established. A 19 Gauge epidural catheter was placed, through 17 Gauge Tuohy needle, in T9-T10 space and advanced for 5 cm in the epidural space. Epidural anesthesia induction has been obtained with bolus of Ropivacaine 0,5% 10 mL (50 mg) and Morphine 1 mg bolus. Ropivacaine 0,2% 4 mL/h epidural infusion has been started at the skin incision. After surgical isolation of aortic aneurysm, we have administered ropivacaine 0.5% 5 ml (25 mg) and lidocaine 2% 3 ml (60 mg) boost. Patient was maintained on spontaneous breathing with 3L/min oxygen supplementation through nasal cannula achieving peripheral oxygen saturation between 94% - 95%.

Surgical Management

A supra and sub-umbilical laparotomy was made (cut about 20 cm) with a retroperitoneum incision and iuxtarenal aorta isolation up to the iliac bifurcation. The endoprosthesis was removed and aneurysmectomy performed. Total clamp time was 48 minutes.

Results: The patient tolerated well the surgical procedure. Hemodynamic was stable during all the procedure. At the end of surgery patient was recovered in Intensive Care Unit for 24 hours. No major event has occurred during ICU admission, so the patient was discharged the day after surgery. Total hospital stay was 10 days.

Discussion: In literature, awake aortic surgery procedures have already been described. Novelty of our case is nor retroperitoneal approach, nor mini laparotomy surgical technique were suitable. We performed a thoracic epidural technique alone with laparotomic transperitoneal approach. Open abdomen aortic aneurysm morbidity and mortality vary from 12% to 26% and 4% to 6%, respectively. The association of epidural anesthesia (EA) with general anesthesia (GA) is linked to improved survival if compared to GA alone. The hemodynamic effects of EA maintain their benefits also when EA is used alone, as in our case. In fact, EA causes modulation of spinal sympathetic outflow and vasodilation with consequent reduction of left ventricle afterload and improved organ perfusion.

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Keywords:

Topic: 07 - Heart and Lung Transplantation
EP.45

Impact of dexmedetomidine treatment in patients undergoing orthotopic heart transplantation − A retrospective study

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Introduction: Prognosis of orthotopic heart transplantation (HT) has continuously improved, with a 10-year survival of 53%.[1] One major risk factor for mortality after HT remains warm and cold ischemia time, partly due to consequences of Ischemia and Reperfusion (I/R) injury. Further, acute kidney injury (AKI) and renal failure is a common complication after HT, independent of a pre-existing kidney injury.[2] Patients often require early or late dialysis, which is accompanied with

an increased risk of mortality. The alpha-2-agonist Dexmedetomidine (Dex) is commonly used as a sedative in cardiac patients and for prevention of postoperative delirium. Experimental studies have shown cardioprotective properties of Dex after I/R-Injury. Moreover, Dex also exerts a protective effect on renal function, especially considering AKI after cardiac surgery.[3] The impact of perioperative Dex treatment on patients undergoing HT has not been examined, yet. Therefore, this study investigated the influence of Dex treatment on myocardial and renal damage as well as delirium in patients undergoing HT.

Methods: The retrospective cohort study was approved by the ethics committee of the Heinrich-Heine University Duesseldorf and included adult patients who received an orthotopic heart transplantation at the University Hospital Duesseldorf, Germany between 2011 and 2021. The main exposure was intraoperative Dexmedetomidine treatment during HT surgery. The primary endpoint was myocardial injury measured by high sensitivity troponin T (hsTnT) at 24h postoperatively. Secondary endpoints were acute kidney injury (AKI) defined by KDIGO classification and occurrence of postoperative delirium up to 72h after HT. Univariate linear and logistic regression as well as multivariate logistic regression with adjustment for risk factors for AKI after HT were performed

Results: A total of 246 patients were screened and 161 were included into analysis. Patients with missing data regarding primary and secondary endpoints as well as patients who were treated with Dex only on the ICU but not during HT were excluded from analysis. Out of 161 patients, 37 received intraoperative Dex treatment and 124 were not treated with Dex. Univariate linear regression demonstrated no association between Dex and myocardial injury (p = 0.523), regression coefficient of -592 (95%CI -2419 to 1235). Further no association was detected for Dex and occurrence of postoperative delirium in univariate logistic regression (p = 0.70) with an odds ratio of 1.21 (95%CI 0.47 to 3.15). Univariate logistic regression of Dex and AKI showed a statistical association (p = 0.015) with an odds ratio of 0.40 (95%CI 0.19 to 0.84). However, after adjustment for known risk factors for AKI after HT, multivariate logistic regression demonstrated no independent association between Dex treatment and occurrence of AKI (p = 0.35), with an odds ratio of 0.65 (95%CI 0.26 to 1.61). Regarding 1-year mortality, no differences were detected between both groups.

Discussion: The results of this retrospective study show no beneficial effect of Dexmedetomidine treatment on myocardial injury, AKI and postoperative delirium in patients undergoing orthotopic heart transplantation in this cohort.

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Keywords:

Topic: 07 - Heart and Lung Transplantation
EP.46

A Case Report of Permanent LVAD with Torrential Aortic Insufficiency and Complex Femoral AV Fistula

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Introduction: A 51 years old patient with history of non ischaemic dilated cardiomyopathy and permanent Left Ventricular Assist Device (HeartMate 3) implanted 6 years ago, presented with worsening heart failure symptoms. Further investigation revealed Torrential Aortic Insufficiency and a complex right femoral AV fistula, which both require surgical intervention.

Methods: Preoperative Echocardiography reveals Torrential Aortic Insufficiency which causes low cardiac output, along with impaired right ventricular function, severe Mitral and Tricuspid Regurgitation. Further Right Heart Catherization shows a Cardiac Index (CI) of 1.59L/min despite having LVAD flows of 4.5L/min. In view of complexity of the surgery, a CT Venogram was undertaken for assessment of vascular access. It was found that there is a complex AV fistula in the right groin with a moderately high flow, as well as a prominent left inferior epigastric vein coursing anterior to the left common femoral vein and an occluded Right Internal Jugular Vein. Due to the concern of increase shunting to the right heart after Aortic Valve Replacement (AVR), a decision was made to repair the complex AV Fistula in the right groin prior to AVR.

Firstly, right groin AV Fistula Repair was done by Vascular Surgeon and a fistula between Right Superficial Femoral Artery and Right Common Femoral Vein was identified and directly closed, together with ligation of numerous arterialised veins. Left groin was exposed and Left Femoral Artery and Veins was directly identified and cannulated via Saldinger technique under TEE guidance. Cardiopulmonary Bypass (CPB) was initiated with gradual weaning of LVAD flows. Aorta was cross clamped and Aortic Valve Replacement done with a size 19mm Bioprosthetic Aortic Valve.

After AVR, CPB was gradually weaned with gradual increased of LVAD flows up to 3.6L/min. Despite being on inotropic support, right heart function remains poor with a dilated Right Ventricle and Inter-Atrial Septum displaced into Left Atrium. Decision was made for insertion of Temporary Right Ventricular Assist Device (RVAD) in view of poor right ventricular function and difficult vascular assess for renal replacement therapy if required. Existing Right Femoral Vein drainage cannula from CPB was then converted to drainage cannula of RVAD and a tunnelled graft with return cannula to Pulmonary Artery was inserted. Permanent LVAD flows was established at 4L and Temporary RVAD flows at 3.5L/min, with slight improvement of Mitral and Triscuspid Regurgitation.

Results: Subsequent stay in Intensive Care Unit has been complicated with respiratory infection and Acute Kidney Failure. Tracheostomy was performed and patient was on prolonged respiratory weaning before further attempts of temporary RVAD weaning and explantation.

Discussion: Aortic Insufficiency is a common cause of insufficient cardiac output from LVAD, and a surgical repair or replacement of Aortic Valve is always challenging due to nature of a redo surgery. In this patient, this is further complicated by a Complex Femoral AV fistula which could increase shunting and causes overload of Right Heart and Right Heart Failure. With a limited options of vascular assess, thorough planning pre-operatively is especially important to ensure a good outcome of this complex surgery.
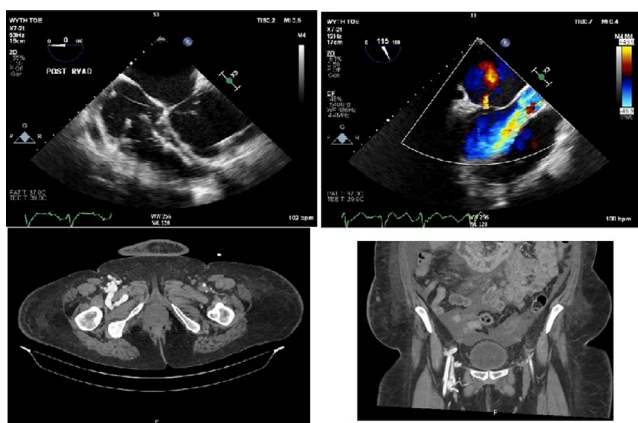
Keywords:

Topic: 08 - Organ Function & Protection
EP.47

Cerebral blood flow variations during on-pump coronary artery bypass grafting and incidence of postoperative delirium: a prospective observational single-center cohort study

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Introduction: Postoperative delirium (POD) after cardiac surgery increases ICU and hospital LoS, and postoperative mortality(1). Although its pathophysiology remains unclear, there could be a correlation between hyperperfusion during cardio-pulmonary bypass (CPB) and POD(2, 3)

Our study aimed to evaluate whether variations in on-pump cerebral blood flow (CBF), in comparison to the pre-anesthesia and pre-bypass values, are associated with postoperative delirium following coronary artery bypass grafting (CABG) surgery.

We aimed to detect significant differences in the ratio between the on-pump Mean Cerebral Artery Velocity (MCAV) values and the pre-anesthesia values of MCAV (on-pump MCAV/pre-anesthesia MCAV), in patients with and without POD.

Secondary outcome was to detect group differences in the ratio between the on-pump and the pre-CPB MCAV values (on-pump MCAV/pre-CPB MCAV).

Methods: 95 patients scheduled for elective on-pump CABG, either isolated or combined with single valve replacement, were enrolled.

Right (MCAV) was assessed using Transcranial Doppler before anesthesia induction, before CPB, every fifteen minutes during CPB, and after weaning from CPB. Individual values, measured during CPB, were normalized to the pre-anesthesia and pre-bypass values.

POD was assessed using the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU) during the first 48 post-operative hours and with the 3-Minute Diagnostic Interview for Confusion Assessment Method (3D-CAM) on the fifth post-surgical day.

Results: Overall POD incidence was 17.9%.

At 30 minutes of CPB, MCAV rel_0 was higher in patients with POD than in those without but at the limit of statistical significance.

MCAV rel_0 at 45 minutes after CPB was significantly higher in POD group (0.87 ± 0.17) than in no-POD group (0.68 ± 0.24), p = 0.04.

MCAV rel_1 at 30 and 45 minutes after CPB initiation was higher in POD group than in no-POD group, albeit at the limit of statistical significance.

MCAV rel_1 was > 100% in POD group, but not in no-POD group.

Discussion: Significant differences in MCAV rel_0 and MCAV rel_1 became evident after 30 minutes from the start of CBP.

Moreover, in the group of patients developing POD, we found values of MVAC rel_1 superior to 1, which is supposed to be a sign of cerebral hyperperfusion developing during CPB, while the no-POD group showed stable MCAV rel values throughout the CPB period.

