

POSTER AND ORAL PRESENTATION ABSTRACTS



VisitBritain®



ANNUAL SCIENTIFIC MEETING GLASGOW 2021

Wednesday 17th & Thursday 18th November

**Grand Central Hotel
99 Gordon Street,
Glasgow, G1 3SF**

www.actaccmeetings.co.uk

Oral Presentation Abstracts

Use of new NIRS cerebral oximetry indices ΔHHb and $\Delta\text{O}_2\text{Hb}$ to monitor cerebral perfusion in cardiothoracic surgery.

Hatem El-Shora, Aamer Ahmed

University Hospitals of Leicester NHS Trust, Leicester, United Kingdom

Abstract

Use of near-infrared spectroscopy (NIRS) to monitor and display continuous rSO_2 values for each side of the brain is well established (1,2). However the separation of oxygenated and deoxygenated components of NIRS is novel. We report a case of its use in CABG surgery.

A 68 year old diabetic male weighing 112 kg was listed to undergo coronary artery bypass surgery. Anaesthesia was induced with etomidate, fentanyl and rocuronium and maintained with air and oxygen and isoflurane to a sedation index of 30. The surgery proceeded uneventfully and successfully. Some new observations were noted: The relationship of an increase in cardiac output and blood pressure at sternotomy with an increase in delivery in oxygenated blood to the brain was noted. This is shown at 1000 in the figure below. Although the global cerebral values hardly change, the $\Delta\text{O}_2\text{Hbi}$ and ΔHHbi change significantly. Between 1000-1012 the effect of turning the head to the right during transoesophageal echocardiography scanning of the patient shows that the global cerebral indices drop. As the head is returned into the neutral midline position and flow is restored we can see a rise in $\Delta\text{O}_2\text{Hbi}$ and a reduction in ΔHHbi i.e. increased delivery of oxygenated blood to the right side with a reduction in deoxygenated blood.



Principles of NIRS monitoring: As the degree of oxygenation in cerebral tissue changes, the wavelengths of light absorbed by tissue and those returned to the sensors also change, forming the basis for the measurement of regional cerebral oxygen saturation, rSO_2 . With these indices, we can display information about the changes in the underlying components calculating rSO_2 values. $\Delta\text{O}_2\text{Hb}$ provides an index representing changes in the oxyhemoglobin component of rSO_2 . ΔHHb provides an index representing changes in the deoxyhemoglobin component of rSO_2 .

These indices provide additional visibility into changes in the underlying oxyhemoglobin and deoxyhemoglobin components of rSO_2 . The relative contribution of each component to a patient's overall rSO_2 was observed and that the use of these additional monitoring indices may allow earlier detection of changes in the blood supply to the brain such as during head movement for central venous line placement and transoesophageal echocardiography scanning, and hence allow earlier corrective intervention. This may be of value in preventing impending cerebral injury in those patients who may be susceptible.

References

Ahmed A, Mariscalco G, Maselli D, Beghi C (2017) The Importance of Cerebral Oximetry in Perioperative Surgery. *Angiol* 5: e118. doi: 10.4172/2329-9495.1000e118

2019 EACTS/EACTA/EBCP guidelines on cardiopulmonary bypass in adult cardiac surgery

Kunst, G. et al. *British Journal of Anaesthesia*, Volume 123, Issue 6, 713 - 757

Can the principles of enhanced recovery be applied to a severely obese patient requiring urgent valve surgery?

Claire Scanlon, Mario Ferrante, Alexander Ng, Matthew Ilchyshyn, Nicolas Nikolaidis

Royal Wolverhampton Hospitals NHS Trust, Wolverhampton, United Kingdom

Abstract

This extraordinary case illustrates how strategies for enhanced recovery can be applied to a morbidly obese patient requiring cardiopulmonary bypass and urgent valve surgery. A 44 year old man of weight 236 kg (body mass index 69.6 kg m⁻²) was referred for aortic valve replacement and tricuspid valve repair. He had a past history of aortic valve endocarditis, rhabdomyolysis and acute kidney injury. Three years later he returned with decompensated severe aortic regurgitation, moderate tricuspid regurgitation and fast atrial fibrillation. Continuous airway pressure was used to manage obstructive sleep apnoea. His EuroSCORE was 12%.

After a multidisciplinary team meeting, anaesthesia was induced with midazolam 10 mg, fentanyl 100 µg and rocuronium 100 mg, maintained with oxygen, air and isoflurane with entropy to monitor depth of anaesthesia. Cardiopulmonary bypass time was 125 minutes with aprotinin 40 000 KIU administered. A tissue aortic valve of size 27 mm and tricuspid annuloplasty were performed. His body was cooled to 34°C, then rewarmed to 37°C. On closure, his sternal wound was double-wired and covered with a vacuum dressing. After surgery, the patient arrived in intensive care on noradrenaline 0.006 µg kg⁻¹ h⁻¹ and adrenaline 0.012 µg kg⁻¹ h⁻¹. As there was good haemostasis and normal acid base balance, he was reassessed for pain, given morphine 4mg, inotropes discontinued and the patient extubated 2 hours after surgery. There was no requirement for transfusion of red cells and blood products. The day after surgery, he sat in a chair, stood out of bed and began with an oral diet. Warfarin was commenced for atrial fibrillation; surgical drains were removed.

This case shows that several principles of enhanced recovery were achieved despite the extreme weight of the patient. We achieved the following outcomes:

- use of minimal doses of inotropes
- early extubation
- early mobilisation
- minimising paralytic ileus
- avoiding acute kidney injury

Moreover, enhanced recovery would not have been possible without attendance to surgical factors including haemostasis, prevention of surgical site infection and sternal dehiscence.

In conclusion, we found that it was possible to prevent delayed recovery of this patient despite his extreme weight and comorbidity. Opioids were titrated and individualised rather than dosed according to total or lean body weight. Several possible postoperative complications were avoided by setting conditions for early extubation and rehabilitation.

References

SA. Hirji et al Expert Consensus of Data Elements for Collection for Enhanced Recovery After Cardiac Surgery. *WorldJSurg*2021;**45**:917–925.

Engelman DT, et al. Guidelines for perioperative care in cardiac surgery. *JAMASurg*. 2019;**154**:755-66.

Schonborn JL, et al. Perioperative medicine: a changing model of care. *BrJAnaesth* 2019; **19**:27-33.

Diagnosis of partial anomalous pulmonary venous connection in a post-operative cardiothoracic patient

Shivani Joshi¹, Grainne Gallagher²

¹Harefield Hospital, London, United Kingdom. ²Harefield Hospital, London, United Kingdom

Abstract

A sixty-four year-old patient underwent elective tissue aortic valve replacement and triple-vessel coronary artery bypass grafting. Central venous catheterisation (CVC) was required for ongoing monitoring in critical care due to post-operative deterioration. Ultrasound-guided insertion of the CVC into the left internal jugular vein (IJV) was uncomplicated with use of Seldinger technique. When transduced, however, the central venous waveform appeared arterial and blood gas from this line showed an arterial pO₂. In this time, the patient showed no signs of neurological or circulatory compromise and arrangements were made to investigate the possibility of arterial puncture.

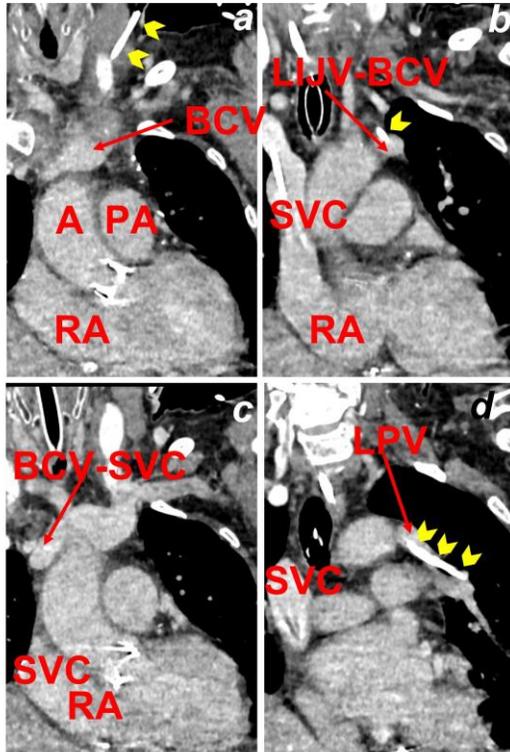


Fig 1. CT images showing communication between BCV and LPV (branch of the left pulmonary vein) in anterior-posterior sequence a-d. A: aorta; LIJV: left internal jugular vein; PA: pulmonary artery; RA: right atrium, SVC: superior vena cava. Arrowheads: CVC line

Chest X-ray was used to verify the location of the CVC line tip. Instead of following the expected course towards the superior vena cava and right atrium, the line extended inferiorly to the level of the left pulmonary hilum with lateral deviation of the line tip into the left lung field. Computerised tomography (CT) imaging was subsequently obtained and confirmed line placement within the IJV with no arterial communication seen. Unexpectedly, though, the line tip was noted to lie within the left pulmonary vein (Fig. 1) demonstrating a left partial anomalous pulmonary venous connection (PAPVC).

PAPVC are rare congenital abnormalities mostly involving the right lung. Left PAPVC usually manifests through drainage of the left upper lobe into the brachiocephalic vein via an aberrant vertical vein - as demonstrated in this patient. Cases are usually detected in paediatric populations if associated with congenital heart diseases. Otherwise PAPVC may remain undetected until adulthood with incidental diagnosis during line insertion or on CT imaging. PAPVC is significant due to its link with right heart strain - secondary to volume overload caused by shunting - with risks of tricuspid regurgitation, pulmonary arterial hypertension (PAH) and, ultimately, right ventricular (RV) failure. Early surgical correction of PAPVC in patients with PAH has been shown to cause right heart remodelling and minimise symptomatic RV failure. However, given that the affected cohort of patients remains small, there is no consensus as to management of PAPVC in asymptomatic patients.

the time of detection. This will, however, remain an important consideration in the future if the patient develops evidence of right heart strain.

Our patient showed no evidence of right heart dysfunction on echocardiography and, as she was recovering from extensive cardiac surgery, consideration of PAPVC repair was inappropriate at

References

Demos T, Posniak H, Pierce K et al. American Journal of Roentgenology 2004;182:1139-1150.

EI Bardissi A, Dearani J, Suri R et al. The Annals of Thoracic Surgery 2008;85:1007-1014.

Hegde M, Manjunath S, Usha M. Journal of Clinical Imaging Science 2019;9:29

Understanding Medicine Prescription and Administration Practices During Cardiopulmonary Bypass

Oliver Oxenham, Mathew Patteril, Jon Echebarria, Paul Sweeney

University Hospitals Coventry and Warwickshire, Coventry, United Kingdom

Abstract

There is variation between institutions in the administration practices by cardiac perfusionists of drugs to patients whilst on cardiopulmonary bypass (CPB). Our interest was in the extent of variation in practice, and reasons for it.

The quality improvement standard for comparison was 'Guide to Good Medical Practice in Clinical Perfusion – Framework for the Administration of Named Medicines'[1] – a national guideline from the Department of Health. The guideline recommends that perfusionists can only administer drugs on instruction from surgeons or anaesthetists (ideally written form and signed), including dose ranges for exercising clinical judgment. Protocols (known as 'Patient Specific Directions' – PSDs) should be developed in advance, involving cardiac surgeons, anaesthetists and perfusionists. PSDs are expansive to account for a variety of surgeries, anaesthetic practices and patient groups; which elements of the PSD to follow should be decided at team brief, and the decision should be recorded and signed for prior to the procedure.

We conducted a nationwide quality improvement survey of all 28 adult cardiac units in England and Wales. A questionnaire of multiple choice and short answer questions was created via Google Forms and emailed to the heads of the cardiac perfusionist departments. Results were collected from January to May 2021. The response rate was 100%.

86% of institutions used PSDs based on the recommended guidelines, with the large majority agreed and signed by all anaesthetists, surgeons and perfusionists (89%), and including drug indications and dose limits (96%). 25% of institutions routinely discuss drug administration before each case, with an additional 40% discussing on an ad hoc basis. 48% of institutions sign for drugs before the start of each case. The most common drugs administered by perfusionists were crystalloid fluids, heparin, cardioplegia, isoflurane, metaraminol and sodium bicarbonate.

PSDs exist to allow perfusionists to work within safe limits; it is reassuring that most centres routinely use PSDs, agreed by all, with drug indications and dose limits. However, PSDs are broad and generic by design; we recommend always discussing specific drugs to be administered before each case with the anaesthetist and surgeon. We recommend signing for each drug pre-operatively, and ensuring the perfusionist is comfortable administering what has been prescribed. An annual review of the PSD should be undertaken, with liaison with pharmacy and approval by the medicines management committee of each individual hospital.

References

[1] Department of Health, *Guide to Good Practice In Clinical Perfusion*. July 2009. Available from: https://assets.website-files.com/5da4ad68b9d5374c5a54c71d/5da4ad68b9d537fd6654c82a_SCPS%20-%20Good%20Practice%20Guide.pdf [Accessed 25th January 2021]

Cryoanalgesia to reduce opioid use following Thoracoabdominal Aortic Aneurysm Repair (TAAA)

Andres Freundlich, Mateusz Zawadka, Carlos Corredor, Sibtain Anwar, Ana Lopez Marco, Benjamin Adams, Giampaolo Martinelli, Lloyd Kwanten, Martinette Ferreira, Cormac O'Connor, Vivek Sharma, Fatemeh Jafarzadeh, Aung Oo
Barts Heart Centre, London, United Kingdom

Abstract

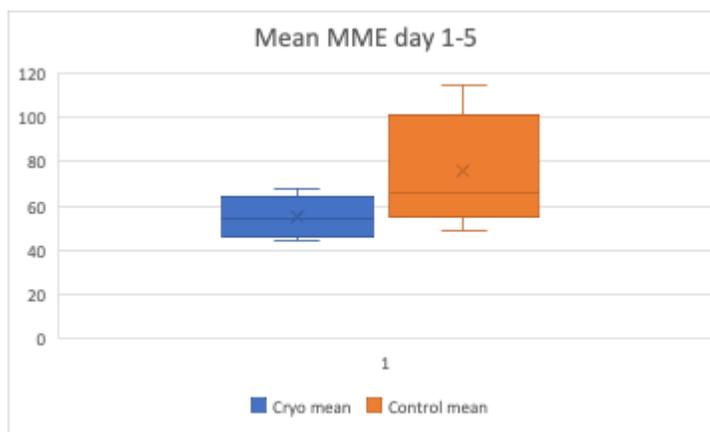
Patients undergoing open thoracoabdominal aortic aneurysm repair (TAAA) require large incisions associated with considerable postoperative pain. Cryoanalgesia of intercostal nerves is a plausible strategy to reduce postoperative surgical pain and opioid requirement according to two published case series from North America^{1,2}. We aim to evaluate the impact of cryoanalgesia on opioid use in the UK.

We measured the before-and-after effects of introducing multilevel intercostal nerve cryoanalgesia (under electromyographic guidance) routinely to our surgical service in September 2020. This procedure is performed intraoperatively using the Cryolce (Atricure, Inc) device. Intercostal nerves located two levels above as well as four levels below thoracotomy incision are treated.

We report opioid requirement, expressed as morphine milligrams equivalent (MME), before and after this practice change. Patients yet to be extubated by day 3 or those reintubated within 5 days were excluded from the analysis. Pain management was standardised to include the administration of regular intravenous paracetamol, fentanyl PCA and pregabalin for all patients. In addition, intrathecal diamorphine was administered regularly prior to the introduction of cryoanalgesia but was limited to rescue therapy afterwards. This study was approved by the Barts Health NHS Trust Clinical Effectiveness Unit (Registration number 11780)

Data from 14 patients in the cryoanalgesia group and the preceding 15 patients in the control group was analysed. Cryoanalgesia patients required 50.6 MME compared with 71.3 MME in the control group (mean difference -18.7, 95% CI -45.9 to 8.55) during the first 5 postoperative days (Fig 1). The mean difference was larger in the second (-26.7 MME), third (-28.8 MME) and fourth postoperative days (-34.4MME). Prior to this change in clinical practice patients received intrathecal diamorphine for an average of 3.25 days with an average cumulative dose of 15mg. Only one cryoanalgesia patient required a single dose of 250mcg of rescue intrathecal diamorphine.

In this series, multilevel intercostal nerve cryoanalgesia under electromyographic guidance is associated with reduced opioid usage following thoracoabdominal aneurysm repair. Cryoanalgesia appears to remove the need for routine intrathecal spinal diamorphine, which is also associated with spinal drainage issues in our experience. Multi-centre, randomised clinical trials are required to formally evaluate the short- and long-term analgesic properties of cryoanalgesia during cardiothoracic surgery.