MCAV during CPB were augmented relative to baseline values in patients developing POD after CABG. Monitoring cerebral blo

Figure 1. Comparison of MCAV rel_0 in the two groups of patients at different CPB times.
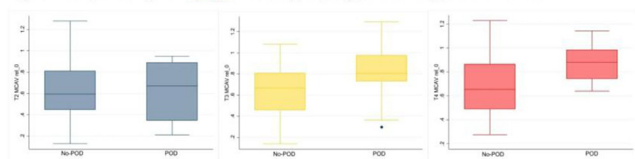
Figure 2. Comparison of MCAV rel_1 in the two groups of patients at different CPB times.
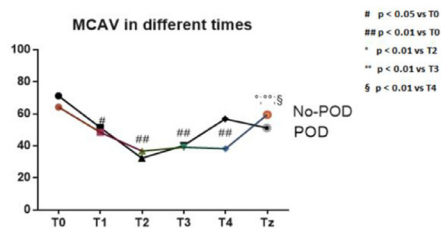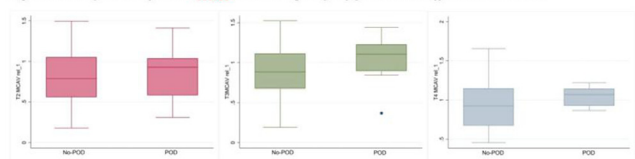
MCAV expressed in cm/s.

T0 = before anesthesia induction; T1 = before establishing CPB; T2 = 15 minutes after establishing CPB; T3 = 30 minutes after establishing CPB; T4 = 45 minutes after establishing CPB; Tz = after CPB weaning.

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Keywords:

Topic: 09 - Myocardial Protection
EP.48

Inspired Oxygen Concentration of 80% Worsens Left Ventricular Global Circumferential Strain in Anaesthetised Patients with Coronary Artery Disease

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Introduction: Although oxygen is the most widely used drug in medicine, clinical practice and formal recommendations regarding oxygen administration during general anaesthesia (GA) remain inconsistent. Oxygen has potent vasoconstrictive properties which may also act on coronary vasculature. In patients with coronary artery disease (CAD), a population at increased risk for perioperative cardiac complications, hyperoxic vasoconstriction may potentially trigger myocardial ischaemia. One of the most sensitive and earliest markers of myocardial ischaemia is myocardial systolic dysfunction, which can be assessed by myocardial deformation analysis from transoesophageal echocardiography (TOE) cine loops, also known as strain. While strain has been traditionally mainly investigated in longitudinal orientation, more recent data also appreciate the role of circumferential strain analysis in short-axis images. We investigated whether global circumferential strain (GCS) analysis detects any effects on systolic function when marked hyperoxia is induced by use of FIO2=0.8 in anaesthetised CAD patients.

Methods: For this randomized, controlled crossover clinical trial, 106 CAD patients scheduled for elective coronary artery bypass graft surgery were prospectively recruited. After induction of general anaesthesia and prior to surgical incision, FIO2 was first titrated to either a normoxaemic (FIO2=0.3, SpO2 95-98%) or a hyperoxic state (FIO2=0.8). Thereafter, three left ventricular short axis cine loops (basal, mid-ventricular, apical) were acquired with TOE. The opposite FIO2 level was then targeted and a second set of TOE images loops in the identical views was acquired. Subendocardial GCS of the left ventricle was quantified by a blinded reader and compared between FIO2 levels (figures 1 and 2). Independently, the burden of CAD was calculated by counting the number of myocardial segments (AHA 16-segment model) perfused by vessels with angiographically defined stenoses.

Results: Patients were aged 66 (44-81) years, 87% male. The majority (59%) had 3-vessel disease, with 33% presenting with 2-vessel disease and 8% with single-vessel disease. Overall, GCS significantly worsened from -26.0±6.9% at normoxaemia to -25.5±7.2% at hyperoxia (p=0.042, n=98). Regression analysis indicated that patients with better GCS at normoxaemia (r=-0.312, p=0.002), and those with fewer myocardial segments subtended to coronary stenoses (r=-0.246, p=0.015) showed poorer GCS at hyperoxia.

Discussion: LV systolic function of anaesthetised CAD patients as assessed by GCS analysis was, in general, better when inspired oxygen concentration was titrated to 30%. Nevertheless, patients with more myocardium at ischaemic risk and/or worse strain at normoxaemia showed better GCS at hyperoxic conditions. Consequently, for support of their LV function under GA, patients with CAD may benefit from individualized FIO2 titration based on the known amount of myocardium at risk and on their normoxaemic GCS.
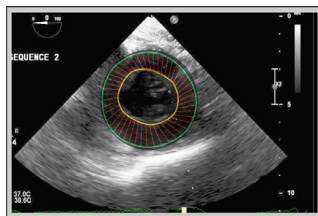
Figure 1: End-diastolic (*green*) to end-systolic (*yellow*) endocardial displacement (*red*) overlayed on the end-systolic 2D short axis basal (mitral valve) plane image.
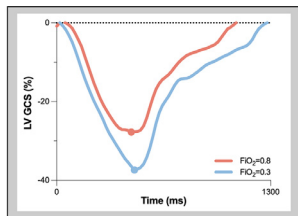

Figure 2: Global left ventricular circumferential strain (LV GCS) in one patient either during normoxaemic (blue) and hyperoxic (red) F_iO_2. Systolic peak strain (dots) worsened (i.e. less negative) under hyperoxia.

References: n/a
Keywords:

Topic: 09 - Myocardial Protection
EP.49

ADENOSINE IN WARM BLOOD CARDIOPLEGIA: A RANDOMIZED, DOUBLE-BLINDED, PLACEBO-CONTROLLED TRIAL

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Introduction: Myocardial protection with cardioplegia is a major issue in cardiac surgery since inadequate cardiac protection increases the risk of postoperative cardiac dysfunction. Whether adenosine as an adjunct to intermittent warm blood cardioplegia has an added value remains unclear (1, 2). Therefore we investigated if the addition of adenosine to standard intermittent warm blood cardioplegia reduced post-operative myocardial injury in patients scheduled for minimal invasive mitral valve surgery with endo-aortic clamping.

Methods: from Feb 2016 − July 2019, ninety-four patients scheduled for minimal-invasive mitral valve surgery are were included in this randomized, double-blinded, placebo-controlled trial, at the Amphia Hospital (Breda, the Netherlands). The primary end point is 6-hour Cardiac troponin T (cTnT) release. Secondary cardiac end point is 18-hour postoperative Area Under the Curve (AUC) release of cTnT. Routine blood samples: pre-operatively (T0); post-operatively, at arrival at ICU (T1), 6 hours after arrival at ICU (T2), and 18 hours after arrival at ICU (T3).

All patients received through an endo aortic balloon (EAB) a 0.4mg adenosine bolus just before inflating the EAB. After inflation of the EAB, antegrade warm blood cardioplegia is induced via bolus and maintained via intermittent application of the 20:1 ratio of oxygenated blood and hyperkalemic

cardioplegic solution. One group received adenosine-enriched cardioplegic solution (A group), and the second group received cardioplegic solution (P group), cardioplegia is repeated every 20 minutes in both groups.

Results: The median 6-hour cTnT release was 0.26ng/L (IQR 0.22) in the A-group and 0.28 ng/L (IQR 0.28) in the P-group (P=0.48) There was also no significant difference in the18 hour postoperative AUC of cTnT (Adenosine Median 3.61 and IQR 4.35; Placebo Median 4.38 and IQR 2.10), P=0.34. Post-operative atrial fibrillation occurred in 13% in the A-group and 10% in the P-group.

Discussion: Adenosine as an added adjunct to intermittent antegrade warm blood cardioplegia in minimal invasive mitral valve surge did not attenuate postoperative myocardial injury.

	Placebo group			Adenosine group		
Bolus (per 25 ml) Syringe	Potassium chloride	20 mmol	= 10 ml	Potassium chloride	20 mmol	= 10 ml
	Magnesium sulfate	1000 mg	= 10 ml	Magnesium sulfate	1000 mg	= 10 ml
	Lidocaine	100 mg	= 5 ml	Lidocaine	100 mg	= 5 ml
Maintenance (total 535 ml) Infusion bag	Potassium chloride	60 mmol	= 30 ml	Potassium chloride	60 mmol	= 30 ml
	Magnesium sulfate	500 mg	= 5 ml	Magnesium sulfate	500 mg	= 5 ml
	Sodium chloride	0.9 %	= 500 ml	Adenosine	1000 mg	= 500 ml
End concentration Maintenance (per 1000 ml bloodflow 1:20 dilution)	Potassium Magnesium sulfate	5.6 mmol/L 46.7 mg/L		Potassium Magnesium sulfate Adenosine	5.6 mmol/L 46.7 mg/L 93.5 mg/L	

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Keywords:

Topic: 09 - Myocardial Protection
EP.50

KINETICS OF CARDIAC MYOSIN BINDING PROTEIN C AFTER CARDIOPULMONARY BYPASS

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Introduction: Cardiac myosin binding protein C (cMyC) is a novel biomarker of myocardial injury that has been shown to rise and fall faster than cardiac troponins after a defined

ischaemic insult. Previous work has compared the two bio-markers starting at 6 hours after coronary artery bypass graft-ing. However, the kinetics in the early period after revascularisation are unknown and early assessment of myocardial injury might allow intervention for high risk cases. Our objective was to assess the kinetics of cMyC release in the first 6 hours after cross clamp release.

Methods: We recruited patients having between two and four coronary artery bypass grafts (n=13, n=2 patients also had valve replacements). Written consent and ethical approval was obtained. Blood was taken from arterial catheters placed during the conduct of anaesthesia, before surgery and then at cross clamp release, every 30 minutes for two hours and then every 60 minutes for 4 hours, and finally at 24 hours. Samples were centrifuged and frozen within 3 hours of collection. Cardiac troponin T (cTn) concentration was measured using a Roche assay in our hospital laboratory whilst cMyC was assayed in-house using methods previously described by the authors. Data was compared with two way mixed-effect ANOVA with post-hoc Šidáki's multiple comparisons test. Data graphed as Mean ± SEM. n = 13 for cTn and n=10 for cMyC (one excluded due to missing samples and two excluded as statistical outliers).

Results: The mean age was 68 (range 51 to 81). Renal function as assessed by estimated glomerular filtration rate was >60 ml/min/1.73m2 in all cases. Six patients were diabetic and five were current or recent tobacco smokers. There was considerable inter-patient variability in the serum concentration of cMyC attained after cardiopulmonary bypass. Two had baseline cMyC levels greater than ten times the upper limit of normal but no clinical or biochemical characteristics otherwise united them. These patients had large cMyC concentrations throughout the time points, tending to decrease slightly on clamp release, perhaps because of dilution from the bypass circuit, and then rise again in the following hours. They were excluded from the analysis pending further validation, although a more moderately elevated baseline was seen in a third patient. When compared with high-sensitivity troponin, cMyC concentrations showed greater inter-individual variability but rose to a level that was statistically distinguishable from baseline at the 3 hour timepoint, as opposed to 5 hours for the more established biomarker.

Discussion: Elevated baseline cMyC may reflect an ongoing ischaemic injury in a population of patients awaiting coronary artery bypass grafting and this finding warrants further validation. Improvement of the cMyC assay and a larger dataset might allow pre-operative risk stratification and rapid post-operative assessment of myocardial injury. Given the interest in myocardial injury in non-cardiac surgery (MINS) it would be interesting to assay cMyC in other patient populations.
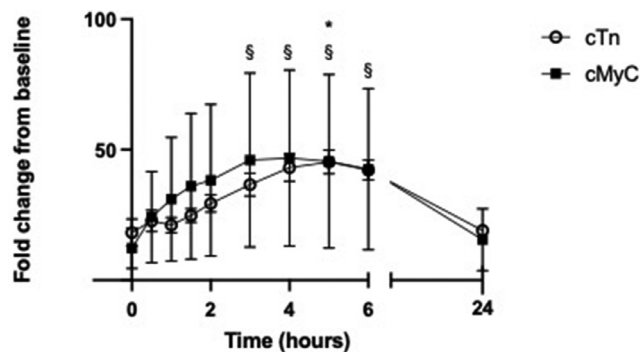
* = cTn timepoint *versus* cross-clamp release
§ = cMyC timepoint *versus* cross-clamp release

References: Not allowed.
Keywords:

Topic: 10 - Haemostasis
EP.51

EXPERIENCE OF THE COAGULOPATHY MANAGEMENT AFTER LEFT VENTRICLE ASSIST DEVICE IMPLANTATION IN CICU

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Introduction: Chronic heart failure is a growing health problem, and it is associated with high morbidity and mortality. Left ventricular assist devices LVADs are an important treatment option for patients with end-stage HF. As a bridge to heart transplantation and also as a permanent therapy destination therapy. Implantation of LVAD is associated with a high risk for bleeding complications and thromboembolic events, including pump thrombosis and ischemic stroke. Bleeding is the most frequent complication, occurring in 30% to 60% of patients, both early and late after LVAD implantation. Non-surgical bleeding (NSB) coagulopathy is a major complication after assist device (LVAD) implantation.

Our study aimed to assess human prothrombin complex administration effectivity on patients after assist device implantation.

Methods: A prospective observational nonrandomized single-centre study was carried out at the National Research Cardiac

Surgery Center, Astana, Kazakhstan. All consecutive patients with advanced heart failure who underwent surgery − left ventricle assist device implantation between January 2022 and April 2023 were included. The indications for placement were: DT. The observation was conducted in the perioperative period. A day before surgery and immediate postop period in ICU. All patients had a standard scheme of anaesthesia and surgery protocol.

Inclusion criteria: LVAD patients in the perioperative period in ICU.

Exclusion criteria: LVAD patients who denied participation in the study.

All patients had a standard scheme of intensive care in the postop period.

Significant bleeding was detected on more than 450 ml level in 180 min.

All patients had received Human prothrombin complex (dosage was calculated according to manufacturer recommendation) intraoperatively in combination with fresh frozen plasma (FFP) 1000 ml, just after cardiopulmonary bypass (CPB) weaning and reversion of heparin by protamine (dosage ratio 1/1.2).

Laboratory data (routine coagulogramma). was collected before surgery, after surgery in ICU and 20 hours after surgery. Thromboelastography (TEG) was conducted once in the immediate postop period.

Results: Total number of patients - 44.
 Male - 85%, female − 15%.
 Mean age -49.58±12.32
 BMI− 27.93±7.17
 Mechanical ventilation (hours) −7.38±3.56
 Mean ICU stay − 2.83±1.03 days.
 Mean CBP time (min) - 90.65±29.5
 Mean Cross clump time (min) − 12.58±19.35
 Laboratory data: Coagulogramma

TEG was measured in the immediate postop period. All samples of TEG were in the normal range.

The mean haemoglobin level decreased from 131.09 to 98.65 g/l due to surgery.

The mean volume of blood loss in 24 hours was detected on the level − 483.94 ml.

In complications, we did not find Transfusion-related acute lung injury (TRALI) or ischemic stroke.

Delirium was detected at 12 patients.

Discussion: Preventive administration of the Human prothrombin complex in combination with fresh frozen plasma in the immediate postoperative period may be beneficial for patients after left ventricle assist device implantation. Administration of the Human prothrombin complex allows for decreasing hemotransfusion of blood components in the postoperative period.

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Keywords:

**Topic: 11 - Evaluation of Methods & Techniques
EP.52**

Audit on Post operative Hypothermia after Elective Cardiac Surgery

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Introduction: Hypothermia, defined as a core body temperature less than 36°C, is a common occurrence in the post operative period after cardiac surgery. A temperature of less than 35.5°C in the post operative period is known to be associated with significant morbidity and mortality.

An audit cycle was conducted with the primary aim to assess the temperature management practice and its outcome in the department.

Methods: 37 adult patients undergoing elective cardiac surgery were included for this audit .The patients undergoing re explorations and chest closures, emergency surgery, prolonged CPB duration(>240mins) and patients undergoing hypothermic CPB were excluded. The first temperature recorded on the patients' arrival to the ICU after the surgery was recorded. The practice of intra operative temperature management was assessed by a survey sent out to 9 cardiac anesthetic consultants.

The findings of the audit were presented in the monthly anesthetic team meeting and a protocol was made to make modifications to the current practice. In order to aid implementation of the protocol a temperature management checklist was installed in all the cardiac surgical - anesthetic rooms.

A re - audit was conducted 3 months later - the temperature on ICU admission of a total of 43 patients and a survey of temperature management practice of consultants were assessed using the same methods as for the audit.

Results: At the audit it was found that 10 out of the 37 patients (27%) of the patients had a temperature less than 36°C on arrival at the ICU with a minimum recorded temperature on arrival to ICU of 34.6°C . The temperature management practice was non - uniform in our department with a 100% use of HME and forced air warming device (Bair Hugger) whereas 44% used the fluid warmer, 22% did not use the fluid warmer and 33% of the members used the fluid warmer in selected cases.The heated mattress was not used routinely.

The re audit conducted 90 days after the team meeting included 42 adult patients with the same criteria as the before. The results showed that 3 out of 42 patients (7%) of the patients had a temperature less than 36°C on arrival at the ICU. The temperature management practice was also more uniform with a 100% use of the HME, forced air warming and the heated mattress and 80% of the

consultants were using fluid warmers in all patients and 20% in selected patients.

Discussion: This audit cycle demonstrated that owing to the non uniform practice in the department - post operative hypothermia was a significant problem in our cardiac surgical ICU. The NICE guidelines for hypothermia(2016) mention specific targets and methods to use for all surgeries but does not take into account the special considerations required for patients undergoing cardio pulmonary bypass. It appears from the above results that all 4 warming devices need to be used together for every patient in order to prevent post operative hypothermia in cardiac surgical patients.

A. Post Operative Temperature

B. Department Practice for Temperature Management
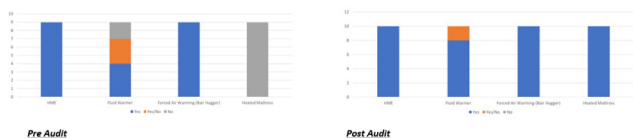
References: NICE Guidelines: Hypothermia: prevention and management in adults having surgery; 2016
Keywords: 11

Topic: 11 - Evaluation of Methods & Techniques
EP.53

COMPLEX MITRAL VALVE REPAIR VERSUS REPLACEMENT FOR INFECTIVE ENDOCARDITIS (IE) WITH SEPTIC EMBOLI

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Introduction: Native Mitral Valve (MV) endocarditis is a rare but life-threatening condition. Effective treatment is mainly by eradication of the infection by antimicrobial therapy, but if this fails and destruction of the MV occurs, surgical treatment is warranted. Surgical options include MV Repair versus Replacement with a Tissue or Mechanical Valve. In a young patient with infective endocarditis complicated by cerebral emboli, MV Repair significantly reduces the potential risk of a cerebrovascular accident following anticoagulation. However, the MV Repair may be complex in the presence of severe bi-leaflet endocarditis, resulting in an increased risk of morbidity and mortality.

Methods: Case report of a single patient.

Results: A 49 year old male patient was admitted for urgent MV replacement/repair. He had a three week history of fever, back pain, swollen right hallux, and severe fatigue. Laboratory results showed raised inflammatory markers and blood cultures confirmed Methicillin Sensitive Staph. Aureus (MSSA) bacteremia. He was commenced on intravenous antimicrobial therapy. A transthoracic echocardiogram showed MV vegetations on both anterior and posterior MV leaflets with moderate mitral regurgitation (MR). A CT Brain reported multifocal cystic areas in the frontal and parietal cerebral lobes with acute infarction, highly suggestive of septic emboli. Despite a course of intravenous antibiotic therapy, there was no improvement in either clinical markers or in echocardiography, and the decision was made for surgical repair or replacement of the MV.

After induction of general anesthesia, the on-table transoesophageal echo (TOE) showed moderate MR, with bi-leaflets vegetations on A1, P2, and P3 and perforation of A1. Direct visualization of the MV confirmed extensive inflamed and friable tissues on both leaflets with a perforation of A1. Taking into account the risk of anticoagulation in a young patient with recent cerebral infarcts, the decision was made to try to repair the MV. Surgical repair was difficult and prolonged, requiring resection of the inflamed tissues of both leaflets, the suturing of pericardial patches to repair the perforation in A1, and to supplement the commissure at A3/P3. A mitral ring was also applied. Post MV repair, the TOE showed trace MR. The patient was weaned successfully from cardiopulmonary bypass on inotropic and vasopressor therapy. The complexity of the MV repair resulted in a prolonged bypass time, with the administration of blood products in order to avoid bleeding complications. The postoperative course was uneventful with subsequent anticoagulation on Aspirin alone.

Discussion: Severe MSSA MV endocarditis may require surgery to repair or replace the MV. In the presence of recent septic emboli, the surgical preference may be for MV Repair in order to avoid the risks of anticoagulation. However, repair may be technically challenging, resulting in prolonged bypass time and a risk of bleeding, pump dysfunction and vasoplegia. The anaesthetist must plan carefully to deal with the echocardiographic, haemostatic and haemodynamic challenges of complex MV repair, in order to ensure a good outcome for the patient.
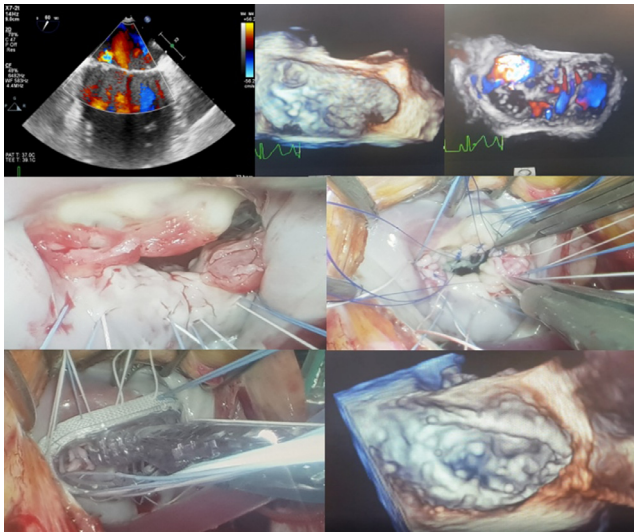
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**Topic: 11 - Evaluation of Methods & Techniques
EP.54**

Dislocation of bronchial blocker during minimally invasive aortic valve replacement. Selection of safe and efficacious blocker for one lung ventilation

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Introduction: Transaxillary access of aortic valve through the 3rd intercostal space is one of the latest innovations for minimally invasive aortic valve replacement. This procedure requires one lung ventilation-OLV with establishment of safe and efficacy block of the right lung. This can be achieved with double lumen tracheal tube-DLT or bronchial blocker-BB. DLT is considered the gold standard for OLV, which must be replaced by single lumen tube-SLT at the end of the surgery, before the transfer of the patient to the ICU. However cardiac procedures have the particularity of heparin administration and reverse of heparin with protamine. Furthermore, prolonged intraoperative stay of DLT, which is rigid and wider regarding SLT, can cause oedema and intratracheal manipulations during change of DLT to SLT may cause injury and bleeding. Usually, in our department, we choose to use SLT with BB. We present a case of dislocation of BB during minimally invasive aortic valve replacement.

Methods: A 68-year old man, 178cm in heigh and 77Kg was admitted for aortic valve stenosis. He was scheduled for aortic valve replacement through right 3rd intercostal space at the anterior axillary line under general anaesthesia.

Results: After induction in anesthesia a SLT (size 8.5, cuffed Covidien) was introduced and under fiberoptic bronchoscopy a BB (Cohen Flex-tip) was advanced into the right main bronchus and the ballon of the BB was inflated. The ballon of BB was visible at the beginning of right main bronchus. The patient was placed supine with a slightly elevated right side of the chest with his right arm above his head. The site of the blocker was confirmed and the procedure get started. Skin incision was made in the right anterior axillary line to open the third intercostal space. Right lung was collapsed. However, during introduction of femoral artery and vein cannula, it was noticed that the right upper lobe was started to be inflated. Bronchoscopy confirmed BB dislocation which was found to be moved into the right intermedium bronchus. The BB was removed and it was replaced by EZ-Blocker (Teleflex), in order to avoid further dislocation of the BB.