References

1. Clemence J, Jr., Malik A, et al. Cryoablation of Intercostal Nerves Decreased Narcotic Usage After Thoracic or Thoracoabdominal Aortic Aneurysm Repair. *Semin Thorac Cardiovasc Surg.* 2020;32(3):404-412.
2. Tanaka A, Al-Rstum Z et al. Intraoperative Intercostal Nerve Cryoanalgesia Improves Pain Control After Descending and Thoracoabdominal Aortic Aneurysm Repairs. *Ann Thorac Surg.*2020;109(1):249-254.

Adoption of a novel biomarker-guided quality improvement treatment bundle for patients with subclinical acute kidney injury after cardiac surgery - a Royal Brompton Hospital - King's Health Partners Innovation Project

Benjamin Milne^{1,2}, Sinead Helyar¹, Thomas Gilbey^{1,2}, Daveena Meeks^{1,2}, Carol Pellowe³, Eugenia D'Andrea¹, Marlies Ostermann⁴, Gudrun Kunst^{1,5}

¹King's College Hospital NHS Foundation Trust, London, United Kingdom. ²King's College London, London, United Kingdom. ³Royal College of Anaesthetists, London, United Kingdom. ⁴Guy's & St Thomas' NHS Foundation Trust, London, United Kingdom. ⁵School of Cardiovascular Medicine & Sciences, King's College London, London, United Kingdom

Abstract

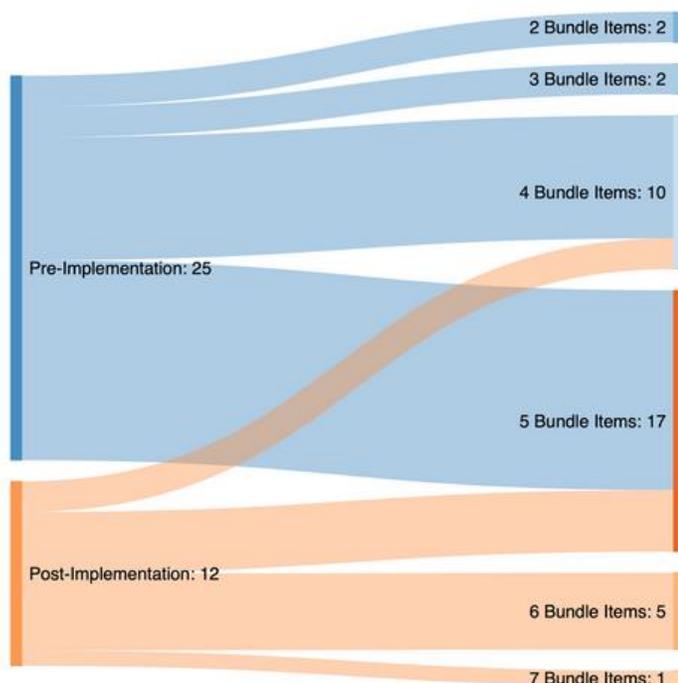
Acute kidney injury (AKI) is a common major complication of cardiac surgery, affecting up to 40% of patients, with associated mortality of up to 50%.^{1,2} G1 cell cycle arrest biomarkers TIMP-2 & IGFBP7 have been shown to be predictive of AKI after cardiac surgery.³ Urinary biomarker-guided identification of high-risk patients, alongside implementation of a Kidney Disease: Improving Global Outcomes (KDIGO)-based care bundle, can reduce the incidence of post-cardiac surgery AKI.^{2,3}

The overarching primary outcome of this project will be staff acceptability of the biomarker-guided treatment bundle at four London cardiac centres. Here we report preliminary single-centre results after implementation of a biomarker-guided treatment bundle.

A retrospective analysis of 25 consecutive cardiac surgery patients at our institution determined local incidence of AKI and baseline usage of potential care bundle items. A biomarker-guided care bundle was implemented for all cardiac surgery patients with urinary $[TIMP-2] \times [IGFBP7] > 0.3 ((ng/ml)^2 / 1000)$ 2h after surgery, including: (i) discontinuation of nephrotoxic agents if possible, (ii) advanced haemodynamic monitoring and protocolised optimisation, (iii) twice-daily serum creatinine/fluid balance, (iv) avoidance of hyperglycaemia ($>10mmol/L$ for $>3h$), (v) consideration of avoidance of radiocontrast agents, (vi) discontinuation of ACE inhibitors for 48h, (vii) avoidance of starch/gelatin/chloride-rich solutions. Subsequent analysis of 75 consecutive cardiac surgical patients was conducted.

16% (12/75) of biomarker-assessed patients were identified as high-risk. Pre-implementation incidence of all-stage AKI within 72hrs was 36% compared with 25.3% post-implementation ($p=0.440$). Post-implementation, patients received a mean of 5.4 bundle items, compared with 4.3 items pre-implementation ($p=0.002$) (Fig.1). Due to the impact of the SARS-CoV2 pandemic on the pre-implementation data, further analysis was performed only on 'Urgent' post-implementation cases (49.3%). Incidence of AKI, severe AKI and RRT requirement was non-significantly reduced post-implementation (35.1% from 36%, $p=1.0$; 10.8% from 28%, $p=0.162$; 5.4% from 12%, $p=0.646$). Median organ support duration was 4d in both phases ($p=0.547$). Postoperative length of stay was reduced from 10d to 8d ($p=0.032$). A mean of 5.3 bundle items were delivered ($p=0.016$).

Figure 1. Sankey diagram showing usage of bundle items per patient prior to implementation as part of routine practice, and uptake of bundle items following implementation



Preliminary retrospective data identified a clear role for the project, based upon incidence of AKI, and variable prior use of the bundle items. The post-implementation data suggests a reduction in incidence of severe AKI, and a significant reduction in length of stay. The provision of renal protective measures has been standardised and variability reduced.

References

1. Chew STH, Hwang NC. *J Cardiothorac Vascular Anesth.* 2019;33(4):1122-1138
2. Zarbock A, Kullmar M, Ostermann M, et al. *Anesth Analg.* 2021;133(2):292-302
3. Meersch M, Schmidt C, Hoffmeier A, et al. *Intensive Care Med.* 2017;43(11):1551-1561

Adding objectivity to submaximal exercise testing by assessment of heart rate recovery – a healthy volunteer study – II (SEARCH-II)

Haroon Minhas¹, Dr. Christopher Morton¹, Dr. Martin Shaw¹, Dr. Benjamin Shelley^{1,2}

¹Academic Unit of Anaesthesia, Pain and Critical Care, University of Glasgow, Glasgow, United Kingdom. ²Department of Cardiothoracic Anaesthesia, Golden Jubilee National Hospital, Glasgow, United Kingdom

Abstract

Submaximal exercise tests (SETs) offer a cheaper, easier to conduct and better tolerated alternative to ‘maximal’ cardiopulmonary exercise testing as a preoperative risk assessment tool (1). Quantifying heart rate recovery (HRR) is a potentially objective method for assessing cardiopulmonary fitness following SETs. HRR1 and HRR2 (calculated as heart rate (HR) on exercise cessation minus HR at 1 and 2 minutes of rest) are commonly used methods for quantifying HRR. Impaired HRR1 following SETs has been shown to be an independent predictor of cardiovascular complications following thoracic surgery (2). However, previous work indicates HRR1/HRR2 are dependent on modality of exercise (3) and so lack reproducibility in a clinical setting. This study assessed the reproducibility of HRR1, HRR2 and a novel area under the curve (AUC) method (**Figure 1.**) for quantifying HRR across different modalities of SET.

Ethical approval was granted by the Golden Jubilee Research Institute and written informed consent was obtained from all volunteers. Thirty-one healthy volunteers underwent three SETs of differing modalities in a randomised order: Cycle Ergometry, Step Test and Shuttle Walk. Individuals on beta blockers or with contraindications for exercise testing were excluded. HR was measured at 30 second intervals for 6 minutes of rest following cessation of exercise. HRR was quantified using HRR1, HRR2 and AUC. Reproducibility was assessed by calculating Pearson's correlation coefficient (r) and the intra-class correlation coefficient (ICC).

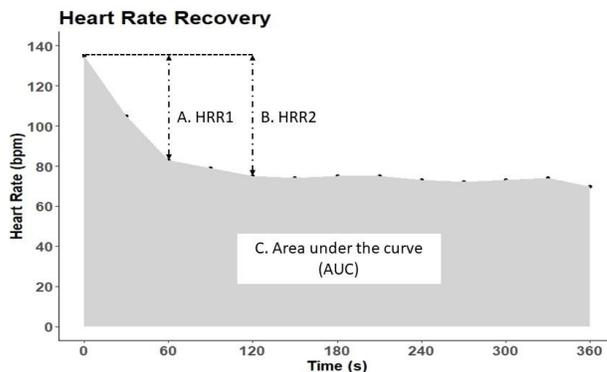


Figure 1. Methods for quantifying HRR.

Example HRR vs time curve; time 0 reflects cessation of exercise.

- A. HRR1 - Absolute difference between HR at exercise cessation and HR at 1 minute of recovery
- B. HRR2 - Absolute difference between HR at exercise cessation and HR at 2 minutes of recovery
- C. Area under the curve – Area under the HRR vs. Time curve (for 360 seconds of recovery) computed using trapezoid method

The median age of the study population was 26 (range 18 - 74) years with 16.1% of the population possessing chronic comorbidities. Mean effort across all exercise tests was 63.8% (95% CI: 62%, 65.7%) of age predicted maximal HR. HRR1 and HRR2 demonstrated poor reproducibility (ICC \leq 0.45 and $r \leq$ 0.53 and ICC \leq 0.29 and $r \leq$ 0.47 respectively) and AUC demonstrated moderate reproducibility (ICC \geq 0.52 and $r \geq$ 0.75) across all comparisons.

HRR1/HRR2 demonstrated poor reproducibility and weak to moderate correlation across different modalities exercise testing suggesting they are

influenced by the modality of exercise. The AUC method however demonstrates moderate reproducibility and strong positive correlation despite differing exercise modality suggesting it may be a superior and more objective method for quantifying HRR following SET. For SETs to become standardised perioperative risk assessment tools further work is required to assess the utility of AUC method in perioperative risk prediction in patients undergoing thoracic surgery.

References

1. Noonan V, Dean E. Phys Ther. 2000;80(8):782–807.
2. Ha D, Choi H, Zell K, et al. J Thorac Cardiovasc Surg. 2015;149(4):1168-U624.
3. Maeder MT, Ammann P, Rickli H, et al. Eur J Appl Physiol. 2009;105(2):247–55.

Prediction of Dyspnoea following Lung Resection Surgery

Brian Lafferty^{1,2}, Philip McCall^{1,2}, Jonathan Silversides³, Adam Glass³, Prabodh Sasidharan⁴, Robbie Lendrum⁵, Benjamin Shelley^{1,2}

¹University of Glasgow, Glasgow, United Kingdom. ²Golden Jubilee National Hospital, Glasgow, United Kingdom. ³Royal Victoria Hospital, Belfast, United Kingdom. ⁴Aberdeen Royal Infirmary, Aberdeen, United Kingdom. ⁵Edinburgh Royal Infirmary, Edinburgh, United Kingdom

Abstract

Lung cancer is the leading cause of cancer death in Europe. Surgical resection is often the preferred treatment but is associated with morbidity and mortality. Survival with a meaningful quality of life (QoL) is important; however, the prediction of post-operative dyspnoea (POD) is difficult and inaccurate.¹

The European Society of Thoracic Surgeons and the (UK) National Institute of Clinical Excellence advocate studies concerning operative risk. *Conventional* prediction uses predicted post-operative FEV1%(ppoFEV1%) and predicted post-operative DLCO%(ppoDLCO%) (<40% in either domain deemed 'high risk').

The aim is to improve *conventional* prediction of POD; identifying patients for recruitment to interventional studies seeking to mitigate POD (prognostic enrichment).

With informed consent and ethics approval, we prospectively recruited 250 patients undergoing lung resection in four UK centres. Dyspnoea was measured pre-operatively and 3 months post-operatively using the Medical Research Council (MRC) score. The primary outcome was patients with a post-operative MRC>2 (Pre-operative MRC>2 excluded).

Two *conventional* models were derived (n=93, single centre), before external validation (n=85, three centres) using the variables age, gender and ppoFEV1%/ppoDLCO%. **Model 1(M1)** incorporates ppoFEV1%/ ppoDLCO% with *conventional* cut-offs and **Model 2(M2)** treats them continuously.

Using similar derivation and validation, *new* models were explored. Univariate analysis identified risk predictors (p<0.1) before variables with significance were used in logistic regression to create **Model 3(M3)** (M2 with the next-best variable-EQ-5DL index score) & **Model 4(M4)** (selected from all variables- ppoFEV1%, BMI, diabetes status and brief pain inventory score).

Models were compared using sensitivity, specificity, positive predicted value (PPV), negative predictive value (NPV) and net reclassification indexing (NRI).

New models improved prediction (derivation dataset): **M2** Vs **M4** (AUROCC comparison, p=0.03, NRI 0.26) (Fig.1).

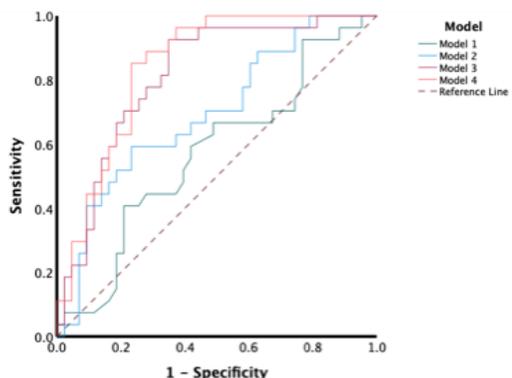


Fig.1:Models 1-4: Area Under Receiver Operator Curves values (95%CI) for prediction of MRC >2 (derivation dataset). *Model 1*- 0.55(0.41 - 0.69), *Model 2*- 0.68(0.56 - 0.81), *Model 3*- 0.81(0.71-0.91), *Model 4*- 0.83(0.74-0.92).(n=93)

The best *conventional* and *new* models (**M2 & M4**) performed similarly (external dataset): Sensitivity (55%Vs 50%), Specificity (68%Vs 73%), PPV (38%Vs 39%), NPV (81%Vs 81%), respectively.

This study demonstrates *conventional* prediction of POD is poor and highlights the challenges when creating a *new* model. At external validation, *conventional* models performed equally to *new* models. Using ppoFEV1%/ ppoDLCO% as continuous variables may increase predictive strength.

Future work should explore new variables to predict POD, such as QoL and biomarkers. Prognostic enrichment models should have high sensitivity and NPV, targeting patients who would benefit from low-risk interventions.

References

1.A.Brunelli et al. Quality of Life Before and After Major Lung Resection for Lung Cancer: A Prospective Follow-Up Analysis. *Ann Thorac Surgery* 2007;**84**:410-6.

Myocardial inflammation after major non-cardiac thoracic surgery

Emma Murphy^{1,2}, Adam Glass², Phil McCall^{1,2}, Ben Shelley^{1,2}

¹Golden Jubilee National Hospital, Glasgow, United Kingdom. ²University of Glasgow, Glasgow, United Kingdom

Abstract

Following major non-cardiac surgery, large numbers of patients have biochemical evidence of perioperative myocardial injury (PMI) associated with increased perioperative and long-term morbidity and mortality.¹ Recent work suggests inflammation is a major driver of PMI.² Our research group have previously demonstrated right (but not left) ventricular dysfunction in patients undergoing lung resection and hypothesised that an inflammatory injury to the right ventricle (RV) was implicated in its aetiology.³

With informed consent and ethical approval, 15 patients undergoing lobectomy underwent T1-weighted cardiac magnetic resonance imaging (CMR) pre and post contrast; pre-operatively, post-operative day two (POD2) and at 2-months. Imaging correlates of myocardial inflammation, native T1 time and extra-cellular volume (ECV) were measured on CMR in the LV and RV (at the ventricular insertion points) using Circle cvi42 (Calgary, Canada) post-processing software.

As previously reported, RV ejection fraction fell postoperatively from 62.3% (9.2) pre-op to 51.7% (9.6) on POD2 ($p=0.001$) whilst left ventricular ejection fraction was unchanged over time ($p=0.90$). Both native T1 time and ECV were significantly increased in the RV, but not in the LV (T1 changes depicted in Figure 1A); ECV rose from 25.9% (3.2) pre-operatively to 43% (4.4) on POD2 ($p=0.001$), with no change in LV ($p=0.50$).

This is the first study to demonstrate imaging correlates of myocardial inflammation in patients undergoing major non-cardiac surgery supporting the hypothesis that inflammation drives PMI. Changes were restricted to the RV; it is plausible that pulmonary vascular effects of lung resection drive RV dysfunction through increased afterload in this patient group. Further work is required to explore the role of RV dysfunction and inflammation in PMI in patients undergoing other forms of major non-cardiac surgery.