Discussion: Of particular importance for access of aortic valve through intercostal space is the establishment of safe and efficacious OLV. Dislocation of BB would jeopardise the procedure. EZ-Blocker is designed to be placed on the carina, ensuring the appropriate location and very difficult regarding other BB can be dislocated.

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**Topic: 12 - Monitoring
EP.55**

Dynamic changes in myocardial oxygenation and function during induction of general anaesthesia: Quantification by cardiovascular magnetic resonance imaging

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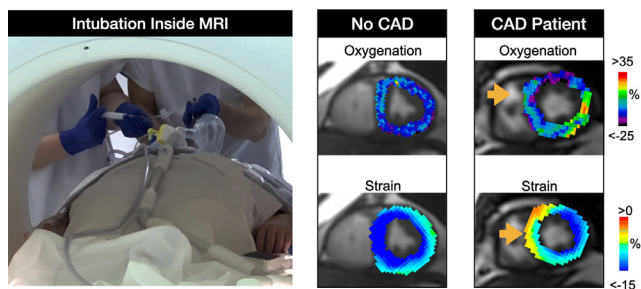
Cardiovascular magnetic resonance continually images the heart during the induction of general anaesthesia. Specifically five minutes after intubation, a patient with no CAD (ASA-PS class II) demonstrates deoxygenation and mild strain abnormalities, homogenous across the heart. The CAD patient developed significant regional myocardial oxygenation heterogeneities and wall motion abnormalities (orange arrow) indicative of inducible ischaemia in post-stenotic myocardium.

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Introduction: The cardiovascular system is vulnerable to effects associated with induction of general anaesthesia (GA). Novel free-breathing cardiovascular magnetic resonance (CMR) techniques can now image rapid fluctuations in tissue oxygenation and wall function of the myocardium beat-by-beat. This provides an excellent temporal resolution to spatially map myocardial oxygenation changes. We present interim findings from an innovative study applying oxygenation-sensitive cardiovascular magnetic resonance (OS-CMR) imaging to investigate the dynamics of myocardial oxygenation and function during the induction of GA in patients with and without coronary artery disease (CAD).

Methods: Four patients without cardiovascular risk factors (no-CAD) scheduled for elective orthopaedic surgery (ASA-PS class I or II), and one patient with documented single-vessel CAD scheduled for elective minimally invasive direct coronary artery bypass surgery (ASA-PS class III) underwent GA induction inside an MRI scanner. OS-CMR imaging was applied continuously from the awake state throughout the entire induction process and for 10 minutes of anaesthesia maintenance, after which patients were transferred to their scheduled surgery. Changes in myocardial oxygenation were calculated in comparison to the awake state (%-change from baseline OS-CMR signal intensity). From these same images, myocardial function was quantified in a circumferential orientation using feature tracking strain analysis.

Results: First with pre-oxygenation (14 breaths/min paced breathing / FiO2=1.0), petCO2 (No-CAD:27±1mmHg, CAD:26mmHg) and myocardial oxygenation (No-CAD:-8.6± 1.6% CAD:-8.8%) decreased in all patients. However, while the No-CAD patients showed an increase in myocardial contractility (strain:-16.3±1.1% to -17.5±11.7%), strain worsened during this phase in the CAD patient (-19.1% to -15.8%). With administration of sufentanil, breathing slowed with

subsequent normalisation of petCO2 (No-CAD:37±2mmHg, CAD:35mmHg), myocardial oxygenation (no-CAD:2.4± 4.1%, CAD:0.5%) and a partial recovery in strain (No-CAD:- 15.1±0.3%, CAD:-16.8%). After propofol and rocuronium administration, manual bag ventilation led to another decrease in petCO2 (no-CAD:23±3mmHg, CAD:20mmHg), a decrease in myocardial oxygenation (No-CAD:-5.2±3.0, CAD:- 11.0%), no change in strain in heart-healthy patients (-16.4± 0.7%) but a decline in ventricular function in the CAD patient (strain=-15.0%). During maintenance (ventilation rate adjusted to target petCO2 35-40mmHg / FiO2=0.4) longer phases of myocardial de-oxygenation (OS-CMR<0%) were observed until 8.7±0.8min after intubation in the no-CAD patients, and until 8.5min in the CAD patient, respectively. By 10min after intubation, myocardial oxygenation had normalized to baseline levels but strain remained reduced (No-CAD:-14.0±10.5, CAD:-11.7%), likely due to direct cardio-depressant effects of sevoflurane. In the CAD patient, co-localized myocardial oxygenation and strain abnormalities were especially pronounced in the myocardial subtended to a haemodynamically significant stenosis, while No-CAD patients exhibited homogenous changes in the myocardium.

Discussion: Interim results demonstrate that in the first study to ever use OS-CMR to monitor the heart during GA induction, complex fluctuations of myocardial oxygenation and function occur in patients with and without CAD. The patient with single-vessel CAD exhibited regional deoxygenation co-localized with myocardial strain deterioration in the territory at risk, indicative of inducible regional myocardial ischaemia. Implementation of advanced imaging in an anaesthesia research setting allows us to investigate how the heart responds to potential perioperative triggers of inducible ischaemia and may further advance the practice of anaesthesia for cardiac risk populations.

Keywords:

Topic: 12 - Monitoring
EP.56

Hemolysis intraoperative monitoring by Helge V-test in patients undergoing extracorporeal circulation in cardiac surgery: a single center data

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Introduction: Hemolysis is a complication that occurs in all surgeries requiring extracorporeal circulation (ECC). In fact, various studies have shown increasing levels of free plasma hemoglobin (PfHb) and decreasing levels of haptoglobin during and after ECC.

The degree of hemolysis is measured by the level of circulating PfHb. The increase in PfHb levels results in both clinical and pathophysiologic repercussions, such as augmented systemic and pulmonary vascular resistance, altered coagulation, platelets dysfunction and acute kidney injury (AKI), with increased mortality and postoperative morbidities.[1][2]

The aim of this study is to evaluate the efficacy and safety of the disposable device 'Hemcheck HELGE V-TEST' on the assessment and quantification of the degree of hemolysis in patients undergoing ECC during Cardiac Surgery, in order to prevent and predict serious complications.

Methods: After the informed consent was signed, 50 patients undergoing elective cardiac surgery with ECC were enrolled. Two whole blood samples were simultaneously collected at different times of surgery: T0-pre ECC; T1-at the time of clamping the aorta; T2-at 20 minutes after the start of ECC; T3-at the end of ECC; T4-at the end of surgery.

Both samples, were analyzed in the operating room by the disposable HELGE V-TEST device, which offers a real-time assessment of the presence/absence of hemolysis (point of care) through a value expressed in mg/dL. The default cut off was 50 mg/dL.

The data collected were analyzed by mean and standard deviation.

Results: A mean hemolysis value (mg / dL) at T0 of 4.9±0.7, at T1 of 8.17±1.8, at T2 of 18.9±4.3, at T3 of 52.4±1.9 and at T4 of 30.8±2.1 was recorded. At all intraoperative timepoints, the difference with the post-operative scores was statistically significant, particularly for the T2 value ($p < 0,03$). ECC duration averaged 77 ± 6.4 min, clamping duration averaged 64 ± 4.4 min. A statistically significant difference was also recorded between hemolysis values> 50 mg / dL at T3 and ECC time> 50 minutes ($p < 0,05$).

Discussion: Evaluating and quantifying hemolysis during ECC using a point-of-care system as HELGE V-TEST allows real-time corrective strategies to be implemented to prevent hemolysis-related complications and improve the outcome of

patients undergoing elective cardiac surgery and, at the same time, optimize healthcare costs. More extensive and comprehensive studies are needed to validate our findings.

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Keywords:

**Topic: 14 - Risk Factors & Outcome**
EP.58

Does Bioelectrical impedance derived phase angle predict adverse outcomes in elderly patients undergoing cardiac surgery?

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Introduction: Frailty has been proposed to be a marker for biological age and may increase the morbidity and mortality after cardiac surgery. Bioelectrical impedance analysis (BIA) is a non-invasive method used to assess body composition including muscle mass, fat and body cell mass which in turn projects the nutritional and hydration status of the patient. Phase angle (PA) is a parameter obtained from bioimpedance analysis and reflects nutritional status and thereby frailty of the patient and helps in preoperative risk assessment. We aim to find out whether bio electrical impedance derived low phase angle predict adverse outcomes in elderly cardiac surgical patients

Methods: An observational prospective study. After obtaining ethical clearance and approval from institutional review board, adult patients more than 60 years of age undergoing cardiac surgery using cardiopulmonary bypass were included . During the preoperative anaesthesia visit, trained research assistants recorded the phase angle with the use of In Body S 10 bioimpedance machine. Based on phase angle values, patients were grouped into two based on cut off value of median phase angle, (phase angle > 5.20),(phase angle < 5.20). Hours of ventilation, Duration of inotropic support, Length of ICU stay, Postoperative drainage for first 24 hours were analysed.
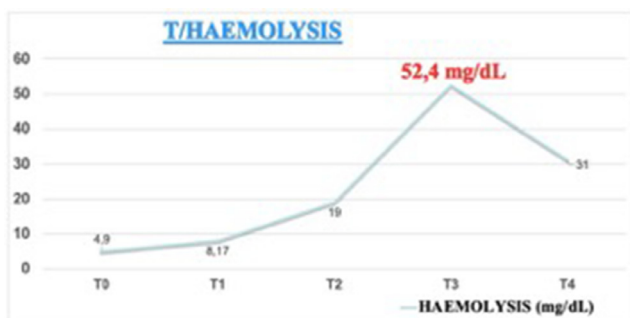
Results: 148 patients were enrolled. The mean age was 66.06±4.55 years (53-78). Subjects with PA cut off of <5.2 had significantly higher mean duration of inotropes (28.30± 14.49 hrs) than with > 5.2 (20.40±20.81 hours, p=0.024). Chest tube drainage was significantly high among subjects with PA cut off of <5.2 (209.81±129.19 ml) than with >5.2 (132.36±113.16 ml) (p=0.001). There was no significant difference in the length of ICU stay and duration of mechanical ventilation between both groups.

Discussion: Biological age is more important than the chronological age in determining the increased risk in elderly patients undergoing cardiac surgery. Observational studies reported that low phase angle values were significant predictors of poor nutritional status, decreased muscular strength, frailty, morbidity and mortality. In our study patients with low phase angle required longer duration of inotropic supports. Malnutrition and perioperative anaemia may aggravate postoperative bleeding. We found that first 24 hour post operative drainage was higher in patients with low phase angle. Preoperative low phase angle may predict the adverse outcome in elderly patients undergoing cardiac surgery. Assessing frailty through phase angle values pre operatively might help in implementing necessary interventions

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Keywords:

Topic: 14 - Risk Factors & Outcome
EP.59

Frailty and need for mechanical cardiac support are associated with increased mortality

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Introduction: Frailty has already been proven to be associated with mortality after orthotopic heart transplantation (HTX). Components of frailty scores can differ to those applied in geriatric patients. On the other hand, in more than 30% of the cases patients are operated in high urgency status with mechanical cardiac support (MCS). The aim of our study was to determine the impact of frailty and the pre-frail state on postoperative mortality in the current era using MCS for bridging to transplantation.

Methods: After Institutional Ethic Committee Approval, we calculated retrospectively the frailty scores in 462 patients undergoing OHT between January 2012 and August 2022 in Heart and Vascular Centre, Hungary. Types of pre-transplantation MCS were separately analyzed. Outcome was all cause mortality. The Cox-proportional hazards regression and time-dependent ROC curve were used in the statistical analyses.

Results: 269 (58%) of the patients were proven to be non-frail, 173 (38%) pre-frail and 20 (4%) frail. The median survival time was 1985 days (IQR: 1487). Frail and pre-frail states were associated with increased mortality vs. non-frail state in duration of follow-up period (both p<0.05). In the univariate analysis, frailty score was associated with mortality [hazard ratio (HR) of 1.38 (95% CI: 1.25-1.53, p<0.005)]. Among the components of the frailty score, age above 50 [HR 1.44 (95% CI: 0.99-2.10); p=0.05)], creatinine above 3.0 mg/dl or dialysis [HR 1.97 (95% CI: 1.37-2.82); p<0.005] and hospitalization before HTX [HR: 1,99 (95% CI: 1.34-2.94); p<0.005] were related to mortality. Among the pre-transplant MCS, extracorporeal membrane oxygenation (ECMO) [HR: 2.55 (95% CI: 1.56-4.17); p<0.005] and continuous flow left ventricular assist devices HR: 2.25 (95% CI: 1.26-4.01, p=0.01) were associated with increased mortality. The model, fit with frailty score alone, had a c-index of 0.65, adding MCS to the model increased the c-index to 0.73.

Discussion: Pre-frail state, as well as frailty are associated with increased mortality after heart transplantation. Components of HTX frailty tool were not equally associated with medium term mortality.

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Keywords:

Topic: 14 - Risk Factors & Outcome
EP.60

Deiodinase enzyme levels associated with acute allograft rejection after heart transplant

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Introduction: Thyroid function in the perioperative period of heart surgeries tend to get more substantial attention than ever before. The phenomenon that is hallmarked with low triiodothyronine (T3), low or normal thyroxine (T4), low or normal thyroid-stimulating hormone (TSH) and high reverse triiodothyronine (rT3) is called nonthyroidal illness syndrome (NTIS) or euthyroid sick syndrome. In spite of the well-known associations between NTIS and adverse outcomes during critical care, the pathogenesis is barely understood yet. Current study's aim to determine any possible connection between deiodinase enzyme levels any adverse outcomes in the perioperative period of heart transplant.

Methods: This prospective, single center study was performed on 283 heart transplanted patients at the Heart and Vascular Centre of Semmelweis University from 2012 to 2020. Demographic data, pre- and postoperative laboratory parameters, thyroid status, adverse events and applied mechanical circulatory support devices were recorded in our database. Type 2 deiodinase (DIO2) and type 3 deiodinase (DIO3) enzymes levels were measured with TaqMan qPCR and were normalized to hypoxanthine phosphoribosyl transferase (HPRT). For every qPCR reaction 30 ng of cDNA was used. Descriptive statistics, Spearman's correlation, Mann-Whitney U test, uni- and multivariate logistic regression were applied for the statistical analysis. Our study was approved by the IRB (65/2017).

Results: Out of 283 orthotopic heart transplanted patients 212 were male (74.9%) and 71 were female (25.1%). Donors' median age was 42 years (IQR 25-75: 32-50), recipients' median age was 54 years (IQR 25-75: 45-59) and median follow up time was 1521 days (IQR 25-75: 749-2270). 1-year mortality rate was 64 patients (22.6%). 34 patients (12.0%) suffered from acute allograft rejection in the first postoperative week, while in the first postoperative month it was 88 patients (31.1%). Acute allograft rejection was defined as per the International Society of Heart and Lung Transplantation (ISHLT) latest histopathologic findings criteria. DIO2 enzyme level were significantly lower in patient who suffered from acute rejection in the first postoperative week and month as well (p= 0.006 and p=0.019 respectively). In the multivariate logistic regression model DIO2 enzyme level measured in the first postoperative week was associated with significantly higher risk for acute rejection after heart transplant (OR: 0.775, 95% CI: 0.613-0.980, p=0.033). The multivariate logistic model calculated for the first postoperative month showed the same result regarding DIO2 enzyme level (OR: 0.832, 95% CI: 0.699-0.990, P= 0.038).

Discussion: Deiodinase enzyme levels after heart transplant are associated with acute allograft rejection in the first postoperative week and month. Thyroid function monitoring in the postoperative period after heart surgery might be essential based on our results.

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Keywords:

Topic: 14 - Risk Factors & Outcome
EP.61

PREOPERATIVE ANEMIA AS A PREDICTOR OF ACUTE KIDNEY INJURY ASSOCIATED TO CARDIAC SURGERY

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Introduction: Post-operative acute kidney injury (AKI) complicates approximately 40% of cases of cardiac surgery, increasing patient morbidity and mortality. Its pathophysiology is complex, with multiple risk factors. Amongst these, anemia is seldomly included in risk prediction models, despite being present in 20 to 30 % of patients undergoing cardiac surgery. We aimed to evaluate the impact of preoperative anemia in the risk of developing AKI after cardiac surgery.

Methods: A retrospective cohort study was undertaken in a single-center University Hospital on consecutive patients undergoing heart surgery between October 2022 and December 2022. Data analysis included descriptive statistics, as well as a bivariate analysis and a binominal logistic regression. In the statistical analyses, factors considered potential effect modifiers were age, sex, body mass index, hypertension, diabetes, smoking, preoperative ejection fraction, EuroScore, II type of cardiac surgery and cardiopulmonarybypass. The normally distributed variables were analysed by calculating the means and standard deviations, and for the other variables we calculated medians and interquartile ranges. Anemia was defined according to the World Health Organization as haemoglobin level < 13 g/dl for men and <12 g/dl for women. The primary endpoint of the study was AKI developing and was defined according to KDIGO criteria.

Results: A total of 178 patients were included. Cardiac surgery associated acute kidney injury occurred in 46 patients (25.8%) and preoperative anemia was presented in 55 (30.9%) patients. There was no difference in all demographic and preoperative variables between groups, except for preoperative haemoglobin and EuroSCORE II. A logistic regression was performed to ascertain the effects of preoperative anemia and EuroScore II on the likelihood of developing AKI. The logistic regression model was statistically significant $X2(2) = 35.401$, p <0.001, the model's AU-ROC curve was 0.655 (95% CI: 0.561-0.749). The Hosmer and Lemeshow test did not show evidence for lack of fit (p = 0.222) and the model correctly classified 75.3% of cases. After adjustment, preoperative anemia remained significantly associated with CSA-AKI. Patients with preoperative anemia were 2.13 times more likely to exhibit CSA-AKI than patients without preoperative anemia (OR 2.132, 95% CI: 1.040-4.37).

Discussion: Preoperative anemia is a modifiable independent predictor of acute kidney injury associated to cardiac surgery, which is one of the strongest postoperative risk factor for death. Our work reinforces the importance on the management of preoperative anemia in patients undergoing heart surgery.

Table 1 - Baseline characteristics of the participants.

	All (n=178)		CSA - AKI (n=46)		Without CSA - AKI (n=132)		p value
Demographics							
Age (years) - median (IQR)	66.0	(59.0-75.0)	68.5	(55.5-76.5)	69.0	(60.0-75.0)	0.68
Male - n (%)	118	(66.3)	32	(69.6)	86	(65.2)	0.58
BMI (kg/m2)- mean ± SD	27.7	± 4.66	27.8	± 5.63	27.6	± 4.29	0.87
Comorbidities							
HTN, n (%)	158	(88.8)	41	(89.1)	117	(88.6)	0.93
DM, n (%)	71	(39.9)	21	(45.7)	50	(37.9)	0.35
Smoker							0.92
- Current	25	(14.0)	7	(15.2)	18	(13.6)	
- Former	46	(25.8)	11	(23.9)	35	(26.5)	
- Never	107	(60.1)	28	(60.9)	79	(79.4)	
Preoperative analytical data							
Hemoglobin (g/dl) - mean ± SD	13.4	(1.8)	12.6	± 2.09	13.6	± 1.67	< 0.01
Serum Creatinine (mg/dl) - median (IQR)	1.15	(0.78-1.12)	1.08	(0.79-1.41)	0.9	(0.75-1.09)	0.037
LVEF - n (%)							0.59
< 20%	8	(4.9)	1	(2.2)	7	(5.3)	
20-40%	16	(9.0)	6	(13.0)	10	(7.6)	
40 - 54%	21	(11.8)	6	(13.0)	15	(11.4)	
> 54%	133	(74.7)	33	(71.7)	100	(75.8)	
EuroSCORE II (%) - median (IQR)	1.5	(0.8-2.6)	2.2	(1.8-4.6)	1.5	(0.87-2.7)	< 0.01
Type of surgery							0.57
Isolated CABG - n (%)	57	(32.0)	12	(26.1)	45	(34.1)	
Single valve - n (%)	73	(41.0)	19	(41.3)	54	(40.9)	
Combined procedures- n (%)	41	(23.0)	12	(26.1)	29	(22.0)	
Aortic surgery - n (%)	7	(7.0)	3	(6.5)	4	(3.0)	
On-pump surgery - n (%)	122	(69)	34	(73.9)	88	(66.7)	0.36
CPB time (min) - median (IQR)	74.1	(47.0-91.5)	94	(61.8-120.8)	66	(46.0-81.8)	< 0.01

LVEF - Left ventricule ejection fracion; BMI - Body mass index; HTN - Hypertension; DM - Diabetes mellitus; CPB - cardiopulmonary bypass; IQR - Interquartile Range; SD - Standard deviation.

ROC Curve for Model. AUC = 0.655
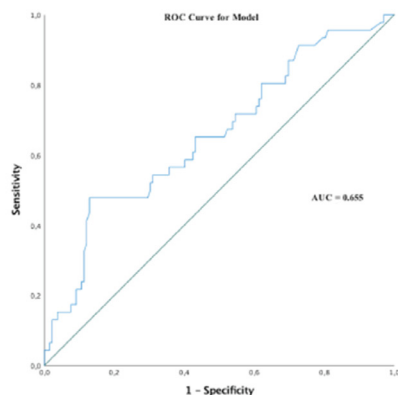
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Keywords:

Topic: 14 - Risk Factors & Outcome
EP.62

A case of favorable outcome achieved through a comprehensive management after superior vena cava injury during transvenous lead extraction of an cardiac implantable electronic devices

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Introduction: Transvenous lead extraction of implantable cardiac electronic devices is performed worldwide as a minimally invasive alternative to surgical approaches, and its use is becoming more widespread in Japan as well. However, cardiac and vascular injury as a complication is extremely life-threatening, and it is recommended that the procedure be performed with a comprehensive system in place. In this report, we describe a case in which we successfully and rapidly managed a superior vena cava injury that occurred during lead extraction, resulting in a favorable outcome.

Methods: A male patient in his 40s was diagnosed with idiopathic ventricular fibrillation 15 years ago and had an implantable cardioverter-defibrillator. As the generator became exposed, and it was deemed to have a high risk of infection, he was going to have the lead extracted. Due to concerns of high risk of complications from the anticipated severe adhesions, the surgery was performed in a hybrid operating room with a cardiovascular surgical team ready to initiate cardiopulmonary bypass if necessary. The surgery was performed under general anesthesia with endotracheal intubation. After a smooth removal of the generator and detachment of the lead from the innominate vein, a sudden drop in blood pressure occurred immediately after pulling and removing the right ventricular lead. Echocardiography confirmed cardiac tamponade, and superior vena cava or cardiac injury was suspected. The patient was immediately transferred to open-heart surgery. The cardiopulmonary bypass was established using suction bypass. The innominate vein and superior vena cava injuries were identified, repaired surgically, and the cardiopulmonary bypass was terminated.

Results: After terminating the bypass, the patient's vital signs remained stable with only a small dose of dopamine infusion, and he was transferred to intensive care unit while still intubated. He woke up the next day and was extubated without any significant neurological sequelae. His subsequent clinical

course was uneventful, and he was discharged without any major neurological deficits.

Discussion: Although superior vena cava injury is a potentially lethal complication, there is a possibility of a favorable outcome with appropriate preparation in terms of location, personnel, and equipment, as well as prompt intervention by a cardiovascular surgeon and the establishment of suction bypass in the event of an occurrence.