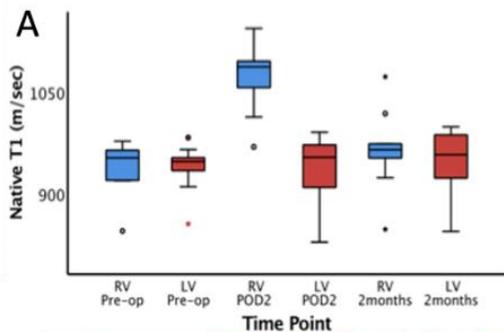
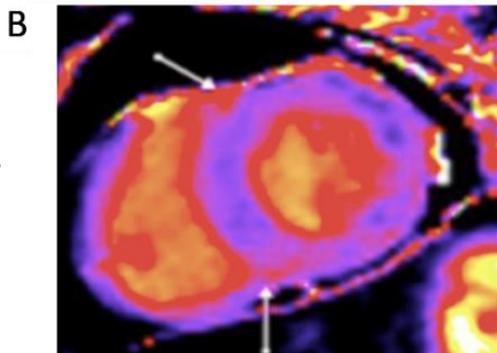


Figure 1 Comparison of native T1 values in the RV and LV and a native T1 map.

Image A demonstrates a change in native T1 value over time at the RVIPs (blue) ($p=0.001$ Friedman's) and the LV (red) ($p=0.60$ Friedman's). Values are median and IQR. Image B is a native T1 map from POD2 in a 57-year-old woman undergoing lung resection. The arrows in white highlight an area of increased native T1 at the RVIPs.



References

1. Ackland GL, Abbott TEF, Jones TF, et al. *BJA* 2020;124(5):535-43.
2. May SM, Abbott TEF, Del Arroyo AG, et al. *BJA* 2020;125(5):661-671.
3. McCall PM, Arthur A, Glass A, et al. *JTCVS* 2019;158(2):556-565.

Poster Presentation Abstracts

A comparison of isolation and spontaneous ventilation for lung management during thoracic surgery: a systematic review and meta-analysis.

Eve Wilson¹, Peter Alston²

¹University of Edinburgh, Edinburgh, United Kingdom. ²Department of Anaesthesia, Critical Care and Pain Medicine, University of Edinburgh, Edinburgh, United Kingdom

Abstract

General anaesthesia, mechanical ventilation with lung isolation using a double-lumen endobronchial tube or bronchial blocker, has been the standard for lung management during thoracic surgery for over 80 years. However, there has been increasing popularity for avoiding lung isolation and maintaining spontaneous ventilation for video assisted thoracoscopic surgery (VATS) both with patients conscious using regional anaesthesia and unconscious using general anaesthesia. Many benefits of spontaneous ventilation over the traditional approach have been proposed. We hypothesised that spontaneous ventilation would be significantly more efficient than lung isolation for thoracic surgery. The primary aim of this study was to compare the duration of hospital stay in patients undergoing thoracic surgery with lung isolation or spontaneous ventilation for lung management. Secondary aims were the durations of anaesthesia, global in-operating room duration and overall hospital cost.

Systematic search of PubMed, OVID/Embase and Google Scholar from January 2000 - October 2020 was conducted using predetermined inclusion criteria. Bias was assessed using the Cochrane screening method. Each lung management technique was segmented into randomised controlled trials (RCTs) and observational studies and analysed both separately and together. Meta-analysis using the Cochrane RevMan5 software was conducted and findings summarised as forest plots. Mean and 95% confidence intervals were compared alongside assessment of probability and heterogeneity.

The literature search identified 649 studies, of which only 23 fulfilled the entry criteria, and these included a total of 2,564 patients. The duration of hospital stay was significantly shorter for spontaneous ventilation than lung isolation (mean: -0.78 days; 95% CI 1.17 - 0.38) in all studies and in RCTs (mean: -0.88 days; 95% CI 1.1 - 0.65). The duration of anaesthesia was significantly shorter in spontaneous ventilation for all studies (mean: -10.87 minutes; 95% CI 9.3 - 12.43) and for RCTs (mean: -13.19 minutes; 95% CI 11.18 - 15.2). Similarly, global in operating room duration was shorter using spontaneous ventilation for all studies (mean: -33.31 minutes; 95% CI 23.57 - 43.04) and for RCTs (mean: -31.77 minutes; 95% CI 28.49 - 35.05). Hospital costs were lower for SV than MV with lung isolation (mean €2,610; 95% CI €2,520 - 2,700) and RCTs (mean €990; 95% CI €760-1,220).

When compared to the traditional technique of lung isolation under general anaesthesia for thoracic surgery, techniques using spontaneous ventilation either under regional or general anaesthesia, were associated with shorter durations of hospital stay and anaesthesia as well as time spent in the operating room. In addition, hospital costs are less expensive using spontaneous ventilation.

Prehospital echocardiography to diagnose acute type A aortic dissection - a feasibility study

James Hambly

St Bartholomew's Hospital, London, United Kingdom

Abstract

Introduction

Acute, type A aortic dissection (ATAAD) is a time-critical, life-threatening emergency and patients can only be managed in specialist cardiothoracic surgical centres that perform major aortovascular surgery. Nationwide, approximately 800 patients die annually from ATAAD, *despite* reaching a hospital (1).

Stroke, major trauma and acute myocardial infarction all have well developed, nationally defined pathways enabling patients to access the most appropriate care in a timely manner. These pathways have saved thousands of lives. The key to their success is making a diagnosis in the prehospital phase of a patient's care, and referring them directly to specialist centres to manage their illness/injuries.

We propose that a new pathway for care of these patients needs to be developed whereby the diagnosis of ATAAD is made prehospitally using echocardiography, and that patients are referred directly to cardiothoracic surgical centres that have the capability to perform ATAAD repair.

Methods

A feasibility study is currently ongoing at St. Bartholomew's Hospital in London to establish whether novice echocardiographers (no formal qualification/accreditation) can confirm the diagnosis of ATAAD when patients are referred to us with a CT diagnosis made at a referring centre.

We have created a focussed echocardiography protocol to enable assessment of the aorta and aortic valve. Participants with a variety of clinical backgrounds underwent a half-day training session using an echocardiography simulator (Heartworks) and live scanning on models to learn the focussed protocol we developed to look for the presence of ATAAD. By demonstrating that novice echocardiographers are able to diagnose ATAAD using hand-held, point-of-care ultrasound, we hope to train London Ambulance Service paramedics to do the same.

Discussion

The ultimate aim of this project is to demonstrate that, with the use of hand-held, point-of-care ultrasound, patients who suffer an acute type A aortic dissection can benefit from their diagnosis being brought forward to the prehospital phase of their care (2). Creation of pathways that stream ATAAD patients directly to an aortovascular centre, avoiding the need for secondary transfer, will drastically reduce the time taken to definitive diagnosis and surgical repair. Utilisation of the telemedicine capability of these probes will enable experts to review images generated in the prehospital phase. Together with the history, the likelihood of ATAAD can be assessed.

Conclusions

Portable, point-of-care ultrasound by utilising telemedicine capability has the potential to revolutionise the care of patients with ATAAD. Together with development of specific pathways to specialist centres, hundreds of lives can be saved.

References

1. HSIB report published 23 Jan 2020
2. Eur. J. Med. Case Reports. 2(2): 83-86

Validation of Days Alive and Out of Hospital as a Patient Centred Outcome Following Lung Resection Surgery

Sophie McCreadie, Brian Lafferty, Ben Shelley

University of Glasgow Academic Unit of Anaesthesia, Glasgow, United Kingdom

Abstract

In the UK, lung cancer is the leading cause of death from malignancy with lung resection surgery offering the greatest chance of cure. Surgical management in this patient cohort is perceived as high risk; underlying comorbidity is common hence surgical and perioperative complications are not infrequent. Consequently, there has been a great deal of research focussing on minimising risk and improving outcome. Of crucial importance to this research is selection of an appropriate patient centred measure.

Days alive and out of hospital at 30 days (DAOH₃₀) has potential as an upcoming patient centred outcome in perioperative medicine, standardising interpretation of the surgical experience. DAOH has been validated in the perioperative setting but has not been studied specifically in the thoracic surgical population¹. The aim of this study is to assess the construct validity of DAOH₃₀ as a patient centred outcome following lung resection surgery.

Perioperative outcome data was collected from 92 patients enrolled within the bnP for pRediction of Outcome Following Lung rEsection Surgery (PROFILES) study. DAOH₃₀ was then calculated by interrogation of national information stores.

Construct validity was sought by assessing associations between DAOH₃₀ and pre-, intra- and post-operative predictors and indicators of perioperative experience. Defined constructs of interest were: pre-operative – age, smoking status, alcohol consumption, pre-operative malignancy, percentage predicted FEV1, DLCO, and comorbidities including COPD; intra-operative – duration of surgery/ anaesthesia and procedure type; post-operative – complications, duration of HDU/ hospital stay and subsequent re-admission. T- or Mann-Whitney U tests or Spearman's rank correlation coefficient were applied as appropriate.

The median (IQR) DAOH₃₀ was 24(22-26). DAOH₃₀ was less in patients with COPD, 23(25.00-20.25), vs without COPD, 25(27-23); p=0.03. Fewer DAOH₃₀ were observed in those with a pre-operative diagnosis of malignancy, 24(26-21), vs benign disease, 25(27-23); p=0.01. There was no association between DAOH₃₀ and the remaining pre-operative constructs (p>0.33 for all). The intra-operative constructs of type of procedure (minimally invasive surgery, 25(27.00-22.75), vs open, 23(24.25-20.00); p=0.01), and duration of anaesthesia (r=-0.26, p=0.02) were significantly associated with DAOH₃₀. DAOH₃₀ was significantly associated with all post-operative constructs (p<0.01 for all).

DAOH₃₀ is being applied as an endpoint to studies enrolling patients undergoing both cardiac and non-cardiac, non-thoracic surgeries. In our study DAOH₃₀ displays construct validity as a patient centred outcome in the context of lung resection surgery, permitting consideration for use in thoracic surgery. DAOH₃₀ can be applied to both clinical trials and for quality improvement in healthcare delivery.

References

Jerath A et al. DAOH. Validation of a Patient-centered Outcome for Perioperative Medicine. *Anaesthesiology* 2019; 131:84-93.

Absent Visitors: The wider implications of COVID-19 on cardiothoracic ICU staff. (The VINCI Study)

Leah Hughes^{1,2}, Benjamin Shelley^{1,2}, Joanne McPeake^{3,2}

¹Golden Jubilee National Hospital, Glasgow, United Kingdom. ²University of Glasgow, Glasgow, United Kingdom.

³Glasgow Royal Infirmary, Glasgow, United Kingdom

Abstract

Introduction

Patients are not lone entities; they are part of larger social networks containing their family and others. Prior to the COVID-19 pandemic visiting policies varied globally¹, many intensive care units in the UK adopted a flexible approach to visiting.

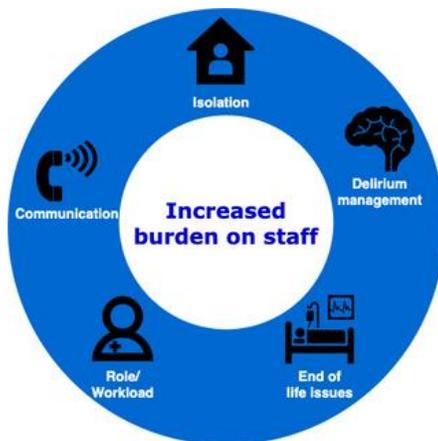
In March 2020 the rapidly progressing pandemic led the Scottish Government to stop non-essential visiting in hospitals. The impact of this policy on non-COVID-19 patients in cardiothoracic ICU, their relatives and staff involved in their care is unknown.

Aim

As one part of a mixed method study, the experiences of staff caring for non-COVID-19 patients in a cardiothoracic ICU unit were explored.

Methods

Participants were recruited using purposive sampling. Data was collected using semi-structured interviews, transcribed, and analysed using grounded theory.



Results

Twenty members of staff were recruited from a range of patient facing roles and experience. From initial coding a range of categories emerged. These were: isolation; delirium management; end-of-life issues; communication; and role and workload. Participants understood the necessity of the national visiting restrictions; however, they observed that the benefits came with notable negative effects on patients and their families.

A sense of increased workload emerged from the data, whether through spending longer with patients in order to reduce isolation or increased time speaking with families remotely. End-of-life care was particularly emotive: participants described experiences as 'barbaric' and speaking with families remotely as a 'professional low point'. This supports an emerging theory of an increased burden on staff (Figure-1).

Figure-1.

Discussion

This study shows an increased burden experienced by participants, not solely in the delivery of clinical care, highlighting the possible exposure of clinical staff not involved in COVID-19 care to potentially morally injurious events at this time. Moral injury is associated with events that lead to internal moral conflict and has potential to develop into other psychological issues².

Further research is needed on identifying and supporting clinical staff with moral injury stemming from caring for ICU patients during COVID-19.

Conclusion

This study provides some insight into the experiences of clinical staff in the cardiothoracic ICU during the pandemic and should be considered alongside the experiences of patients and their families.

References

1. Cappellini E, Bambi S, Lucchini A, et al. Open Intensive Care Units: A Global Challenge for Patients, Relatives, and Critical Care Teams. *Dimensions of Critical Care Nursing* 2014; 33(4): 181-93.
2. Čartolovni A, Stolt M, Scott PA, et al. Moral injury in healthcare professionals: A scoping review and discussion. *Nursing Ethics* 2021; 28(5): 590-602.

The Effect of Pulmonary Artery Catheterisation on Physiological Parameters and Level of Haemodynamic Support in Post-Cardiac Arrest Patients

Aryan Ali¹, Philip I McCall², Martin Shaw³

¹University of Glasgow, Glasgow, United Kingdom. ²Golden Jubilee National Hospital, Glasgow, United Kingdom.

³Glasgow Royal Infirmary, Glasgow, United Kingdom

Abstract

Outcome following out-of-hospital cardiac arrest (OHCA) is poor, with only 10% of patients surviving to hospital discharge. Haemodynamic instability is common, and management can be challenging. Some centres use the pulmonary artery catheter (PAC) to guide support, however no previous studies have investigated the role of the PAC in this population. Patients may be exposed to PAC-associated risk, with no evidence of benefit. This retrospective analysis of prospectively collected data sought to determine the effect of PAC insertion on level of haemodynamic support and physiological parameters following OHCA.

Between August 2015 and August 2020, 254 patients were admitted to the intensive care unit (ICU) at the Golden Jubilee National Hospital following OHCA. Thirty-two patients (13%) had a PAC inserted and high-fidelity, minute-to-minute, ICU data was extracted from the clinical information system for these patients. The primary outcome was the difference in a vasoactive inotrope score (VIS) and mean arterial pressure (MAP) at two hours following PAC insertion. This was investigated using the paired Student's t-test or paired Sign test as appropriate to data distribution. Secondary outcomes used generalised linear mixed effects interaction modelling to explore the change in trend of drug infusion rates, VIS, and MAP following PAC insertion.

There was no difference in MAP at two hours following PAC insertion ($p=0.851$). There was a difference in VIS at this time, median (95%CI) difference 5.0 (0.1, 5.06 [$p=0.004$]). Fourteen (44%) patients experienced a change in dose ($\geq 25\%$) in at least one vasoactive drug within 2-hours of PAC insertion. Thirteen (41%) patients had an addition of at least one new vasoactive drug within 2-hours of PAC insertion. PAC insertion interacted significantly with all variables and led to a significant change in trend. Following PAC insertion; all vasoactive drug infusions trended downward, except dobutamine, and MAP trended upward.

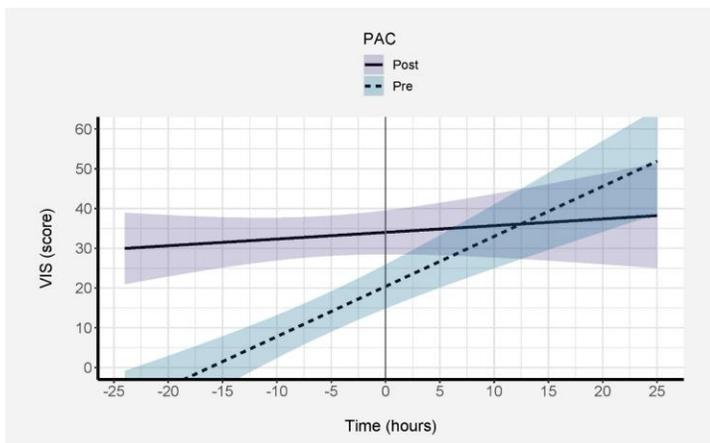


Figure 1: Predictive effects of mixed effects interaction modelling for vasoactive-inotropic score (VIS) against time, with a reference line at PAC insertion [n=32]

PAC insertion is associated with a relative decrease in the trend of level of haemodynamic support and increase in the trend of MAP, although the degree of change is difficult to estimate and may be clinically insignificant. Further research is required to confirm these findings and explore the use of PACs in patients following OHCA. Determining the optimal physiological targets in post-cardiac arrest care is a current research focus and PAC use may allow personalised management of haemodynamic and physiological targets, which may lead to improved outcomes for these patients.

Defining the Drivers of Decline in Quality-of-Life Following Lung Cancer Resection: A Secondary Analysis of the PROFILES Database

Chloe Doris¹, Brian Lafferty², Phil McCall³, Ben Shelley³

¹University of Glasgow, Glasgow, United Kingdom. ²West of Scotland, School of Anaesthesia, Glasgow, United Kingdom.

³Golden Jubilee National Hospital, Glasgow, United Kingdom

Abstract

Lung cancer is the second most common cancer in the UK. Despite its curative potential, lung resection is associated with significant decline in quality of life (QoL) postoperatively. Currently the drivers of deterioration in QoL are poorly understood. It is imperative that we identify peri-operative factors which are associated with a significant decline in postoperative QoL to allow testing of stratified interventions to ameliorate this decline.

This was a secondary analysis of the PROFILES study database, a prospective, observational cohort study recruiting patients presenting for lung cancer resection. This study analyses QoL data from 93 patients at the primary centre. The EORTC Quality of Life Questionnaire (QLQ) C30 was administered at baseline, three-months and one-year postoperatively. In line with the well accepted minimal clinically important difference for EORTC QLQ-C30 [1], a significant decline in global QoL was defined as ≥ 10 -point reduction in the summary score in this study. Multivariate logistic regression was performed based on this cut off to explore the drivers of postoperative decline including comorbidities, lung function, cancer stage and perioperative exposures.

A total of 75 patients were included in the final analysis at 3-months. The EORTC QLQ-C30 *Summary Score* trajectory over time can be seen in *Figure 1*. On multivariate analysis receipt of volatile anaesthesia (vs total intravenous anaesthesia) (OR=2.93, CI:1.00-8.53) and cancer stage >1 (OR=2.40, CI:1.12-5.17) and were independently associated with a decline in global QoL at three-months postoperatively whilst better predicted post-operative lung function was protective (OR=1.04, CI:1.01-1.08). The Area Under the Receiver Operating Characteristic Curve for this model is: 0.80 (CI:0.70-0.90).

This study found that receiving volatile anaesthetic, having a cancer stage >1 and poorer predicted postoperative lung function increased risk of a clinically significant decline in QoL at three-months after lung cancer resection. The independent association between choice of anaesthetic technique and decline in QoL is an unexpected finding; if validated it would be an important finding as an easily modifiable risk factor. There is biological plausibility for this association; previous studies have suggested that total IV anaesthesia (TIVA) can reduce complications and ICU admissions following surgery [2].

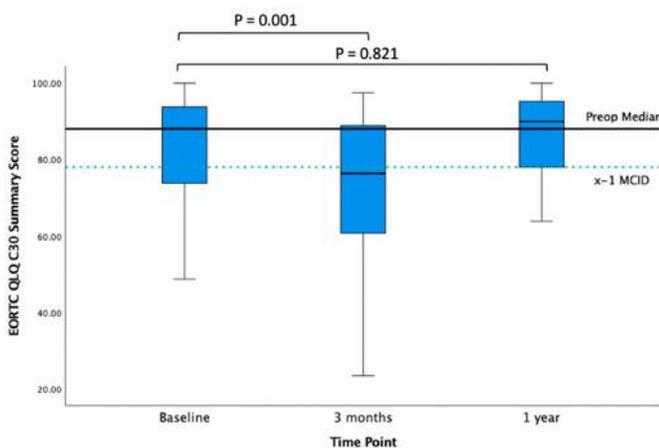


Figure 1 - EORTC QLQ C30 Summary Score Trajectory (MCID: Minimal Clinically Important Difference)

This is the first study to utilise the EORTC QLQ-C30 *Summary Score* to determine the predictors of postoperative decline in QoL after lung cancer resection. The observation that use of TIVA may protect against a decline in QoL requires further validation but would offer a simple perioperative intervention.

References

1. Fiteni F, Anota A, Westeel V et al. BMC Cancer. 2016;16(1)
2. McCall P. J, Macfie A, Kinsella J et al. 2015; Dec;70(12):1382-9

Renal replacement therapy in post-cardiac surgery patients at a high-volume centre - Incidence and risk factors

Grace Keegan¹, Owen Chambers², Omar Al-Rawi²

¹University of Liverpool, Liverpool, United Kingdom. ²Liverpool Heart and Chest Hospital, Liverpool, United Kingdom

Abstract

Introduction

Acute Kidney Injury (AKI) complicates recovery from cardiac surgery in up to 30% of patients. The risk of death following AKI remains high for 10 years after cardiac surgery, even with complete renal recovery post-operatively. When renal replacement therapy (RRT) is required post-operatively, mortality approaches 70%. There is potential to improve outcomes for patients susceptible to AKI after cardiac surgery by modifying intra and post-operative factors.

Objectives: 1) To find the incidence of RRT in post-cardiac surgery patients, 2) To determine why patients classified as low risk for AKI required RRT and 3) To see if changes could be made to the Liverpool Heart and Chest Hospital (LHCH) AKI risk calculator to better predict patient outcome.

Methods

This was a retrospective study assessing 14 patients admitted to LHCH for cardiac surgery between 03/10/18 and 22/08/19, predicted to be 'Low Risk' for developing an AKI and placed on RRT post-operatively.

At LHCH patients are risk stratified using a modified Cleveland Clinic Scoring Tool and classified as low or high risk for developing an AKI post-surgery. The parameters used are: end stage renal failure, gender, pre-op creatinine, congestive heart failure, left ventricular ejection, preoperative insertion of an intra-aortic balloon pump, chronic obstructive pulmonary disease, insulin-dependent diabetes, previous cardiac surgery, emergency surgery and operation type.

Results

2124 patients underwent cardiac surgery between 03/10/18 and 22/08/19. An AKI risk score was calculated for 989 (47%) patients. 852 (86%) were classified as low risk and 137 (14%) high risk. In the low risk group, 14 (1.6%) patients needed RRT post-surgery, compared to 19 (13.8%) in the high risk group.

The low risk group requiring RRT had a mean age of 69 ± 10 years. 64% were male. None had previous cardiac surgery. 21% had diabetes. 50% had atrial fibrillation (AF) post-surgery compared to 29% pre-surgery. 57% had inotropic support during surgery compared to 57% post-operatively. 50% required a re-sternotomy. 86% were administered prophylactic gentamicin. 42% had a post-operative infection. Mean cardiopulmonary bypass time was 157 ± 104 minutes. Mean total aortic cross clamp time was 113 ± 74 minutes.

Conclusion and recommendations

Despite these patients being classified as low risk for AKI, postoperative complications were associated with AKI. The high association between AKI and pattern of complication cannot be ignored.

Although this study is observational, it seems patients became high risk of developing AKI due to post-operative complications as well as their pre-operative state.

A bundle of care has been written for managing AKI in post-cardiac surgery patients, and now will include patients needing a re-sternotomy, inotropic support or postoperative AF.

Lower activated clotting time values in patients undergoing cardiac surgery with retrograde autologous priming of the bypass machine and avoidance of hypothermia.

Catalina Bianca Samoila¹, George Hadjipavlou², Maurizio Renna¹

¹Department of Cardiothoracic Anaesthesia, Oxford University Hospitals NHS Trust, Oxford, United Kingdom. ²Oxford University Hospitals NHS Trust, Oxford, United Kingdom

Abstract

Background and Goal of Study: Hypothermia and haemodilution increase the Activated Clotting Time (ACT) during hypothermic (<34°) cardiopulmonary bypass (CPB). However, little data is available regarding ACT values when such conditions are avoided during CPB. Recently, a shift in surgical practice has occurred in our Institution towards non-hypothermic (>34°) CPB associated with retrograde autologous priming (RAP) of the CPB circuit. RAP consists in using the patient's own blood as part of the priming volume, thus reducing the extent of haemodilution during CPB. We therefore decided to test the hypothesis that minimizing the effect of hypothermia and haemodilution during CPB would be associated with lower average values of ACT after systemic heparinization.

Materials and Methods: We conducted a retrospective audit of data from 312 patients undergoing cardiac surgery with CPB at Oxford University Hospitals during January to March 2013 (n=144) and January to March 2016 (n=168). We did this in order to compare the 2016 cohort with a similar cohort of patients undergoing CPB before the introduction of RAP into clinical practice. Data analyzed were demographics, temperature, haemoglobin and ACT values during CPB, total amount of heparin administered, type of surgery, surgeons and anaesthetists, total bypass time.

Results and Discussion: None of the 144 patients from the 2013 cohort had RAP (**no-RAP**). Of 168 patients from the 2016 cohort, 133 had RAP (**RAP**) and 35 did not (**no-RAP**). Out of the whole 312 patient group, 87 (27.9%) had hypothermic (<34°) CPB (**COLD group**) and 225 (72.1%) had non-hypothermic (>34°) CPB (**WARM group**). Patients in the WARM group were significantly heavier (83.7 vs 78.5 kg, P=0.008) and received more Heparin (27652 vs 25260 Units, P=0.02) but had significantly lower ACT values (499 vs 549 sec, P=0.01) than patients in the COLD group. ACT values were also significantly lower in RAP patients both within the COLD (RAP 495 sec vs no-RAP 586 sec, P=0.0005) and WARM (RAP 486 sec vs no-RAP 510 sec, P=0.01) groups.

Conclusion: Avoidance of hypothermia coupled with retrograde autologous priming of the CPB pump is associated with significantly lower ACT levels during cardiopulmonary bypass. **When the biasing effect of hypothermia and haemodilution is minimized, we suggest that ACT more accurately reflects the degree of anticoagulation produced by systemic heparinization for cardiac surgery.**

References

Cohen E, Camerlengo L, Dearing J. Activated clotting times and cardiopulmonary bypass I: The effect of haemodilution and hypothermia upon activated clotting time. J Extra-Corpor Technol. 1980; 12: 139-141

A survey of Heparin Resistance (HR), Activated Clotting Time (ACT) and heparin management in the United Kingdom: Current evidence and practice

Pádraig Ó Scanail¹, Gudrun Kunst¹, Jan Spegar²

¹King's College Hospital NHS Foundation Trust, London, United Kingdom. ²South Tees Hospitals NHS Foundation Trust, Middlesbrough, United Kingdom

Abstract

Heparin resistance (HR) is defined as the requirement of substantial doses of heparin to achieve adequate anticoagulation and is periodically encountered during cardiac surgery¹. The incidence of HR varies between 4-30% however its definition varies in the literature^{1,2}. The minimum activated clotting time (ACT) and optimal target ACT required for patients on extracorporeal cardiopulmonary support remains unknown³. The validity of using the ACT in the cardiac patient population has also been called into question³. Therefore a survey of HR, ACT and heparin management was issued to 28 cardiothoracic departments the United Kingdom (UK).

This ten-question survey was conducted over a two-month period from April to May 2019 (Table 1). It was conducted with the assistance of the Association of Cardiothoracic Anaesthesia and Critical Care (ACTACC). The results were collated and analysed by the senior author

Table 1: National survey of ACT and heparin management in the United Kingdom.

Question 1:	What is the target ACT to commence and maintain CPB in your institution in an elective first time cardiac procedure?
Question 2:	What is your initial heparin dose (units/kg) prior to CPB?
Question 3:	What is the usual volume of the cardiopulmonary bypass priming solution at your hospital and what is the usual dose of heparin administered into the prime?
Question 4:	What type of ACT measurement machine are you using?
Question 5:	Are you having double control (i.e. two measurements) of ACT at the same time?
Question 6:	Heparin resistance is the failure to achieve or to maintain expected ACT despite having given more than the usual dose of heparin. What is the order of your actions in this situation? (You may include: give more heparin, give AT III, give FFP and please add how much?)
Question 7:	Do you have a protocol in your hospital for heparin resistance?
Question 8:	Roughly, what is the estimated incidence of heparin resistance in your institution?
Question 9:	Do you routinely measure AT III levels before cardiac surgery?
Question 10:	Would you like to participate in a national audit to study heparin resistance over a period of 6-12 months?

units (n=11). Less than 80% of units surveyed had a protocol for the management of HR. Regarding the incidence of HR, over 70% of centres considered the incidence to be <5%, which is well below the reported incidence. Over 65% of respondents to this survey indicated that they would be interested in being involved in a follow up survey on this topic in the future.

There is a large variation in clinical practice with heparin management in the UK. This snapshot survey has provided the first insight into the management of anticoagulation in the perioperative period for cardiothoracic surgery and provides an incentive to examine this topic further.

References

1. *Anesth Analg* 2013;116(6):1210-1222
2. *Perfusion* 1999; 14: 437-42.
3. *Anesth Analg* 2017;125(6):1871-1877

There is a large variance in practice regarding ACT and heparin management in the UK. 18 of 28 centres responded to this survey. Of the 18 responders, 28% target an ACT >400 seconds and 39% above 450 seconds for cardiopulmonary bypass. Half of centres surveyed use an initial heparin dose of 300iu/kg with nearly a quarter using 350iu/kg. Only 16% of units report using 'double-control' for confirmation of ACT results. Nationally, the majority of centres administer additional heparin if HR is encountered. Management of heparin resistance included additional doses of heparin in all units, thereafter Fresh Frozen Plasma (FFP) in 50% (n=9) and anti-thrombin III (AT-III) in 40% of

Preoperative fasting and hydration in children undergoing elective congenital cardiac surgery/ cath lab intervention

Ameya Mandrekar^{1,2}, Dash Newington³

¹Trust Registrar- Anaesthesia/ ICU, Harrow, London, United Kingdom. ²Formerly, Trust Fellow- Paediatric Cardio-Thoracic Anaesthesia, Newcastle-upon-Tyne, United Kingdom. ³Locum Consultant- Paediatric Cardio-Thoracic Anaesthesia, Newcastle-upon-Tyne, United Kingdom

Abstract

Background:

In 2017, our Trust adopted 6-4-1 perioperative fasting policy in children (6 hours for solids, 4 hours for breastmilk, 1 hour for clear fluids). In 2018, work by Thomas et al(1) led to a joint consensus statement by the Association of Paediatric Anaesthetists of Great Britain and Ireland, the European Society for Paediatric Anaesthesiology, and L'Association Des Anesthesistes- Reanimateurs Pediatriques d'Expression Francaise supporting the 6-4-1 strategy. However, unnecessary prolonged preoperative fasting in children continues to occur. Allowing children to drink until called to the procedural suite (6-4-0 fasting strategy) has subsequently shown to reduce the average fasting duration without increasing aspiration risk(2). We undertook an audit to determine whether we comply with our Trust guidelines and to what extent this results in excessive fasting times for children.

Aims:

1. Are children being fasted for at least 4 hours for breast milk/ 6 hours for solids?
2. How long are enteral clear fluids withheld prior to induction of anaesthesia?
3. Are there any adverse events occurring during induction of anaesthesia that could potentially be related to our fasting practices?

Methods:

We included all ASA 2-4 children under 18 years undergoing elective/ urgent paediatric cardiac surgical/ cath lab procedures (diagnostic/ interventional). Adults, children requiring emergency surgeries, PICU in-patients and ASA 5-6 patients were excluded. Demographic data, hemodynamic parameters, fasting durations, and any adverse event that occurred during the fasting period or induction of anaesthesia were recorded prospectively.

Results:

Data were collected for 43 patients from 01/11/2020 to 14/12/2020:

1. Mean(SD) duration of fasting for solids= 11.9(3.6) hours.
2. Mean(SD) of fasting for liquids= 4.16(3.49) hours.
3. Adverse events recorded during the fasting period were nausea, vomiting, dizziness (n=1/43) and induction of anaesthesia were bradycardia, arrhythmias, hypotension (n=2/43).
4. Mean(SD) decrease in MAP from baseline= 11.63%(18.94).

Recommendations:

1. Fasting for solids is difficult to address due to unpredictable case timings.
2. Changes are needed for fluid fasting.
3. We support the 6-4-0 strategy recently advocated by Andersson et al(2) allowing children to continue drinking until called to the procedural suite.

Note: After presentation of our audit findings, our Trust adopted the 6-4-0 strategy and has revised its policy accordingly.

References

1. Thomas M, Morrison C, Newton R, Schindler E. Consensus statement on clear fluids fasting for elective pediatric general anesthesia. *Paediatr Anaesth*. 2018 May; 28 (5): 411-4.
2. Andersson H, Hellstrom PM, Frykholm. Introducing the 6-4-0 fasting regimen and the incidence of prolonged preoperative fasting in children. *Paediatr Anaesth*. 2018 Jan; 28 (1): 46-52.

Patient perioperative experience at St. Bartholomew's during the COVID-19 pandemic

Sarra Wang, Adenike Odeleye, Sue Body, Amieth Yogarajah
St Bartholomew's Hospital, London, United Kingdom

Abstract

The pressure of the global COVID-19 pandemic led to unprecedented changes in the delivery of healthcare services in a short period of time. St. Bartholomew's Hospital, a tertiary cardiothoracic centre, underwent mass redistribution of intensive care services and creation of a new hospital (The Nightingale) to manage the influx of COVID-19 patients. Consequently, the delivery of cardiothoracic perioperative services changed significantly, requiring online or telephone appointments for pre-op assessment clinic; strict no visitors policy and the need for patient self-isolation prior to hospital admission. Delivering perioperative care in this new environment was challenging and we wanted to investigate how these changes impacted the perioperative experiences of cardiothoracic patients during this time with the aim of improving any shortcomings identified.