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Keywords:

Topic: 15 - Quality Management
EP.63

ASSESSING UTILITY OF THE CURRENT NEUROPROGNOSTICATION MODALITIES FOR PREDICTING HYPOXIC BRAIN INJURY IN OUT OF HOSPITAL CARDIAC ARREST PATIENTS

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Introduction: Hypoxic brain injury is inevitable in half of the out of hospital cardiac arrest patients. This has created an increased burden on the cardiac critical care unit to deliver high quality services with limited resources. The ESC/ESICM 2021 guidelines are implemented to neuro-prognosticate comatose patients as an appropriate timely decision-making endeavor. This quality improvement project aims to assess the predictability of a quadruped integrative tools for neuro-prognostication.

Methods: An electronic record for 176 of total 193 out of hospital cardiac arrest patients was evaluated retrospectively. 16 patients were excluded due to missing or incomplete data and death on arrival. A neuro-prognostication score was calculated based on clinical examination, neurophysiology (Electroencephalogram and Somatosensory Evoked Potentials), Neuron-

Chart Title

Pearson Chi-square Value

■ Miracle score 2   ■ Initial Rhythm   ■ NPI
■ Corneal reflex absent   ■ Tracheal reflex absent   ■ Status Myoclonus
■ EEG   ■ SSEP   ■ CT head

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Keywords: 11

**Topic: 15 - Quality Management
EP.64**

specific enolase biomarker and CT/MRI Head imaging. A Minitab statistical software was used for data analysis. The outcome was interpreted as Deaths due to primary hypoxic brain injury or withdrawal of life support treatment. Chi-square testing was used to evaluate the correlation between different diagnostic tests and outcome.

Results: Data collection has been ongoing since June 2021. Amongst 176 patients, 41.5% deaths with male predominance were observed. We confirmed the best predictors mentioned in guidelines had significant statistical influence for predicting poor outcome compatible with hypoxic neurological impairment. They are namely higher age, Miracle score >6, Initial rhythm as asystole or PEA, NPI less than 3, absent corneal or tracheal reflexes, myoclonus, abnormal EEG with burst suppression, highly malignant waves, status epilepticus, bilaterally absent SSEP N20 waves, loss of grey-white matter on CT head. Although gender and MRI had statistical insignificant correlation. This QI project also highlighted higher specificity (70-90%) in all eight prognostic tests but lower sensitivity (50-60%). The positive predictive value was highest for NPI, absence of corneal reflexes and abnormal CT head (85-100%). Only 13% of hypoxic brain injury patients had MRI as a second radiological test to conclude findings from the CT head in selected cases.

80% patients discharged from ICU had positive neurological outcomes with Cerebral performance category scale CPC 1-2. 92% of them were discharged home with an average LOS in hospital of 14 days. 10% of CPC 5 died for multifactorial reasons, 10% had CPC of 3 or 4 with average LOS of 52 days and 7% required repatriation to neurorehabilitation.

Discussion: Being able to make the right decision for all patient at the right time enhances best practice, allows for appropriate clinical decision and avoids prolonged ITU stay. So a robust, structured and multimodal neuroprognostication approach is necessary alongwith multidisciplinary meeting including intensivist, cardiologist, neurologist and radiologist. In each case, after 72 hours a neuroprognostication score was calculated based on the guidelines. Overall, all patients with more >2 markers of poor prognosis went for withdrawal of life sustaining therapy in their best interest.

Empowering Patients through Informative Health Posters: Enhancing Understanding and Engagement

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Introduction: Health literacy has been increasingly recognized as one of the most important social determinants for health. Patient education plays a crucial role in empowering individuals to take control of their health and make informed decisions. This abstract highlights the significance of using posters as a means to educate patients, foster understanding, and promote engagement with their own health.

Patient health information material, particularly in the form of posters, serves as an effective medium to disseminate valuable knowledge and enhance health literacy. Hence, we advocate the use of posters as we believe information needs to be captured, centralized and connected to patient experience. The incorporation of attractive graphics, illustrations, and infographics helps in creating a lasting impact, enabling patients to retain and recall vital health information.

Amongst some of the benefits of posters lie in their versatility of reaching a diverse patient population. Healthcare providers can tailor the content, language, and visuals of the poster to cater to the specific needs and preferences of various demographic groups by considering factors such as cultural background, literacy levels, and health beliefs. Moreover, the accessibility and cost-effectiveness of posters make them an ideal tool for disseminating health information across different settings, including hospitals, clinics, community centres and schools.

Methods: Our posters (Diagram 1) will be prominently displayed in waiting areas, examination rooms, and public spaces, thereby maximizing their visibility and reach. Additionally, digital versions of posters can be shared through websites, social media platforms, and mobile applications, expanding their potential audience and impact. Our poster design is user-centred design. It utilises plain language, employing intuitive layouts, and employing inclusive imagery, enhance the comprehensibility and accessibility of the information presented.
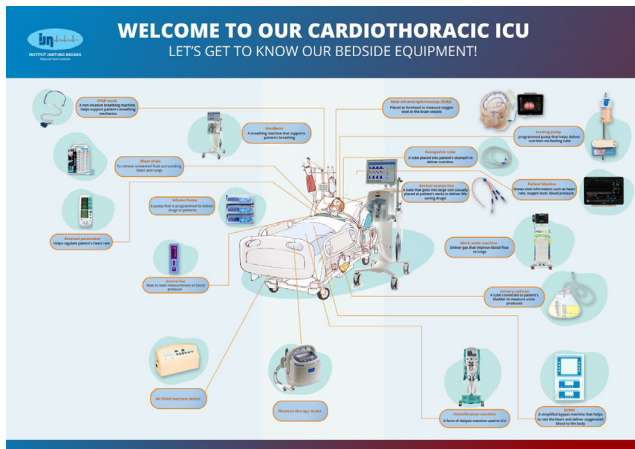
Results: In assessing the effectiveness of the poster, we will be conducting a survey by means by of hard copy and soft copy via QR code that will be linked to online questionnaire. The questionnaire consists of patient/relative understanding of the poster and how it impacts their understanding of the treatment being received, in this case, the equipment used in ICU

Discussion: To conclude, in the era of healthcare digitalisation, posters are part of the conundrum to bridge the gap in healthcare literacy especially in the Asian population. This is an attempt to overcome the familiar paternalistic model of healthcare that is commonplace in the Asia-Pacific region and encourage patient engagement.

By leveraging the visual appeal, versatility, and accessibility of posters, healthcare providers can effectively educate patients, bridge communication gaps, and contribute to improved health outcome.

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Keywords:

**Topic: 16 - Paediatric Cardiac Anaesthesia and ICU
EP.65**

MORBIDITY AND MORTALITY RISK STRATIFICATION IN PATIENTS WITH CONGENITAL HEART DISEASE AFTER CORRECTIVE SURGERY

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Introduction: Congenital heart disease (CHD) constitute about 50% of all congenital abnormalities and are one of the main cause of death in the first year of life. In live born there are 8-14 children with CHD in 1000 newborn. Surgery for CHD carries high risk of morbidity and mortality. Perioperative period (especially when critical CHD in newborn are corrected) is often accompanied by multiple organ dysfunction syndrome (MODS) and mortality.

Methods: We conducted a retrospective research of laboratory and clinical data of 891 pediatric patients with CHD (from 1 day to 18 years of life) treated in our clinic from 2019 to 2022.

Results: There were 637 patients operated with the use of cardiopulmonary bypass and 254 patients treated without bypass. Age and weight were different in groups with and without bypass. Mortality in bypass group was 4% (26 patients) and 1.9% (5 patients) in group without bypass. Bypass use was not a significant mortality factor (p=0.5). Bypass time was significantly longer in the deceased group (113.5 [53.7;189] vs 64 [43.5;96]). Mortality correlated with bypass time (AUC − 0.76, optimal threshold− 149 minutes; Se% - 56%; Sp% - 93%; p=0.0006). Patients with cyanotic CHD constituted 83.9% of the deceased patients (26 from 31). Odds ratio for cyanotic CHD is 10.2 [95%CI 3.9;26.3; p<0.0001]. Of the deceased patients 23 (74.2%) were newborn with critical CHD. Odds ratio of mortality for critical CHD is 13.8 [95%CI 4.27;44.9;p<0.0001]. We found statistically significant differences between deceased and surviving patients in ventilation time (1 [1;5] vs 1 [1;3] days; p<0.01) and ICU stay (3 [1;7 vs 1 [1;4] days; p<0.01). Weight between dead patients and survivors was significantly different: 3.5 [2.9;3.7] vs 6.8 [3.7;15] kg. Severe comorbidity was present in 42.3% (11 patients) in deceased patients group and in 25.5% of the survivors. Odds ratio for severe comorbidity is 2.7 [95%CI 1.2;6.2;p<0.015]. Perioperative incidents were present in 23 (88%) patients in deceased group and in 187 (30%) of the survivors. Odds ratio is 15.9 [95%CI 4.8;52;p<0.0001;NNT=-9.7].

Discussion: Overall, the data of our research can help to better understand factors that influence postoperative course in children after congenital heart surgery. Surgery in critical CHD is associated with higher mortality risk. Moreover, most of the deceased patients had cyanotic CHD and 74.2% of them had critical CHD. Main mortality predictors were: severe comorbidity, perioperative incidents. Bypass time, ischemic time and cyanotic CHD were statistically significant mortality predictors.

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Keywords:

**Topic: 16 - Paediatric Cardiac Anaesthesia and ICU
EP.66**

EFFECT OF LEVOSIMENDAN ON VENOARTERIAL EXTRACORPOREAL MEMBRANE OXYGENATION WEANING AFTER PEDIATRIC CARDIAC SURGERY

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Introduction: Pediatric patients who experience postcardiac surgery myocardial depression and low cardiac output syndrome refractory to conventional medical therapy, venoarterial extracorporeal membran oxygenation (VA ECMO) is used to restore cieculation and maintain end-organ perfusion (1). Levosimendan is an inodilatator agent known to improve cardiac function, hemodynemic performance and survival critically ill patients (2). The aim of our study was to evaluate the impact of levosimendan on VA-ECMO weaning in pediatric patients after cardiac surgery.

Methods: This retrospective study conducted in pediatric cardiac intensive care. All patients requiring V-A ECMO form January 2020 to December 2022 were eligible and divided into two groups: group Levosimendan and group Control (without Levosimendan). Patients who were given Levosimendan were compared to patients who were not, on rates of successful V-A ECMO weaning. And it was eveluated VIS score, lactate levels, urine amount, ECMO time in two groups.

Results: 45 patients were include in this study. 17 patients in the Levosimendan group and 28 patients in the control group. Patients administered Levosimendan trended towards improved weaning success, but in between two groups, the difference was not statistically significant (41% vs 35% p=0,61). The Levosimendan group was associated with lower VIS score, lower lactate levels, higher urine amounts. Moreover, the Levosimendan group had longer ECMO duration.

Discussion: Levosimendan did not improve V-A ECMO weaning success in our study after pediatric cardiac surgery. Moreover, Levosimendan may be associated with favorable

outcomes including lower VIS and lactate levels.

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Keywords:

**Topic: 16 - Paediatric Cardiac Anaesthesia and ICU
EP.67**

EFFECTS OF HYPOPHOSPHATEMIA IN PEDIATRIC CARDIAC SURGERY

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Introduction: Hypophosphatemia is common in ICU patients especially undergoing cardiac surgery with extracorporeal circulation (1). Phosphate disturbance has been reported to be associated with increased morbidity and mortality in critically ill patients such as respiratory failure, increase the duration of stay on mechanical ventilation, and increased PICU length of stay (2). In our study, it was eveluated pre and postoperatively phosphorus levels for establish association of phosphate levels with ssurgical outcome of pediatric patients with cardiac disease.