Between 7-28th September 2020, all patients who were at least 48h post-procedure were given a self-administered paper questionnaire after verbal consent was obtained. This consisted of a total of eight structured and unstructured questions. These were analysed using simple frequency analysis and manual analysis respectively. Common themes were identified.

51 patients completed the questionnaire - 39 cardiac and 12 thoracic patients. Main themes were pain and surviving the operation with concerns regarding family. 88% of patients positively recalled speaking to an anaesthetist face to face, with over half of these interaction being a day before their surgery. 92% felt meeting the anaesthetist was useful in addressing their worries and helped with anxiety. Information delivery regarding post-operative pain was an overwhelming theme and potential area for improvement. 88% of patients would recommend St. Bartholomew's hospital to friends and family. 64.8% who completed the question "*Is there anything else you want to tell your anaesthetists or critical care doctors?*" wanted to express their gratitude to all healthcare professionals involved in their care. Interestingly, a number of patients reported that they would like information about lifestyle changes and identified a potential window for signposting for more support.

Unfortunately, there is little national or international data for direct comparison of our findings. Post-operative pain expectations can be further explored to establish whether more preoperative information surrounding analgesia is required. Anaesthetists should be aware that the perioperative period for major surgery is a teachable moment for potential lifestyle changes and could play an important part in utilising this opportunity. We hope that this simple questionnaire can provide healthcare staff a better insight into perioperative patient experience and the importance of preoperative provision of information. Despite significant changes during the pandemic, it is reassuring to know that the overall patient experience was positive.

Thoracic anaesthesia: the effect of aerosol precautions during two COVID surges

Siew-Ling Harrison, George Christodoulides, Humza Yusuf, Kim Edgerton, Cheng Ong

Guy's and St Thomas' NHS Foundation Trust, London, United Kingdom

Abstract

Aerosol generating procedures (AGPs) are associated with thoracic anaesthesia, and result in a significant exposure risk for the anaesthetist. The association for Cardiothoracic Anaesthesia and Critical Care addressed this by providing a consensus for the practice of lung isolation during the COVID-19 pandemic[1]. We evaluated the implementation of the consensus and its effect in the two COVID-19 surges.

Methods

Prospective questionnaires were completed by anaesthetists on thoracic cases during the two surge periods, 07/05/20 to 03/08/20 and 15/02/21 to 22/02/21.

Results

During the first surge, thoracic surgery was diverted to an additional two hospitals such that only 30% were performed at the original Guy's unit. In the second surge all cases returned to the single Guy's unit. Practises instituted and outcomes are outlined in table 1.

Practises instituted	First surge (n=120)	Second surge (n=39)
Utilisation of FFP3 Mask	100% (120)	61% (24)
Facemask ventilation performed	57% (78)	97% (38)
Direct Laryngoscopy (DL) / Videolaryngoscopy (VL)	58% (78) / 42% (56)	82% (32) / 18% (7)
HEPA filters on the tracheal and bronchial limbs	72% (52)	0% (0)
Outcomes		
First pass success rate DL	82% (64)	84% (27)
First pass success rate VL	87% (49)	100% (7)
Hypoxia during induction	8% (11)	5% (2)
Hypoxia during one lung ventilation	11% (15)	11% (4)

Discussion

In the second surge there was a move away from AGP precautions due to established COVID-19 free pathways. The use of high-efficiency particulate air (HEPA) viral filters on the tracheal and bronchial limbs were discontinued in the second surge as were found to be cumbersome with potential to kink the tube. VL was performed in a greater proportion in the first wave and a prominent finding was a greater first pass success rate with VL compared to DL. Despite recommendations of avoiding FM ventilation, we found it was necessary in this population, due to a higher incidence of hypoxia during induction in the first surge. Hypoxia under one lung ventilation was also greater than that previously published at 4%[2]. This may be secondary to late presentations and delays in surgery due to the pandemic, resulting in more advanced cancer and its sequelae. PPE may have contributed as comments included; obscured view due to glare from the visor.

References

Thornton M, Reid D, Shelley B, Steven M. Management of the airway and lung isolation for thoracic surgery during the COVID-19 pandemic. *Anaesthesia*. 2020; **75**: 1509-1516

Campos JH, Feider A. Hypoxia during one-lung ventilation—a review and update. *Journal of Cardiothoracic and Vascular Anesthesia*. 2018; **32**: 2330-2338

Maintaining nutritional services during covid-19 lockdown limits impact of “covibesity!” in patients awaiting cardiac surgery

Tomoyo Fujiwara, Nawwar Al-Attar

Golden Jubilee National Hospital, Clydebank, United Kingdom

Abstract

“Covibesity” is a new pandemic¹. Recent studies highlighted that the covid-19 pandemic disrupted normal life patterns leading to unhealthy lifestyle and weight gain^{2&3}. Obesity is known risk factor for surgical site infection and postoperative Complications after cardiac surgery. We investigated the impact of covid-19 lockdown on BMI and outcome of patients who underwent cardiac surgery and audit the effect of maintaining nutritional services during lockdown.

This retrospective study enrolled all patients who underwent cardiac surgery between 15/08/2019 to 15/11/2019 (pre-covid 19) and compared them to the population operated on from 15/08/2020 to 15/11/2020 (post covid-19) at Golden Jubilee National Hospital (GJNH). Data collection included BMI, age, gender, length of stay and outcome of the surgery. The aim of this study was to compare patient demographics and outcomes of cardiac surgery between pre covid-19 in 2019 and post covid-19 lockdown in 2020.

	2019 (n=350)	2020 (n=249)	P value
Age (years)	63.14±13.1	63.78±13.3	0.561
Gender (F/M)	116/234	61/188	0.022
BMI (kg/m ²)	29.2±5.35	28.42±4.92	0.063
Euro SCORE II (%)	Q1=2.08 Q2=3.37 Q3=6.92	Q1=2.21 Q2=4.40 Q3=7.90	0.014
Priority	elective=159 (45%) non-elective=191	elective=94 (38%) non-elective=155	0.213
ICU stay (hours)	Q1=19 Q2=22 Q3=42.25	Q1=20 Q2=23 Q3=50.5	0.013
Ventilation (hours)	Q1=3 Q2=4 Q3=7	Q1=3.5 Q2=5 Q3=13	0.000
Length of stay (days)	Q1=7 Q2=8 Q3=12	Q1=7 Q2=10 Q3=17	0.000
30 day mortality	7	9	0.227

The covid-19 pandemic affected our cardiac activity dramatically.

- 1) an overall drop in activity: 29% reduction of the cardiac activity in 2020
- 2) gender difference: fewer female patients had surgery in 2020
- 3) change in risk profile: preoperative EuroSCORE was significantly higher in 2020
- 4) repercussions of risk profile on patients' pathway: ICU stay and ventilation time were significantly longer for patients who had surgery in 2020
- 5) maintaining active dietetic support during the Covid 19 pandemic had a critical role in avoiding the added burden of obesity in the patients undergoing cardiac surgery at GJNH. This has important ramifications in planning of services during major health crises.

During the COVID19 pandemic, patients were more “high risk” for cardiac surgery, therefore all efforts to reduce preventable risks prior to surgery should be undertaken. Patients would benefit from receiving ongoing tailored dietary intervention particularly with the increased surgical risk. This highlights the value of tailored dietary support during the pandemic to mitigate for increased operative risk in cardiac surgery.

References

1. Khan MAB, Smith JEM. Obesity Medicine. 2020; 19: 100282.
2. Chague F, et al. ESC Heart Failure.2020; 7: 4420-4423.
3. Petroni, ML, et al. Clinical Nutrition ESPEN. 2020; 40:659.

Think MYOCARDIAL

Anders Hulme, Amol Lotlikar, Bonnie Kyle
St Bartholomew's Hospital, London, United Kingdom

Abstract

Cardiothoracic intensive care units (CICU) present new challenges for ST3+ anaesthetic trainees despite their experience of managing patients on general intensive care units (ICU). Unfamiliar surroundings, differing use of drugs, and patients with pathologies and procedures not seen in general ICUs can be a daunting prospect for rotational trainees, particularly in the first few weeks of their placement. A survey of new trainees yielded data suggesting a lack of familiarity with certain aspects of routine postoperative CICU care for cardiac surgery patients.

A ten-point *aide-memoir* based on an acronym of the word “myocardial” was developed to improve knowledge, handover, assessment and management of post-operative cardiac patients. Dubbed “*Think MYOCARDIAL*,” the cognitive aid covers:

Metabolic state; **Y**ield from drains; **O**perative information; **C**ardiac infusions; **A**nticoagulation plan; **R**ate, rhythm, pacing wires, pacing modes; **D**rug chart; **I**ntraoperative echo and events; **A**dditional points/equipment; **L**ightening and extubation plan.

Each section contains salient points and condensed centre-specific policies and protocols, as well as “red flags” and infusion dosing information. There are QR code links to more detailed policies and guidelines for further reading.

Think MYOCARDIAL was well received by CICU educational and clinical leads and is now included in the departmental handbook PDF document that is distributed to all new starters. Several trainees, unprompted, specified *Think MYOCARDIAL* as a document they regularly referred to during their placement.

Trainees will become familiar with the management of CICU patients through their clinical work and teaching sessions during their placement. *Think MYOCARDIAL* aims to accelerate this aspect of their training for the betterment of patient care and improved workflow on CICU, being particularly applicable during initial CICU shifts at the beginning of their cardiothoracic block.

Think MYOCARDIAL may be adapted and applied to other units, with inclusion of guidelines and protocols in line with local practice. At our institution, we hope to widen the use of *Think MYOCARDIAL*, with both medical and nursing staff using the tool. We would ideally incorporate *Think MYOCARDIAL* into our existing electronic patient record system to streamline post-op processes and promote visibility of the document.

CardiothoracicAnaesthesia.com - A hub for cardiothoracic anaesthesia education and training

Anders Hulme¹, Paul Balfour², Stephen Shepherd¹

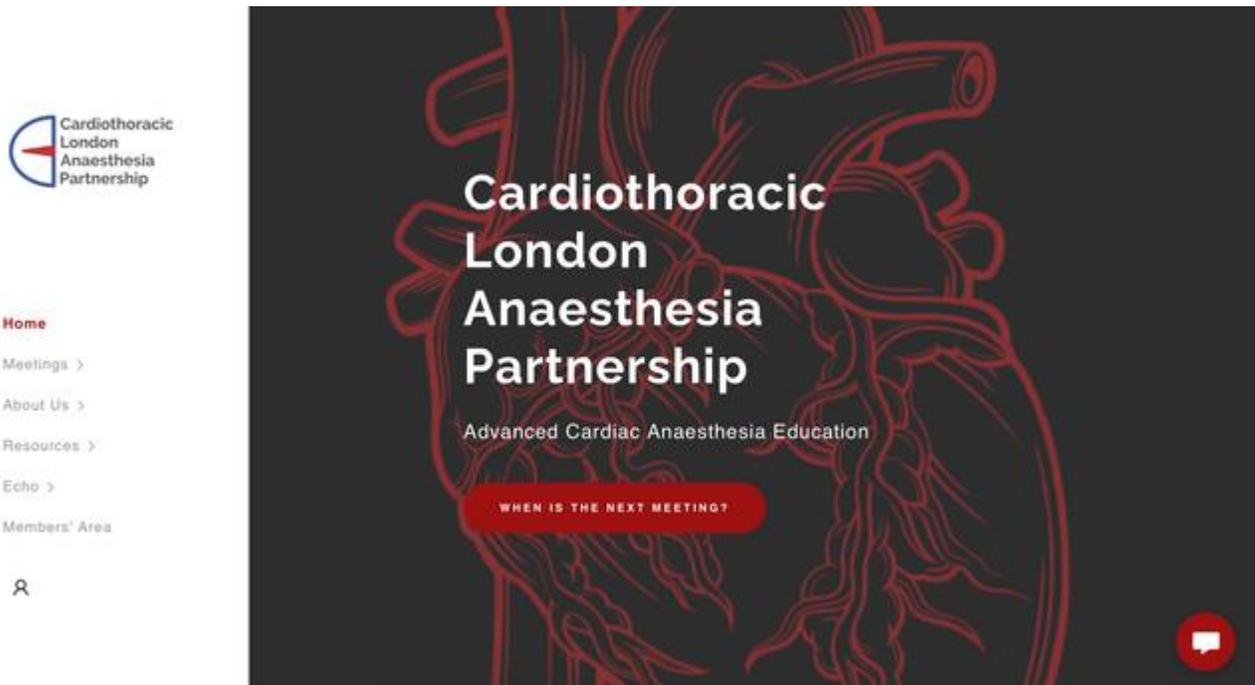
¹St Bartholomew's Hospital, London, United Kingdom. ²St Thomas's Hospital, London, United Kingdom

Abstract

To complement the Cardiothoracic London Anaesthesia Partnership (CLAP) (a novel, national, advanced cardiothoracic (CT) anaesthesia teaching programme), a companion website - www.CardiothoracicAnaesthesia.com - was created to host recorded presentations and meeting resources. The website has continued to evolve into an educational and careers hub catering for budding - and established - CT anaesthetists.

The website is managed using an online website builder with content written by the CLAP committee. The website advertises CLAP meetings and collates presenter material and handouts to support presentations. A transoesophageal echo (TOE) section provides links to weekly TOE teaching and information on TOE accreditation schemes and educational resources. Recorded presentations allow for later viewing and reviewing of CLAP meetings and have proved to be a popular addition to the website. The site has 250 subscribers and records around 350 unique hits per month.

Our aim is for *CardiothoracicAnaesthesia.com* to become a ubiquitous resource for senior anaesthetic fellows, trainees and consultants, as well as acting as a platform for showcasing their quality improvement work and interesting TOE cases. Another facet we are keen to add to the website is a networking hub to allow CT anaesthetists from across the UK (and beyond!) to link up for clinical, careers and educational discussion to help further the development of CT anaesthesia as a subspecialty, and improve patient experience and outcomes¹.



References

¹Cunningham F, Ranmuthugala G, Plumb J, et al. *BMJ Qual Saf* 2012; 21: 239-249.

Delirium assessment in cardiac surgical patients

Paul Balfour¹, Thom O'Dell², Gudrun Kunst³

¹St. Thomas' Hospital, London, United Kingdom. ²National Hospital for Neurology and Neurosurgery, London, United Kingdom. ³King's College Hospital, London, United Kingdom

Abstract

Post-operative delirium (POD) is common in cardiac surgical patients (incidence 26-52%)(1). POD is associated with increased mortality and morbidity, including major adverse cardiac events (2).

An audit of 50 cardiac surgical patients assessed evidence of POD using Electronic Patient Records (EPR). We then introduced postoperative day 1 delirium screening by nursing staff. EPR were reviewed to identify POD on downstream wards, and compared to pre-screening data.

Table 1. Pre-screening baseline audit data.

	Delirium documented	No delirium documented	p-value
No. of patients	10 (20%)	40 (80%)	
Mean age (years)	66.7	61.8	0.21
Valvular surgery (+/- CABG)	9/10 (90%)	12/40 (30%)	
Median length of stay (LOS) (days)	14	8	0.003
Mean cardiopulmonary bypass (CPB) time (mins)	121	96	0.12
Mean aortic cross clamp (AXC) time (mins)	76	50	0.06
Mean duration of surgery	285	267	0.44

Using CAM-ICU - 30/90 (33.3%) patients were screened, with 2/30 (6.7%) positive results. Of these - EPR review identified 7/30 (23.3%) with POD.

Using 4AT - 54/72 (75%) patients were screened, 12/54 (22%) tested positive, and POD was identified, on EPR review, in 6/54 (11%). 92% of positive patients had valvular surgery (+/- CABG) with increased median LOS (15.5 vs 9 days [p=0.02]), mean XC time (84 vs 57 mins) and mean CPB time (110 vs 93 mins).

Diagnosing POD with reliable screening remains challenging. Nursing staff confidence in completing the tools and minimising "subjectivity" were important. Positive 4AT screening correlated with the operative risk factors for POD - longer surgery, CPB and AXC time, and valvular surgery. Excess positive 4AT tests compared to documented delirium may be due to sedative drugs or screening oversensitivity. A larger sample is needed to discern this, although we believe over-identification of POD preferable to missed cases. The observed incidence of POD was lower than expected, possibly due to single testing events. It was recently reported that 4 days of POD screenings twice daily can detect 97% of cases (3). It is our intention to establish routine screening on downstream wards in addition to the CRU. We aim to use this project to inform a "delirium bundle" creation for cardiac surgical patients.

References

1. Brown C. Delirium in the cardiac surgical ICU. *Curr Opin Anaesthesiol.* 2014; 27: 117-22.
2. Ogawa M, Izawa K, Satomi-Kobayashi S et al., 2017. Impact of delirium on postoperative frailty and long term cardiovascular events after cardiac surgery. *PLoS One.* 2007; 12: e0190359
3. Hamadnalla H, Sessler D, Troianos C, et al. Optimal interval and duration of CAM-ICU assessments for delirium detection after cardiac surgery. *J Clin Anesth.* 2021; 71: 110223

A novel national teaching network - the Cardiothoracic London Anaesthesia Partnership

Paul Balfour¹, Anders Hulme², James Hambly³, Roger Cordery⁴

¹St. Thomas' Hospital, London, United Kingdom. ²National Hospital for Neurology and Neurosurgery, London, United Kingdom. ³The Royal London Hospital, London, United Kingdom. ⁴St. Bartholomew's Hospital, London, United Kingdom

Abstract

For anaesthesia trainees during the pandemic, one of the lesser-known casualties was education. Bart's Heart Centre's (BHC) monthly fellows' teaching was suspended, along with society conferences and College examinations (1). There also exists a gap between examination-based teaching for basic and intermediate trainees and the societal conferences that are aimed at consultants; advanced trainees often have little regular formal teaching.

We performed a survey of London advanced cardiothoracic anaesthesia trainees. 80% of respondents received no formal teaching in their post, with 100% keen to attend teaching, and 64% suggesting monthly meetings were desirable. These results, combined with pandemic-driven adoption of video-conferencing systems (Zoom Boom) (2), encouraged us to restart fellows' teaching with a view to sharing it with advanced trainees across London. Therefore the authors (previous BHC fellows) formed the Cardiothoracic London Anaesthesia Partnership.

We retained the BHC model, with monthly half-day meeting based upon a specific theme within cardiothoracic anaesthesia: e.g. Mitral valve, TOE and Transplant. Our goal was to provide advanced-level teaching of value to senior fellows and consultants. Meetings are multi-disciplinary, utilising expertise from surgical, perfusion and cardiology colleagues, as well as multi-centre, to benefit from alternative perspectives and specialist knowledge. For our first three meetings, invitations were sent to all London cardiothoracic centres. Universally good or excellent feedback and word-of-mouth meant that by month three we had delegates join from outside of the capital. Prior to our fourth meeting we contacted a cardiothoracic anaesthetist at every centre in the UK in order to advertise our talk and received RCoA approval for CPD accreditation. Since then, all teaching has been freely available to a national audience with average attendances of 40 online and 15-20 in person. A fully-featured website - www.cardiothoracicanaesthesia.com - and an active Twitter presence has enabled our mailing list membership to swell to over 250. Meetings have been attended by colleagues from India and Kenya.

Future meetings include international speakers as well as practical sessions comparing pig heart anatomy with HeartWorks® TOE simulator practice. We have outlined content for three years of our flagship advanced-level teaching sessions. We also aim to develop a multi-centre collaborative teaching programme in cardiothoracic anaesthesia and intensive care for more junior anaesthetists, as well as creating an online clinical and professional networking hub.

References

1. Sneyd J, Mathoulin S, O'Sullivan E, et al. Impact of the COVID-19 pandemic on anaesthesia trainees and their training. *Br J Anaesth.* 2020; 125: 450-455
2. Kallia A. The Zoom Boom: how video-calling became a blessing - and a curse. Available at <https://www.theguardian.com/technology/2020/may/21/the-zoom-boom-how-video-calling-became-a-blessing-and-a-curse>

Monitoring Nociception in Thoracic Surgery - Should Tech‘NOL’ogy guide our practice?

David Burgess, Stefan Schraag

Golden Jubilee National Hospital, Clydebank, United Kingdom

Abstract

Introduction

Nociception is the unconscious perception of a noxious stimulus and predominantly, but not exclusively, processed via the autonomous nervous system. Nociceptive monitoring utilises physiological responses to these stimuli to quantify levels of nociception and the effect of anti-nociceptive measures such as opioids and local anaesthetics. [1]. Management of post-thoracotomy pain remains challenging and postoperative pulmonary complications and chronic pain can be up to 50% [2]. We reviewed the performance of non-invasive multi-parameter nociceptive monitoring during thoracic surgery in patients receiving neuraxial local anaesthetics.

Methods

During 2019, The PMD200™ (Medasense, Israel) was prospectively evaluated at NHS Golden Jubilee in patients undergoing thoracic surgery, including VATS, RATS and open thoracotomy. All patients received TIVA and mostly paravertebral (PVB) or, rarely, high thoracic epidural (HTE) local anaesthetic infusions alongside multimodal analgesia according to our standard practice. The NOL value was continuously recorded during the procedure on an observational basis with no related intervention. This audit was part of an ethics approved perioperative data science project on outcome following cardiothoracic surgery (REC18/YH/0366).

Results

Data was collected for 25 surgical procedures. Three were discounted due to poor signal quality. The mean area under the curve (AUC) for all procedures was 665.75. In a subset of patients, AUC for RATS was 596.64, for VATS 542.87 and for thoracotomy 305.28. The mean time of all procedures within the manufacturer recommended NOL Range (between 10-25) was 38.1% of procedure time. This increased to 81.64% when including NOL values from 0-25. There was no significant difference between VATS and RATS procedures with NOL <25. Anecdotal observations indicates that HTA suppress the NOL signal most effectively.

Discussion

This device evaluation indicates that it is feasible to quantify nociception levels during thoracic surgery. It also suggests the utility of nociception monitoring in future clinical studies comparing loco-regional techniques that are otherwise difficult to quantify. Our results of a significant proportion of NOL values less than the manufacturer recommendation suggests that patients are given adequate anti-nociception low but raises the possibility of occasional excessive analgesia. In addition, analyses from individual patient records indicate that NOL can distinguish incomplete from well working neuraxial blocks.

Conclusions

So far, there is little published evidence for the utility of NOL in thoracic surgery with regional anaesthetic techniques [3]. Our observations, however, should stimulate further research on this topic.

References

1. Ledowski T. BJA. 2019 1;123(2):e312–21.
2. Mesbah A, Yeung J, Gao F. BJA Education. 2016; 16(1):1–7.
3. Ghanty I, Schraag S. J Thorac Dis 2019. doi: 10.21037/ jtd.2019.08.62

The preoperative journey of the type A aortic dissection: from triage to theatre.

Frances McConaghie, Calum Craig, Katrina Bramley

Royal Infirmary of Edinburgh, Edinburgh, United Kingdom

Abstract

With a mortality rate of 1% per hour from onset of pain, time is of the essence in the preoperative management of the patient with a type A aortic dissection (A-AD). We sought to examine our patient population and their preoperative journey to target areas for intervention in the development of our aortic dissection guideline.

We retrospectively reviewed the case notes of patients who underwent operative intervention for an A-AD at the Royal Infirmary of Edinburgh between 1st January 2018 and 31st December 2020.

During our review period, 49 patients underwent surgical repair of their A-AD. Of these, 32 (66%) were men, with a median age of 66 years (IQR 56;74). Eight patients died during their hospital admission, giving an in-hospital mortality of 16%, comparable to published registry data¹. Seventeen patients presented directly to our centre. Their median time from presentation to CT was 88 minutes (IQR 55;215) with a median time from CT to KTS of 157 minutes (IQR 150;181). Patients presenting out of hours had a shorter time to CT (65 vs 106 minutes) but a longer time to KTS (165 vs 130 minutes). Thirty-two patients initially presented to one of our referring centres. These patients have an unavoidable longer time to definitive treatment with a median time from CT to KTS of 338 minutes (IQR 279;487), compounded by the wide geographical area we serve. The median time from their arrival at our centre to KTS was 158 minutes (IQR 112;196), similar to our CT to KTS time. Those who arrived with an arterial line in situ (n=9) had tighter BP control on arrival, with 8 patients having a SBP <120mmHg compared with only 5 of those with no arterial line (n=20).

A multi-disciplinary approach to the care of the patient with an A-AD results in reduced mortality rates². The preoperative care of our A-AD patients involves a number of different departments and clinicians, over multiple hospital trusts, as the majority of our cohort do not present to our centre – one of the most significant challenges in ensuring a cohesive and expedited preoperative journey. Analysis of our local patient data has given us insight into the different pathways that our patients follow and has not only allowed us to target our guideline development, but also promote areas of previously unknown areas of good practice.

References

1. Bashir M et al. J Thorac Cardiovasc Surg 2017;154:398-406
2. Andersen ND et al. Journal of the American College of Cardiology 2014;63:1796 - 803

A baseline audit of iron deficiency anaemia in elective cardiac surgery and the introduction of a new multidisciplinary management pathway.

Scott Minns, Jon Echebarria, Mathew Patteril

University Hospital Coventry & Warwickshire, Coventry, United Kingdom

Abstract

Introduction

UK guidelines have recommended preoperative screening and treatment of anaemia in major surgery since 2015.⁽¹⁾ We audited rates of anaemia in elective cardiac surgery in our centre and developed a pathway to manage these patients.

Iron deficiency anaemia, in cardiac surgical patients in the UK, has a prevalence of between 23% and 45%. Although still debated there is evidence efficient treatment may decrease; transfusion requirement and risk, perioperative morbidity and mortality and shorten ICU and hospital stays.⁽²⁾

Methods

We retrospectively reviewed notes from one hundred patients undergoing elective primary coronary artery bypass grafting and/or valve replacement surgery between 22/8/2019-11/2/2020. Twelve patients had to be excluded due to misclassification. Using electronic records we reviewed blood results at the time of booking and on the day of surgery and audited if treatment for iron deficiency had been offered.

Results

At booking, 28.4% (25/88) of our sample was anaemic (Hb <130 Male, <120 Female). The average time between booking and surgery was eighty-four days. Of the twenty-five anaemic patients four had iron studies performed and one patient received iron therapy.

On the day of surgery forty-four patients had blood tests repeated, 47.7% were anaemic. Eight patients who were anaemic at booking had no repeat blood tests and were likely still anaemic. Nine patients had become anaemic since booking and eleven of the twenty-five anaemic patients had lower haemoglobin levels.

Given the low rate of repeat blood tests, the real number of patients anaemic on the day of surgery is likely to be higher (est. 47.7%-65.9%).

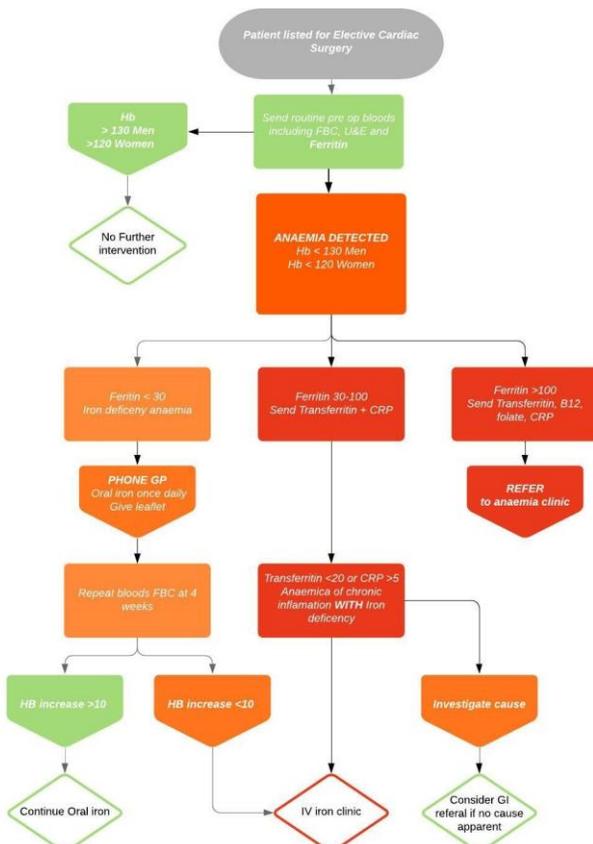
Discussion

Given the prevalence of anaemia in our sample population, the long period from booking to surgery and the surprising increase in anaemia on the day of surgery we developed a new management algorithm. All cardiac patients now have iron studies at the time of listing and treatment is initiated as per the algorithm below if they are iron deficient.

This work is currently being extended to all of our elective patients undergoing major surgery. Unfortunately, our surgical service has been severely disrupted by COVID-19 decreasing our elective workload and thus delaying re-audit to assess the efficacy of our interventions at this time.

References

1. National Institute for Health and Care Excellence (2015). [NG24]. Accessed January 2020, Available at: <https://www.nice.org.uk/guidance/ng24>
2. Klein, A.A, et al. Anaesthesia, 2016; 71: 627-635.



Minimising emergency return to theatre time following cardiac surgery

Scott Minns, Deborah Turfrey, William Tosh

University Hospitals Birmingham NHS Foundation Trust, Birmingham, United Kingdom

Abstract

Introduction

Emergency return to theatre, for re-sternotomy, following cardiac surgery is associated with increased morbidity and mortality. It leads to greater resource usage including increased lengths of stay, rates of renal replacement, respiratory failure and transfusion requirements. It has been suggested that these outcomes are, at least in part, due to a prolonged period of hypoperfusion prior to surgical re-exploration. Thus minimising this time period may improve patient outcomes.⁽¹⁾

Return to theatre rates in our centre exceeds the national average.⁽²⁾ In view of this, we audited return to theatre times identifying ways to minimise this and strategies to decrease rates of postoperative bleeding.

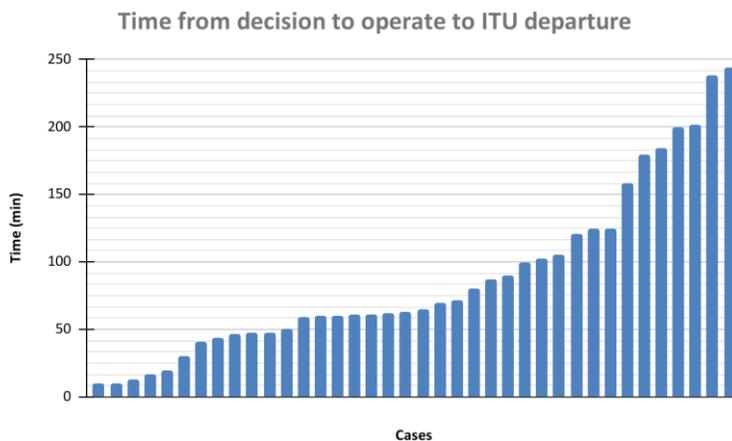
Methods

Although there is no national standard for return to theatre time, on-call staff are required to live within thirty minutes of the hospital, these cases are typically classified as NCEPOD immediate – ‘Normally in theatre within minutes of decision to operate.’⁽³⁾ Allowing for time to set up a theatre we set an initial standard of one hour.

We conducted an audit of our emergency return to theatre cases over four hundred and two days, identifying thirty-nine episodes from the theatre record. Time from surgical decision to reopen to departure from intensive care to theatre was calculated from electronic patient records.

Results

Our data showed a large range of times for emergency return to theatre, from ten minutes to two hundred and forty-four minutes, with a mean time of eighty-eight minutes.



We met our standard in thirty-four percent of cases. Mean times were worse out of hours and data suggests patients with a longer return to theatre time had a higher mortality rate.

Discussion

By engaging key stakeholders and reviewing practice in other centres we identified strategies to try and decrease bleeding rates and barriers to timely return to theatre. We have introduced a haemostatic checklist for use before chest closure in theatre. We developed a return to theatre protocol to standardise care and decrease set-up time and simulation sessions to practice these scenarios. We have standardised switchboard calls, categorising urgency,

and developed a simplified surgical kit for reopenings. Going forward, reasons for delays in return to theatre will be reviewed on a case by case basis to allow us to rapidly identify and resolve issues.

References

1. The National Institute For Cardiovascular Outcomes Research, 2020 interactive report. <https://www.nicor.org.uk> (accessed 29/5/2021)
2. Agarwal S, Choi SW, Fletcher SN, et al. Anaesthesia 2021; 76(1):19-26.
3. National Confidential Enquiry into Patient Outcome and Death. <https://www.ncepod.org.uk> (accessed 29/5/2021)

Erector spinae plane block for minimally invasive thoracic surgery: a local audit and quality improvement project.

Rachel Fraser, Mark Steven

Golden Jubilee National Hospital, Glasgow, United Kingdom

Abstract

Significant postoperative pain is common following minimally invasive thoracic surgery (MITS). This can be mitigated with regional anaesthesia in conjunction with systemic multimodal analgesia. The erector spinae plane block (ESPB), a recently established interfascial block, has demonstrated effective postoperative analgesia following thoracic surgery (1), with fewer risks compared to paravertebral block (PVB). The introduction of ESP catheters for continuous infusion or intermittent bolus administration of local anaesthetic can provide further analgesia in the postoperative period (2), however, sufficient data is lacking.

The aim of this project is to compare the quality of postoperative analgesia in patients undergoing MITS with single shot ESPB, ESPB with catheter top-up or continuous PVB.