Methods: We prospectively measured Phosphorus levels (preoperative, at the pediatric intensive care unit arrival, and at 24) in 85 children undergoing cardiac surgery.Patients were divided in two groups according to immediate postoperative Phosphate levels; those with hypophosphatemia (<3,7) and other group with normal Phosphate levels (3,7-6,5) Aortic cross clamp time (ACC time), cardiopulmonary bypass time (CPB time), inotropic score, duration of ventilation, PICU stay and mortality were recorded.

Results: ACC,CPB times and inotropic score were higher in hypophosphatemia group than normal phosphate group (respectively, p=0,02, p=0,03, p=0,01) . However, duration of ventilation and ICU stay were longer in hypophosphatemia group than normal phosphate group (respectively, p=0,002, p=0,001). No significant difference of post operative mortality was found in both groups (p=0,07).

Discussion: Hypophosphatemia was common after pediatric cardiac surgery. However, hypophosphatemia may ocur in postoperative period especially, intraoperative management

and is associated with significant respiratory and cardiac morbidity. So, serum Phosphorus levels should be routinely measured after cardiac surgery and appropriate therapy may be started.

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Keywords:

Topic: 17 - COVID-19 Management
EP.68

The long-term residual effects of COVID-associated coagulopathy

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Introduction: During the acute phase of COVID-19, many patients experience a complex coagulopathy characterized by a procoagulant pattern. Recognized patterns of COVID-associated coagulopathy are increased thrombin generation, thrombocytosis in the early phases and thrombocytopenia in late severe conditions, blunted fibrinolysis, high levels of fibrinogen, and D-dimer. This complex pattern clearly shows a dynamic behavior. Whether this pattern resists and leaves a long-term signature in the hemostatic system after the closure of the acute phase of the disease is still not well defined.

The present study aims to investigate the hemostatic pattern of COVID-19 patients at a long-term follow-up and to assess the association between patterns of the acute phase, persistence of clinical symptoms, and hemostatic system profile.

Methods: This is a prospective cohort study on 102 patients hospitalized in our Institution during the acute phase and then called for an in-presence follow-up visit after 3 to 18 months. Standard coagulation and viscoelastic tests were performed, along with an assessment of persistent symptoms and a recording of acute phase details.

Viscoelastic tests were performed by ClotPro, a novel CE-marked semi-automatic in vitro point-of-care device. In particular, the TPA test, studying the susceptibility to fibrinolysis was included.

A procoagulant state was adjudicated in the presence of fibrinogen > 400 mg/dL, D-dimer > 500 ng/mL, platelet count > 450,000 cells/μL, nadir antithrombin (AT) activity < 70%, or a maxim clot lysis at viscoelastic test < 2%.

Results: During the acute phase, a procoagulant pattern was identified in 99 (97.1%) of the patients.

After discharge from the hospital, a procoagulant state was still present at follow-up in 38 (37.3%), presenting one or more of the following: fibrinogen levels > 400 mg/dL in 7 (6.9%) patients; D-Dimer > 500 ng/mL in 28 (27.4%) patients; platelet count > 450,000 cells/μL in 17 (15.8%) patients, AT activity < 70% in 4 (3.9%) patients, and ClotPro EXtest ML < 2% in 7 (6.9%) patients.

A procoagulant state was still present in 75% of the patients at 3 months follow-up, 50% at 6 months, and 30% at 12-18 months. Factors associated with the persistence of a pro-coagulant state were age, the severity of the acute phase, and the persistence of symptoms. Patients with major physical symptoms (MPS) carry a pro-coagulant state relative risk of 2.8 (95% confidence interval 1.17-6.7, P=0.019).

Discussion: The main results of our study are (i) persistent hemostatic changes are detectable in 37% of patients hospitalized for COVID-19 at a median follow-up of 17 months; (ii) the main pattern is suggestive of an ongoing fibrinolytic process, and (iii) patients with residual major physical (especially persistent dyspnea) and neuropsychological symptoms have significantly lower levels of fibrinolysis.

In conclusion, the hemostatic system continues to react to the residual effects of COVID-19 in a considerable amount of patients even after several months from the acute phase.

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Keywords:

Topic: 17 - COVID-19 Management
EP.69

Cardiac surgery outcome during the COVID-19 pandemic

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Introduction: Due to high risk intensive care unit (ICU) readmission and extremely high mortality in COVID positive patients undergoing cardiac surgery, it was recommended cardiac surgeries in the asymptomatic COVID 19 positive population to be postponed unless deemed emergent. The aim of our study was to evaluate the outcomes of treatment of patients admitted for cardiac surgery that acquired COVID infection during hospital stay.

Methods: This was a single centre, retrospective observational study conducted over a one-year period (2021) at a referral, high-volume cardiac surgery center. 2021 year. This study included all patients with a confirmed perioperative (7 days preoperative up to 7 days postoperative) diagnosis of COVID-19 infection. Patients were underwent cardiac surgery (coronary artery bypass grafting (CABG) and cardiac valve repair or replacement surgery), percutaneous coronary intervention (PCI) or procedure was postponed. COVID- 19 infection was defined as a positive laboratory diagnosis. Data from patient medical records collected contemporaneously were reviewed and analysed, supplemented by telephone call interviews after discharge. All statistical analyses were performed using IBM SPSS Statistics 19.0 statistical software (IBM Armonk, New York, NY, US).

Results: This study included 108 patients (64 men). The mean age of patients was 67 ± 9 years at the group of survived and 66 ± 10 years at group of died patients. Clinical characteristics of patients admitted for cardiac surgery that acquired COVID infection during hospitalization is shown at table 1. There were no difference between two groups of patients, survived vs died, in type of treatment, including the use of CABG, valve surgery, combined and endovascular treatment (table 2) No treatment of coronary artery or valve disease found to be as the independent predictor for postoperative mortality (table 2 and table 3).

Discussion: In some our patient, decision was made to move forward with cardiac surgery or PCI despite positive COVID testing after an extensive risk and benefit analysis and multidisciplinary approach. In our study, no treatment of coronary artery or valve disease was independent predictor of mortality.

Cardiovascular surgery and PCI can safely be performed with acceptable mortality rates during the COVID-19 pandemic. The decision to operate should be discussed between a patient, anaesthesiologist, cardiologist and surgeons

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Keywords:

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Impact of Microvascular Disease on Changes in Left Ventricular Long-Axis Shortening with Hyperoxia

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Introduction: In Europe, more than 5.7 million operations are performed each year on patients with cardiovascular diseases, most commonly coronary artery disease (CAD). CAD can affect the epicardial vessels but also the microvasculature. Yet, pre-operative risk evaluations focus on the presence of macrovascular disease, often overlooking microvascular disease. A potential trigger for adverse perioperative cardiac events is hyperoxia as it is a known vasoconstrictor. During general anaesthesia, high fractions of inspired oxygen are common although recent studies are showing that it can lead to poor perioperative and postoperative outcomes, albeit with mixed results. This study aimed to investigate the influence of oxygen on cardiac function in awake CAD patients and the potential impact of underlying macrovascular and microvascular disease.

Table 1. Clinical characteristics of patients admitted for cardiac surgery that acquired COVID infection during hospitalization

Variable	Survived n = 99	Died n = 9	P value
Age (years)	67±9	66±10	0.991
Males n (%)	60 (60.1)	4 (44.4)	0.274
Heredity n (%)	46 (46.4)	7 (77.8)	0.072
Hypertension n (%)	87 (87.8)	6 (66.7)	0.109
Diabetes mellitus n (%)	33 (33.3)	4 (44.4)	0.369
Dyslipidemia n (%)	64 (64.6)	4(44.5)	0.198
Current smoking n (%)	26 (26.3)	1 (11.1)	0.289
Previous CV event n (%)	42 (42.4)	3 (33.3)	0.547
Autoimmune disorder n (%)	1 (1.0)	0 (0.0)	0.917
Thyroid disease n (%)	7 (7.1)	0 (0.0)	0.534
BMI (kg/m2)	30.2±16.9	29.2±6.8	0.964
LVEF (%)	48.3±10.7	51.1±7.8	0.214

BMI – body mass index; COPD – chronic obstructive pulmonary disease; CVI – cerebrovascular insult; LVEF – left ventricular ejection fraction; MI – myocardial infarction; PAD – peripheral arterial disease

Table 2. Type of treatment in patients admitted for cardiac surgery that acquired COVID infection during hospital stay

Variable	Survived n = 99	Died n = 9	P value
CABG n (%)	25 (25.2)	3(33.3)	0.426
Valve surgery n (%)	24 (24.2)	3 (33.3)	0.399
Combined surgery n (%)	6 (6.1)	1 (11.1)	0.459
Endovascular treatment n (%)	5 (5.0)	1 (11.1)	0.414
No treatment n (%)	31 (31.3)	6 (66.7)	0.041

CABG – Coronary artery bypass grafting

Table 3. Univariate and multivariable logistic regression analyses to identify predictors of mortality

	Univariate		Multivariate	
	HR [95% CI]	P-value	HR [95% CI]	P-value
Age	0.999 [0.927 – 1.077]	0.989	- - -	- - -
COVID vaccination	0.316 [0.063 – 1.598]	0.164	0.258 [0.049 – 1.365]	0.111
No treatment	4.387 [1.030 – 18.694]	0.046	5.117[1.161 – 22.554]	0.031
Combined surgery	1.917 [0.205 – 17.948]	0.569	- - -	- - -
Heart failure	0.914 [0.215 – 3.882]	0.903	- - -	- - -
CRP level	1.003 [0.996 – 1.010]	0.353	- - -	- - -

CI – Confidence interval; HR – Hazard ratio; CRP – C reactive protein
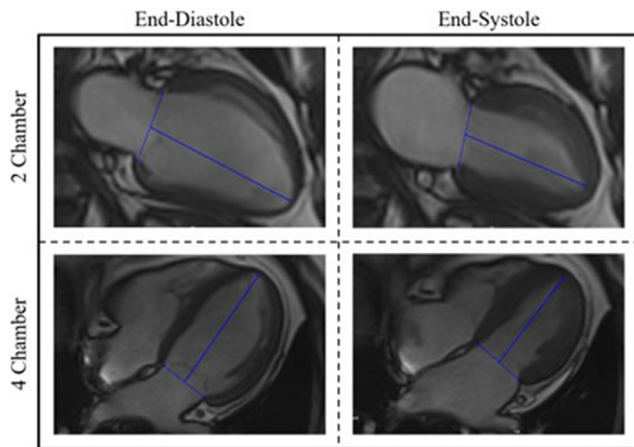
Figure 1 shows cardiovascular magnetic resonance images in a 2-chamber and 4-chamber view at end-diastole and end-systole. The long-axis shortening technique calculates shortening of the ventricle (mitral valve to apex) across the cardiac cycle.

Methods: Twenty spontaneously breathing CAD patients (65± 9 years, 90% male) and 15 healthy controls (56 ± 5 years, 73% male) were prospectively enrolled to undergo a cardiac magnetic resonance exam. CAD patients were included if they had at least one obstructive epicardial lesion (diameter stenosis >50%) and were scheduled for a percutaneous coronary intervention to be performed after the cardiac magnetic resonance exam. During the imaging exam, biplanar functional images were acquired first when participants breathed room air (normoxia), and a second time five minutes after breathing in supplemental oxygen at 10L/ min (hyperoxia) through a facemask. Left ventricular function was measured using a long axis shortening technique (Figure 1), also known as rapid strain, and was compared between gas levels. Additionally in the patient group, diffuse fibrosis was quantified by extracellular volume tissue characterization techniques after administration of a gadolinium contrast. In the patients' subsequent catheterization exam, fractional flow reserve (FFR) as a haemodynamic measure of macrovascular disease and the index of microcirculatory resistance (IMR) as a measure of microvascular disease were obtained invasively during maximal hyperaemia induced by adenosine infusion.

Results: In both cohorts, the left ventricular function worsened significantly under hyperoxia (controls: -18.7±2.1% at normoxia, -17.6±2.0% at hyperoxia, p=0.01; patients: -16.9± 2.1 at normoxia, -14.7±2.5% at hyperoxia, p<0.01). The drop in systolic function was significantly larger in CAD patients than controls (p=0.04). However, in CAD patients the degree of hyperoxia induced systolic dysfunction was worse in patients with a greater burden of microvascular disease, assessed by the invasively measured IMR (r=0.56, p=0.01) and with more diffuse myocardial fibrosis measured by cardiovascular magnetic resonance (r=0.46, p=0.04). No significant correlation was observed in comparison to the degree of macrovascular disease measured by FFR (r=-0.25, p=0.29).

Discussion: Interim findings demonstrate that in both awake CAD patients and age-related healthy controls, supplemental oxygen has a detrimental effect on left ventricular systolic function. Our results show that the extent of systolic deterioration in CAD patients was dependent on the severity of the microvascular dysfunction and diffuse tissue abnormalities. Knowledge of the presence of microvascular disease may play a role in appropriate perioperative oxygen titration management.

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UNCONTROLLED DONATION AFTER CIRCULATORY DEATH: A NEW LOCAL PROTOCOL AND A TWO-CASE REPORT

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Introduction: Uncontrolled Donation after Cardiac Death (uDCD) is a donation path following cardiac arrest (CA) without further indications for resuscitation efforts . This represents a unique opportunity for organ procurement since incidence of brain death is decreasing. Despite its potential, this procedure is limited nowadays due to its logistic and relational complexity and the concern regarding organs' function after long warm ischemia time (WIT)., We developed a local decision protocol to assign patients with CA to three possible different pathways:1) Extracorporeal Cardio-Pulmonary Resuscitation (E-CPR), 2) normothermic regional perfusion (NRP), 3) standard Advanced Life Support (ALS) (Figure 1). Here we present the first two cases of uDCD happened in Legnano, Milan, Italy in January 2023, after the protocol introduction.

Methods: Two patients, aged 66 and 61, reported witnessed out-of-hospital cardiac arrests (OHCA) but no bystander Cardio-Pulmonary Resuscitation (CPR) was performed. The Emergency Medical System (EMS) started ALS procedures with mechanical CPR (mech-CPR) during transport to the hospital; according to the protocol both patients were deemed ineligible for E-CPR due to the long no flow time. When resuscitation efforts were no longer indicated, clinical conditions, prognosis and all the care performed were reported to the closest relatives.

The Italian Transplant Information System (SIT) for Living Will was consulted but no records were found. After that, they were informed about the possibility of organ donation through

Figure 1. TRIAGE ALGORYTHM FOR CA PATIENTS

1.   **POSSIBLE PATHWAYS IN CASE OF REFRACTORY CARDIAC ARREST (after 3 rhythm analysis)**
From the top to the bottom, the absence of one criterion excludes the patient from the pathway on the left column and determines the irreversible switch to the pathway on the right.

FEATURES	E-CPR	DONOR	ALS (DNR)	
AGE (years)	12-70	12-70	> 70	AGE:
FIRST SHOCKABLE RHYTHM (ADD PEA IF IHCA)	YES	NO	-------	RHYTHM:
WITNESSED CA WITH "NO FLOW TIME" (minutes)	< 6	> 6 < 15	> 15 unwitn	CA TIME:
MECHANICAL CPR	YES	NO	-------	
TIME BETWEEN CA (loss of consciousness) and ER ARRIVAL (minutes)	< 60	> 60 < 90	> 90	T' CA→ ER:
TIME BETWEEN CA (loss of consciousness) and "ON PUMP" (minutes)	< 90	< 120	> 120	T' CA→ OnPump:
EtCO₂ > 10 mmHg (HIGHEST VALUE OF CAPNOGRAPHY BEFORE ER ARRIVAL)	YES	NO	-------	VALUE:

E-CPR, extracorporal cardiopulmonary resuscitation; ALS, advanced life support; DNR, do not resuscitate; PEA, pulseless electrical activity; IHCA, intrahospital cardiac arrest; CA, cardiac arrest; CPR, cardiopulmonary resuscitation; ER, emergency room; T', time; EtCO₂, end-tidal CO₂.

Figure 2. TIMELINES OF THE TWO CASES
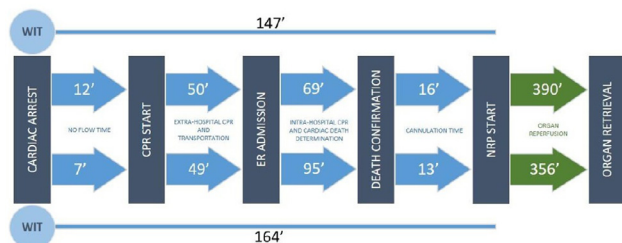
uDCD protocol and they declared no opposition. Before interruption of mech-CPR small sheath introducers were placed in femoral vessels and full dose heparin was given. According to the Italian law 20 minutes of isoelectric EKG was recorded. After cardiac death declaration, cannulation procedure was performed. Aortic occlusion balloon was inflated to exclude upper circulation and NRP started to recondition abdominal organs.

Results: The process of organ retrieval began after 6 and 6.5 hours of NRP, respectively. Figure 2 presents the timeline of the two cases: patients' WIT were 147 and 164 minutes. Overcoming the WIT limits illustrated in the protocol, in these two uDCD cases, the livers were successfully transplanted in both cases, while kidneys in one of them.

Discussion: Despite the difficulties, this simple protocol permits managing and triaging patients undergoing refractory CA in three different pathways (ECPR, uDCD, ALS), depending on CA timing and patient features. Long WIT, known difficulty in uDCD, did not prevent the successful transplanted organs outcome. These results suggest the need for further research about organ WIT, in order to potentially increase organs availability through DCD path.

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Anomalous Left Coronary Artery from the Pulmonary Artery (ALCAPA) as a cause of an Out Of Hospital Cardiac Arrest

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Introduction: Bland White Garland Syndrome is a rare disease characterised by an anomalous origin of the left coronary artery from the pulmonary trunk (ALCAPA) (1). It affects 1 in 300,000 live births (2). Onset of symptoms is usually observed in the neonatal period, however, cases of asymptomatic adult patients have also been reported (1).

Methods: A 29 year old female was brought in by ambulance to the emergency department following an out of hospital cardiac arrest (OOHCA). She had a witnessed collapse in the community with immediate bystander CPR. Upon arrival of the paramedics, she was in ventricular fibrillation and, after receiving one shock, return of spontaneous circulation (ROSC) was achieved. She had a background of DiGeorge syndrome, mosaic trisomy 14, Pierre Robin sequence, recurrent aspiration pneumonias and was noted to have had a previous cardiac arrest on induction of anaesthesia as a child. On arrival to the emergency department, her Glasgow Coma Scale was 3 and she was subsequently intubated. CT-pulmonary angiogram and CT-brain demonstrated no abnormalities. She was admitted to ICU and commenced on intravenous antibiotics for pneumonia. Following an uncomplicated course in ICU, she was extubated on day 2. An ECHO performed during her admission demonstrated moderate dilation of her left ventricle (LV) and moderate dysfunction of her LV with an ejection fraction of 35-40%.

Results: She was transferred to the Mater hospital where a cardiac MRI showed signs of subendocardial infarction involving the high and low anterolateral segments extending through greater than 50% of the myocardial wall. A subsequent CT cardiac angiogram diagnosed anomalous left coronary artery from the pulmonary artery with collateral supply to this artery from the right coronary and from the hypertrophied bronchial artery. She had a pacemaker inserted and subsequently underwent reimplantation to establish a dual coronary system.

Discussion: ALCAPA syndrome is a rare cause of cardiac arrest. Although typically diagnosed in early childhood, there are case reports of ALCAPA syndrome presenting with cardiac

arrest in previously well adult patients. The development of inter-coronary collateral vessels from the right coronary artery can allow survival into adulthood without symptoms developing (3). In those who are diagnosed in adulthood, mitral regurgitation is often the first symptom, however, as in this case, it can often present with an unexplained cardiac arrest (3).

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Implementation of national Patient Blood Management recommendations is associated with a reduction in allogeneic blood transfusion − a single-centre, before-and-after, retrospective study of 1174 patients

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Introduction: Despite the existence of obstacles to its successful adoption, the integration of Patient Blood Management (PBM) in cardiac surgery has proven to be effective in

Variable	Before	After	P=	Matched before	Matched after	P=
PRBC transfusion N patients (%)	369 (52%)	266 (57.3%)	0.072	79 (50.3%)	78 (44.9%)	0.334
Perioperative PRBC transfusion (units, medians and IQR)	1 (0-2)	1 (0-3)	0.009	1 (0-2)	0 (0-1)	0.424
Perioperative PRBC transfusion (units, means and SD)	1.39 (2.26)	2.04 (3.88)	<0.001	0.94 (1.32)	0.89 (1.32)	0.705
Perioperative FFP transfusion (units, medians and IQR)	0 (0-2)	0 (0-2)	0.348	0 (0-0)	0 (0-0)	0.04
Perioperative FFP transfusion (units, means and SD)	1.02 (2.34)	1.83 (5.27)	<0.001	0.7 (1.73)	0.38 (1.05)	0.04
PLT transfusion N patients (%)	65 (9.3%)	40 (8,6%)	0.748	10 (6.3%)	6 (3.5%)	0.239

diminishing the need for blood transfusions and the accompanying complications, while simultaneously enhancing patient outcomes.

Methods: The primary objective of this study was to determine the impact of the Romanian national PBM recommendations on the usage of allogeneic blood products in cardiac surgery (1).

We conducted a retrospective, single-center study as part of the Romanian national pilot program for PBM. The study took place in a tertiary cardiovascular surgery center and involved patients from two distinct time periods: before and after the implementation of the national recommendations. Using coarsened exact matching, from a total of 1174 patients, we identified and matched 157 patients from the pre-implementation group with 169 patients from the post-implementation group, using age, sex, hospital length of stay (LOS), ICU LOS, the type of surgery, surgery time, pre-operative anaemia, pre-operative Hb, the use of ROTEM and cell-saver as co-variates.

The data were recorded according to the directives of the Order of the Minister of Health no. 1251 of 2018 and their statistical processing for publication was approved by the institutional ethics and study approval committee.

Results: Although there was a trend towards a lower proportion of patients requiring packed red blood cells (PRBC) transfusion in the 'after' group (44.9% vs. 50.3%), it was not statistically significant. Similarly, there was no significant difference between the groups in terms of peri-operative PRBC units transfused (1 vs 0 units per patient, p = 0.424). The findings reveal that in the 'after' group, there was a decrease in median Hb levels compared to the "before" group, both immediately after surgery - 10.1 g/dl (IQR 9.1-11.1) vs. 9.4 (IQR 8.7-10.1) and at hospital discharge - 9.8 g/dl (IQR 9.2-10.7) vs. 9.3 g/dl (IQR 8.5-9.9).

There was a significant difference in terms of fresh frozen plasma (FFP) transfusion rates, with a lower percentage of patients requiring FFP transfusion in the 'after' group (14.2%, vs. 22.9%, p= 0.04). This difference was also seen in the total number of peri-operative FFP units transfused (mean transfusion 0.7 units, SD 1.73 vs. 0.38 units, SD 1.05, p= 0.04) and

intra-operative FFP transfusion (mean transfusion 0.59 units, SD 1.31, vs. 0.23 units, SD 0.79, p= 0.003).

PLT transfusion rate was not statistically different between the two groups, 6.3% vs. 3.5%, p= 0.239.

Discussion: FFP transfusion is a common intervention in cardiac surgery and can lead to significant morbidity, as each unit has a cumulative detrimental effect in outcomes. Any reduction in FFP transfusion rates is clinically relevant, as it can lead to improved patient outcomes and reduced healthcare costs.

Implementing national PBM recommendations was associated with a reduction in FFP transfusion.

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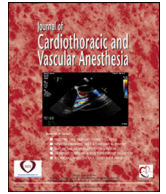
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