We performed a retrospective review of patients who had undergone MITS, namely wedge resection by video-assisted thoracoscopic surgery, with a surgically sited PVB and continuous infusion within the last year from a database compiled by our acute pain service. We then planned to perform ultrasound-guided ESPBs with catheter insertion intraoperatively in patients undergoing similar minimally invasive surgery: wedge resection, bullectomy, pleurectomy, decortication, pleurodesis and invasive rib surgery. We instituted a protocol for postoperative delivery of regular pump-driven ESP 20 ml top-ups of 0.125% levobupivacaine.

The primary outcome is total opioid consumption up to the second postoperative day. Secondary outcomes are hospital length of stay, postoperative pain scores, postoperative nausea and vomiting and block complications.

The project was registered with clinical governance.

22 patients had an intraoperative ESPB for MITS from February to July 2021 (11 patients had single shot ESPB and 11 patients had an ESPB with postoperative catheter top-ups). Compared to continuous PVB, patients with ESPB top-ups required less opioid, on average, up to the second postoperative day (68 mg vs. 101 mg, $P = 0.06$) and reported lower pain scores. Primary and secondary outcomes are displayed in table 1. No block complications were recorded in any group.

Table 1. Primary and secondary outcomes.

Technique (no.)	Total opioid consumption up to 8am POD2 (milligrams of oral morphine equivalent)		Hospital LOS (days)	PONV % (no.)	Pain VAS Scores 0- 4 (mode)		
	Mean (SD)	P-value	Median (IQR)		PON	POD1	POD2
PVB continuous (30)	101 (56)		3 [3 - 6.75]	20 (6)	2	2	2
ESP single shot (11)	99 (57)	0.93	3 [2 - 3.5]	18 (2)	2	1	2
ESP top-up (11)	68 (42)	0.06	3 [2 - 5.5]	18 (2)	1	2	1
ESP total (22)	83 (53)	0.26	3 [2 - 4.5]	18 (4)	2	2	1

SD = standard deviation. IQR = interquartile range. P-value derived from Two-sample t-Test and compared to PVB. Pain VAS (visual analogue scale): 0 = No pain at rest or on movement, 1= Comfortable at rest, pain on movement, 2 = Pain at rest but manageable, 3 = Pain at rest and cannot do exercise or breath deeply, 4 = Severe unmanageable pain.

The results indicate superior pain control in the patients who received ESPB with postoperative top-up. However, due to the small sample size and wide-ranging opioid consumption, this did not reach statistical significance. Future work should look to investigate both techniques with further standardisation in a large-scale randomised control trial.

References

1. Finnerty DT, McMahon A, et al. Comparing erector spinae plane block with serratus anterior plane block for minimally invasive thoracic surgery: a randomised clinical trial. *Br J Anaesth.* 2020;125(5):802-810.
2. Pişkin Ö, Gökçe M, et al. Effects of continuous erector spinae plane block on postoperative pain in video-assisted thoracoscopic surgery: a randomized controlled study *Gen Thorac Cardiovasc Surg.* 2021;10.1007/s11748-021-01687-1.

Implementing Epicardial Pacing Safety Check Protocols in a Cardiothoracic ITU

Melanie Coates, Rosalie Magboo, Dina Paoloni, Chris Oscier, Martina Buerge
Barts Heart Centre, Barts Health NHS Trust, London, United Kingdom

Abstract

Introduction

Temporary epicardial pacing is routinely placed in patients following cardiac surgery to manage arrhythmias including ventricular arrhythmias and conduction disturbances.(1) A known complication of epicardial pacing is an increase in capture threshold over time.(2) Given the risk of arrhythmias, it is important to ensure that epicardial pacing is functional and able to safely pace the ventricles should a patient become pacing dependent. We identified a deficit in epicardial pacing checking in our cardiothoracic intensive care units. Our aim was to establish a nurse-led daily epicardial pacing check procedure, to improve patient safety following cardiac surgery.

Methods

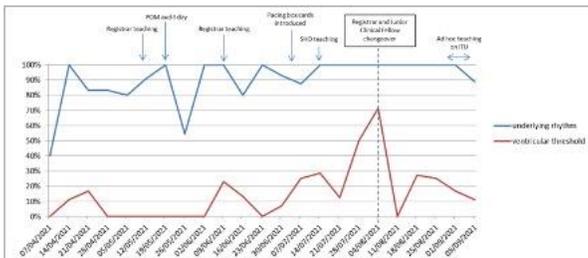
A standardised protocol for a pacing safety check was developed by the multi-disciplinary team of anaesthetists, cardiologists, cardiothoracic surgeons and nurses, to assess underlying rhythm and ventricular threshold daily in all patients being paced or with backup settings. We delivered a series of training sessions for critical care doctors and nurses, in order to make all staff competent at performing checks independently. The protocol should be part of the nursing safety checks to be carried out daily, and the admission clerking by medical staff.

Posters of the protocol were distributed around the ITU and cards outlining the check attached to each pacing box. A sticker was developed to be affixed to the nursing observation charts and a preconfigured documentation was added to the doctors' clerking proforma.

We used the model for improvement approach to monitor iterative changes in one post-surgical cardiothoracic ITU. As process measures, we assessed electronic and paper documentation of daily checks. Snapshot audits of between 10-16 patients were carried out every 1-2 weeks. Run charts were produced to analyse trends, with annotations marking the interventions made.

Results

We saw variable documentation of both underlying rhythm and ventricular threshold. Underlying rhythm was more consistently documented. We saw an overall increase in documentation of both parameters by medical staff. Documentation by nursing staff was very variable and did not improve significantly, however feedback indicates that nurses have become more confident at independently performing checks.



Conclusions

To our knowledge, this is the first nurse-led pacing check protocol of its kind in the country. We saw variable uptake of the protocol. Challenges faced include influencing culture, differences in management, changeover of staff/trainees and staffing shortages. These barriers will be addressed in further PDSA cycles.

References

1. Chung MK. Cardiac surgery: postoperative arrhythmias. Crit Care Med. 2000;28
2. Lazarescu C et al. Reassessment of the Natural Evolution and Complications of Temporary Epicardial Wires After Cardiac Surgery. J Cardiothorac Vasc Anesth, 2014. 28: 506-511.

Using Perioperative Quality Improvement Programme data to evaluate thoracic surgery processes and outcomes

Sophie Hunter¹, Julia Benham-Hermetz¹, Samantha Warnakulasuriya¹, Emilie Martinoni Hoogenboom¹, Anders Hulme²

¹University College London Hospital, London, United Kingdom. ²St Bartholomew Hospital, Barts' Health NHS Trust, London, United Kingdom

Abstract

The Perioperative Quality Improvement Programme (PQIP), established in 2016, aims to improve outcomes in patients undergoing elective major non-cardiac surgery¹. Since 2019, after stakeholder consultation, UCLH thoracic and research teams recruited patients undergoing thoracic procedures. This has continued during the 2020-21 COVID-19 pandemic as thoracic procedures were performed at a “green” site. Data analysis allowed processes and outcomes monitoring and identified targets for quality improvement (QI).

The recruitment process which initially commenced by the thoracic pre-assessment (PAC) team, has been sustained by building relationships with departmental research teams.

Suitable patients are identified using the electronic health record system and consented on the day of surgery. Process and outcome data are then extracted from the PQIP database and disseminated locally, including quality of life data at 6 and 12 months. Results have been presented at local joint thoracic surgical, perioperative medicine and anaesthesia meetings and a focus group will drive direct QI efforts.

251 patients were recruited to PQIP between April 2020 – March 2021. Figure 1 shows monthly recruitment during the COVID-19 pandemic. Median length of stay was 4.4 days. 195 patients had no complications post operatively, 9 patients had Clavien Dindo² Grades III or above complication. The most common complications were infection related (14 patients), cardiovascular (8), and pulmonary (6). Targets for improvement were identified: intraoperative temperature control (9% of patients have temperature <36C on arrival in recovery) and postoperative pain where 33% (62/186) of patients reported moderate or severe pain at post-operative day one. 78 patients had completed 6 month follow up on quality of life with 32% of patients reporting worse pain than preoperatively.

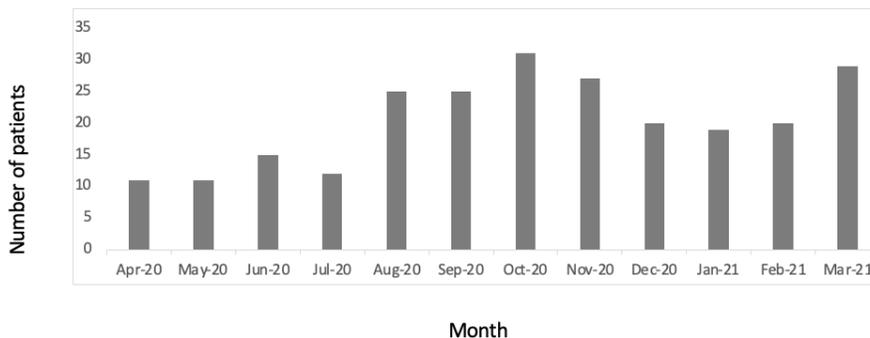


Fig1 Recruitment of UCLH thoracic patients to PQIP during 2020-2021 Covid-19 Pandemic

We demonstrate how sites undertaking thoracic anaesthesia can gain valuable data for monitoring processes and outcomes by recruiting patients for PQIP. Building relationships between subspecialty PAC and research teams can improve recruitment processes. Analysis of hospital level PQIP data and comparison with national data can provide sites with insight into areas for improvement, therefore, feedback should be provided to subspecialty teams regarding short and long term outcomes to enable QI.

References

1. Moonesinghe SR, McGuckin D, Martin P, et al. The Perioperative Quality Improvement Programme (PQIP Patient Study): Protocol for a UK Multicentre, Prospective Cohort Study to Measure, Report and Improve Quality and Outcomes of Major Surgery. PREPRINT. Published online 2021. doi:10.21203/rs.3.rs-708161/v1
2. Dindo D, Demartines N, Clavien P-A. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. *Annals of surgery*. 2004;240(2):205-213

Neuromuscular Monitoring Post-Cardiac Surgery: A Quality Improvement Project in Cardiac Intensive Care Unit, Aberdeen Royal Infirmary

Sandra Hapca¹, Sarah Rae², Amy Dutia³, Prabodh Sasidharan⁴

¹Academic Foundation Year 2 Doctor, NHS Grampian, Aberdeen, United Kingdom. ²Consultant Cardiothoracic Anaesthetist and Intensivist, NHS Grampian, Aberdeen, United Kingdom. ³Anaesthetic Trainee, NHS Grampian, Aberdeen, United Kingdom. ⁴Consultant Anaesthetist, NHS Grampian, Aberdeen, United Kingdom

Abstract

Introduction

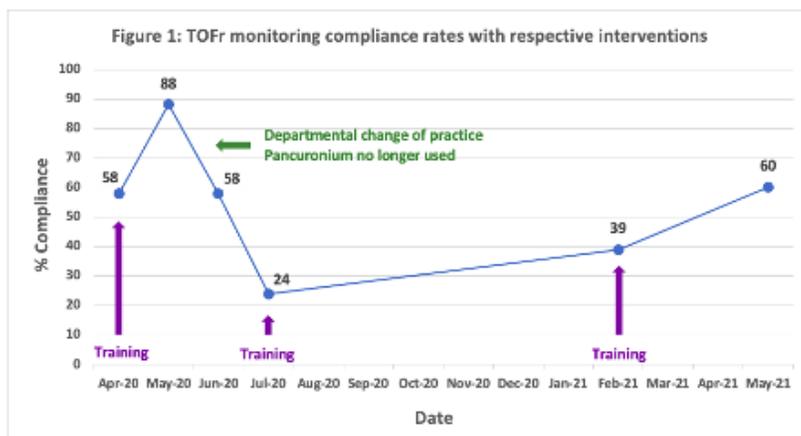
Residual paralysis is a known complication of intra-operative neuromuscular blockade and a significant post-operative adverse event associated with increased risk of accidental awareness and pulmonary complications (Plaud *et al.*, 2010). Cardiac surgery patients may be more likely to experience prolonged duration of action of neuromuscular blocking agents due to underlying risk factors including hypothermia, acidosis and magnesium administration. In 2019, there were 3 cases of residual paralysis following cessation of sedation in our cardiac intensive care unit (CICU). A quality improvement project centred around neuromuscular monitoring was designed to address this issue.

Methods

Nursing staff were trained to record train of four ratio (TOFr) in cardiac surgery patients on admission to CICU and before extubation. TOFr recordings were added to the electronic observation chart. Posters detailing TOFr interpretation and indications for sugammadex were placed around CICU. A TOFr<0.9 was described as indicative of residual paralysis and need for reversal. A TOFr>0.9 was described as safe for extubation. Initially, data related to TOFr post-cardiac surgery was collected retrospectively over a 5-month period. Compliance with neuromuscular monitoring was assessed prospectively on five cycles, each time over a 2-week period.

Results

126 patients were included in the initial data collection. 16%(n=12) had TOFr<0.9 on admission to CICU and 9%(n=7) had TOFr<0.9 before extubation. Of these, only one received sugammadex prior to extubation with successful reversal. 47%(n=8) of patients administered pancuronium, had TOFr<0.9 before extubation. This was higher compared to rocuronium (5%,n=2), vecuronium (0%,n=0) or atracurium (9%,n=1). Compliance with monitoring was assessed on six occasions and is summarised in Figure 1.



Discussion

Our study shows evidence of residual paralysis and potential for harm in cardiac surgery patients within our department. This was more common following use of pancuronium compared to other neuromuscular blockers. Increased awareness led to a departmental move away from use of pancuronium. Compliance with neuromuscular monitoring is overall improving with departmental training, however, remains sub-optimal. Achieving 100% compliance is of particular importance in patients identified for our CICU “warm, wake and extubate” protocol, in which we aim extubation as soon as possible in line with enhanced recovery

after surgery pathways. To improve this, we implemented a pre-extubation checklist to include neuromuscular monitoring on our electronic system. In addition, we aim to expand nursing staff training to include a teaching video which can be sent via email. We aim to re-assess compliance within six months.

References

Plaud, B. *et al.* (2010) ‘Residual Paralysis after Emergence from Anesthesia’, *Anesthesiology*. American Society of Anesthesiologists, 112(4), pp. 1013–1022. doi: 10.1097/ALN.0B013E3181CDED07.

Analgesic Strategies For Video-Assisted Thoracoscopic Surgery – A National Picture

Emily Edmondson, Rachel Steele, Rik Kapila

Nottingham University Hospitals, Nottingham, United Kingdom

Abstract

Introduction

The majority of lung cancer surgery is now performed by video-assisted thoracoscopic surgery (VATS)¹. It is associated with reduced post-operative pain, pulmonary complications and length of hospital stay². However, there is little consensus on the optimal analgesic strategy for this technique.

Methods

We conducted a retrospective analysis of 60 patients undergoing VATS between February and May 2020 at our hospital. We recorded perioperative analgesia and dynamic pain scores until day 3 post-operatively. Subsequently, we distributed a national survey to thoracic anaesthetists and surgeons across the UK between September 2020 and January 2021 to capture colleagues' techniques to help inform best practice.

Results

Local analysis showed a varied analgesic approach. Ten per cent of patients received premedication. Intercostal blocks (ICB) were administered to 42%, 28% had a paravertebral catheter (PVC), 8% had both and 13% had an epidural. The ICB alone group had lower pain scores in the first 24 hours post-operatively but higher opioid requirements than the PVC group on Day 1 and 2. Eight-eight per cent of PVCs were stopped by Day 2; this had no effect on subsequent PRN opioid requirements.

The national survey received 87 responses from anaesthetists and 21 responses from surgeons, with all regions of the UK represented. Use of pre-medication is greater nationally with clinicians always or sometimes prescribing: paracetamol (40%), NSAIDs (26%), pregabalin (16%) or gabapentin (20%). There is high use of intra-operative adjuvants; magnesium (69%), clonidine (58%) and NSAIDs (83%). Fentanyl and morphine are the most commonly used opioids, whilst 39% never use remifentanyl. 91% of institutions always or sometimes use ICBs. Use of PVCs is common (61%) but 72% use alongside ICBs. Twenty millilitres of 0.25% levobupivacaine is the most popular loading volume for PVCs and 0.125% levobupivacaine for infusion. There is higher use of morphine and fentanyl PCAs nationally.

Discussion

We have demonstrated a variation in analgesia used for VATS both locally and nationally. However, common themes include; ICBs as a favoured regional technique, use of adjuvants to opioids are common practice and perioperative NSAID use is widely accepted. A large randomised controlled trial could be established to assess the most effective method of analgesia post VATS.

References

1. Royal College of Physicians. Healthcare Quality Improvement Partnership. National Lung Cancer Audit. Lung Cancer Clinical Outcomes publication. January 2020.
2. Shah RD, D'Amico TA. Modern impact of video assisted thoracic surgery. J Thorac Dis 2014; 6(S6): S631-S636

Developing the 2021 ACTACC acute Type A aortic dissection audit

Tom Gilbey^{1,2}, Ben Milne^{1,2}, Simon Kendall^{3,4}, Seema Agarwal⁵, Joseph Arrowsmith⁶, Gudrun Kunst^{1,2}

¹King's College Hospital, London, United Kingdom. ²King's College London, London, United Kingdom. ³James Cook University Hospital, Middlesbrough, United Kingdom. ⁴Society for Cardiothoracic Surgery, London, United Kingdom. ⁵Manchester Royal Infirmary, Manchester, United Kingdom. ⁶Royal Papworth Hospital, Cambridge, United Kingdom

Abstract

Introduction

ACTACC runs a yearly audit project with the aim of assessing and improving current standards in cardiothoracic anaesthesia and critical care. In 2019 President-elect Dr Arrowsmith's proposal for a review of the transfer and treatment of patients suffering from acute Type A aortic dissection was selected. These patients are at high risk of death and poor neurological outcomes. Care is centralised to those centres with appropriate expertise but must also be delivered before the patient deteriorates. These challenging logistical issues have been explored in a pair of landmark Healthcare Safety Investigation Branch reports (1,2).

Methods

An initial dataset suggested by Dr Arrowsmith was further refined with two rounds of discussions. Stakeholders were identified from the cardiothoracic surgery, subspecialty aortic communities and the ACTACC Scientific Committee. Work from emergency medicine, in particular the "Think Aorta" campaign, was reviewed (1). The questions were split in to three areas; relating to transfer, to surgery and anaesthesia, and to outcomes. Development was interrupted by the first wave of the COVID-19 pandemic and the launch of the audit was postponed until May 2021. The survey was implemented in the online platform SurveyMonkey (Palo Alto, California), using expertise gained during the previous successful ACTACC audit (3). The second round of review consisted of testing the questions on real cases both locally and with collaborators from another centre before launch.

Results

The final survey comprises 31 questions and 31 of the 33 centres who currently accept acute dissection cases in the UK have pledged support. The audit started on the 1st May 2021 and will run for 12 months ending on the 30th April 2022. There is a stream of data being submitted; the challenge is to capture information from three distinct periods of the patient journey, with transfer data particularly easily lost. Posters with QR codes, paper copies of the form and online spreadsheets for data updates have been added to suit individual requirements.

Conclusion

The key to a successful audit is the hard work of the clinicians collecting data. We hope to have created an audit that reflects the interests of the membership, to implement it in a flexible manner and to analyse the results so that lessons can be learned.

References

1. Healthcare Safety Investigation Board: Delayed Recognition of Acute Aortic Dissection. Healthcare Safety Investigation I2012/002B. Jan 2020.
2. Healthcare Safety Investigation Board: Transfer of Critically Ill Adults. Healthcare Safety Investigation I2012/002A. Jan 2019.
3. Agarwal S, Choi SW, Fletcher SN, Klein AA, Gill R; Contributors. Anaesthesia. 2021 Jan;76(1):19-26.

Post-Myocardial Infarction Ventricular Septal Rupture; reviewing a 25-year dataset from a single centre in the UK.

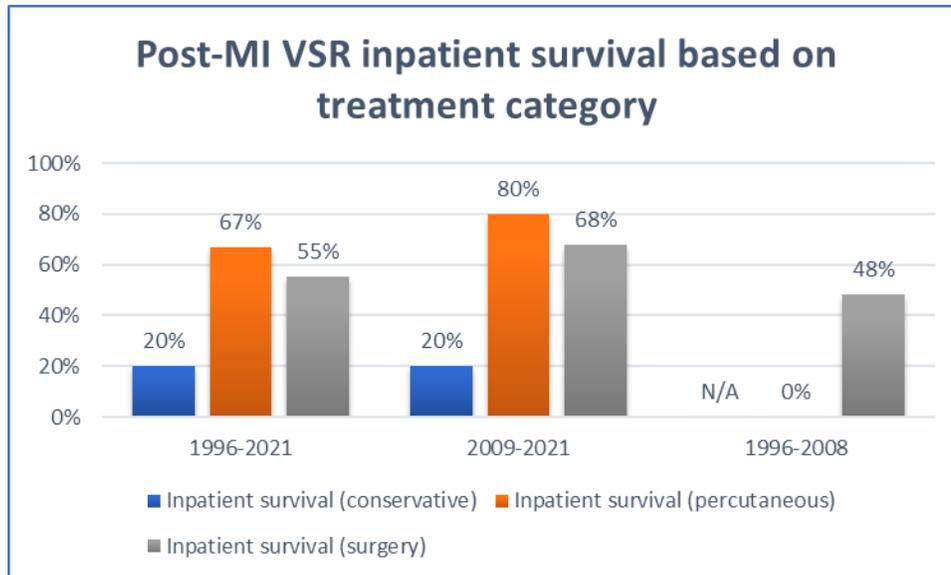
Francois Wessels, Andy Curry

Southampton NHS Foundation Trust, Southampton, United Kingdom

Abstract

The Wessex Cardiac Centre was an index centre for surgical repair of post-myocardial infarction (MI) Ventricular Septal Rupture (VSR) between 1973 and 1989 with a surgical mortality of 20.8%.¹ Since the introduction of Primary Percutaneous Coronary Interventions (PPCI), post-MI VSR complicates less than 1% of ST-elevation Myocardial Infarctions, but we suspected an increased incidence during the COVID-19 pandemic.

We reviewed the records for all post-MI VSR cases admitted to the Adult Cardiac ICU over a 25-year period (April 1996 to April 2021).



95 Patients were included with an average age of 71 years (range 43 - 85). The median number of cases were 3/year (IQR 2-5) with a 5-year high of 6 (2020), but since 2009 the median fell from 4 to 3. Inpatient mortality was 46%, improving from 53% to 38% since 2009 (intention-to-treat analysis). Surgical mortality was 45%, improving from 52% to 32% since 2009 and percutaneous device-closure mortality was 33%. 5 Patients were treated conservatively with an inpatient mortality of 80%.

Our single centre mortality rates are consistent with previously published data by *Arnaoutakis et al* reporting 42.9% surgical mortality² and

Kariyanna et al reporting 37% percutaneous device-closure mortality³. The literature supports an approach to operate on patients with haemodynamically significant post-MI VSR, unless there is a non-cardiac reason to opt for conservative treatment. Percutaneous device-closure in patients with cardiovascular instability or significant organ dysfunction is increasingly being considered as a bridge to organ recovery or surgery or as a destination therapy. The parallel focus on supportive therapy depends on access to mechanical cardiovascular support, which plays a significant role, but most non-transplant Cardiac centres are limited to Intra-aortic counterpulsation balloon devices.

In our case-series 97.9% of survivors lived beyond 1 year, which further supports the role for intervention.

Interestingly, a proportion of post-MI VSR cases admitted after 2019, with an intention-to-treat, were managed conservatively. Given the low annual incidence, variations may occur by chance, but this change in practice likely reflects the impact COVID-19 has had on these high-risk patients.

References

1. Skillington PD, Davies RH, Luff AJ, Williams JD, Dawkins KD, Conway N, et al. J Thoracic Cardiovasc Surg 1990; 99: 798-808
2. Arnaoutakis GJ, Zhao Y, George TJ, Sciortino CM, McCarthy PM, Conte JV. Surgical repair of ventricular septal defect after myocardial infarction: outcomes from the Society of Thoracic Surgeons National Database. Ann Thorac Surg 2012; 94(2): 436-43
3. Kariyanna PT et al. Percutaneous Closure of Post-infarction and Iatrogenic Ventricular Septal Ruptures Using Amplatzer Occluder®: A Systematic Review. Am J Case Rep 2021; 9(3): 184-189

Incidence of antibiotic escalation post Coronary Artery Bypass Graft (CABG) surgery

Richard Di Palma, Clare Thakker, [Caterina Vlachou](#)

High Dependency Unit, Royal Brompton Hospital, Royal Brompton and Harefield NHS Foundation Trust, London, United Kingdom

Abstract

Introduction

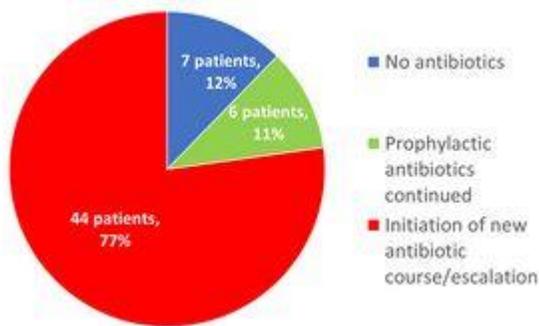
All patients undergoing CABG surgery at our hospital are routinely prescribed prophylactic antibiotics post op - cefuroxime 750mg for 2 further doses and teicoplanin 400mg (or 6mg/kg) 12 hours post induction. The exception to this are patients with a high Brompton & Harefield Infection Score (BHIS) who are kept on extended antibiotic prophylaxis¹. From our experience on the High Dependency Unit (HDU) CABG surgery patients are often required to be initiated on broad spectrum antibiotics within the first few days after prophylactic antibiotics have been stopped.

Aims and Objectives

1. Identify the proportion of patients who require an escalation in antibiotics
2. Identify the common indications for the antibiotics
3. Is there chest x-ray evidence and/or microbiology cultures to confirm active infection?

Methods

Data was retrospectively collected for first time CABG surgery patients over the course of one year (May 2017 - 2018). Only patients who had a stay of ≥ 72 hours on HDU/ITU were included.



Results

- 77% (n=44) of patients required an escalation in antibiotics, with the majority initiated on cefuroxime +/- teicoplanin (n=18) followed by piperacillin/tazobactam +/- teicoplanin (n=16)
- The most common documented indication was chest infection (36%, n=18)
- Of those with an indication of chest infection, 56% (n=10) had chest x-ray evidence of infection
- Of those on antibiotics 66% (n=29) had cultures taken, of which 14% (n=4) had positive microbiology

Discussion

Our data show that a very high proportion of post op CABG surgery patients who remain on HDU/ITU for ≥ 72 hours are initiated/escalated onto broad spectrum antibiotics.

The most common indication for antibiotic therapy was a chest infection, which is expected due to often less effective inspiratory efforts and cough due to pain despite ongoing analgesia. A further factor is the reduced mobility of these patients despite early mobilisation after surgery².

Interestingly only 56% of patients with a suspected chest infection had chest x-ray evidence of active infection, which questions whether there is over-prescribing of antibiotics or if the clinical picture or blood infection markers predominate decision making.

Future Plan

- Liaise with other cardiothoracic centres to see whether escalation of antibiotics is also frequently seen in this cohort of patients
- Investigate whether measures that have been shown to reduce the likelihood of contracting a chest infection post cardiac surgery are being optimised
- Present findings to the microbiology team to explore whether current antibiotic prophylaxis is sufficient

References

1. Infection Control Team, RBHT. High BHIS Protocol. 2015
2. Weissman C. Pulmonary complications after cardiac surgery. *Semin Cardiothorac Vasc Anesth.* 2004 Sep;8(3):185-211

Thrombectomy for acute embolic stroke following heart surgery

Cameron Semple, Peter Alston

Royal Infirmary of Edinburgh, Edinburgh, United Kingdom

Abstract

Introduction:

Acute ischaemic stroke (AIS) occurs in approximately 1-10% of patients undergoing cardiac surgery and can markedly impair recovery¹. Thrombolysis carries an unacceptably high risk of haemorrhage in the early postoperative period after heart surgery. Mechanical thrombectomy is becoming an increasingly preferred alternative to treat AIS, and unlike thrombolysis, is not contraindicated in the early postoperative period. We report a patient who had witnessed onset of AIS in the early postoperative period following cardiac surgery and was treated with mechanical thrombectomy.

Discussion:

An 81-year-old male patient underwent elective tissue AVR and CABG (internal mammary to left anterior descending coronary artery) surgery. Surgery was uncomplicated and the patient's trachea was extubated on the evening of surgery. His recovery progressed uneventfully and on the day after surgery, he was moved to a high dependency unit. On the morning of the second post-operative day, the patient had a witnessed rapid deterioration in conscious level, becoming unresponsive with a divergent gaze. Urgent plain CT scan of the brain showed hyperattenuation of the left middle cerebral artery (MCA) territory consistent with acute thrombosis. The patient was granted emergency funding for a mechanical thrombectomy and was transported to the regional neurology hospital. A mechanical thrombectomy was performed successfully, with digital subtraction angiography (DSA) confirming complete occlusion of the left MCA with poor collateral cross-flow. The patient failed to recover neurological function and died approximately 24 hours later.

Mechanical thrombectomy is now a well-established treatment for AIS. There are clear advantages with regard to functional outcome for patients undergoing mechanical thrombectomy versus best available medical therapies such as thrombolysis². A recent systematic review of AIS post cardiac surgery showed that 50% of patients who underwent endovascular mechanical thrombectomy had a full or good neurological recovery, 36% had moderate recovery and 14% had little improvement¹. Factors that may have led to a poor outcome in this patient's case included the delay in hospital transfer, the poor cerebral cross blood flow noted on DSA and extensive comorbidities.

Conclusion:

In conclusion, although there are many reports of mechanical thrombectomy being associated with a good neurological outcome from AIS associated with cardiac surgery, outcome may not be improved if there is underlying cerebrovascular disease and intervention is delayed.

References

1. Kashani HH, Mosienko L, Grocott BB, Glezerson BA, Grocott HP. Postcardiac Surgery Acute Stroke Therapies: A Systematic Review. *Journal of Cardiothoracic and Vascular Anesthesia* 2020; **34**: 2349-54
2. Lambrinos A, Schaik AK, Dhalla I, et al. Mechanical Thrombectomy in Acute Ischemic Stroke: A Systematic Review. 2016; **43**: 455-60

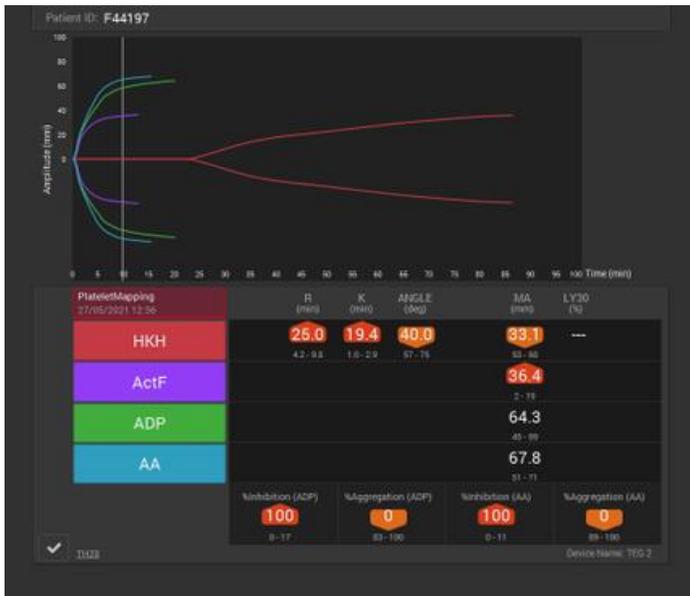
Interpretation of Platelet Mapping: Is the Graph Important.

Juneenath Karattuparambil, Ravish Jeeji, Krishna Pasupuleti
University Hospitals of North Midlands NHS Trust, Stoke on Trent, United Kingdom

Abstract

Introduction :

Platelet mapping has become a standard for patients on dual anti platelet medication coming for cardiac surgery . Platelet mapping has also been used to predict increased bleeding in patients on anti platelet medication for major abdominal surgeries. Interpretation of platelet mapping is paramount in these cases.



Case report

A 70 year old male with history of hypertension and ischaemic heart disease was posted for urgent major abdominal surgery . He was on Clopidogrel and prophylactic dalteparin. A platelet mapping was done by TEG 6, to assess the percentage of platelet inhibition.

The platelet mapping showed 100% inhibition for ADP and 100% inhibition for AA. Platelets were requested for the procedures. Re analysing the platelet mapping graph, we could identify the misinterpretation of the study. The HKH trace was abnormal with prolonged R time and reduced MA, may be due to the dalteparin . So that made the interpretation of the result abnormal . The patients didn't receive any products at the end of the procedure .

Discussion

The use of viscoelastic haemostatic tests (VETs) to guide resuscitation during major haemorrhage has increased significantly in recent years and is now recommended by the National Institute for Health and Care Excellence (NICE) for cardiac surgery

TEG PlateletMapping assay percentage (%) inhibition/ aggregation calculation

The platelet inhibition in response to the agonist is calculated from platelet aggregation: $[(MA_{ADP} - MA_{Fibrin}) / (MA_{Thrombin} - MA_{Fibrin})] \times 100$ and % inhibition = (100% - % aggregation).

A reduction in the baseline value in the HKH trace , due to reduced fibrinogen or prolonged R time, alter the equation and hence the platelet aggregation and inhibition.

In our case , the R time was prolonged and the MA fibrin was reduced . This can be attributed to the dalteparin effect . The value of 100% inhibition of ADP and AA may lead to misinterpretations, if the graph is not properly analysed. If HKH trace is abnormal results should be interpreted with caution and an alternative platelet function test is advisable for management of anti platelet activity

Conclusion:

Platelet mapping by thromboelastograph method is very useful tool in patients on anti platelet medication. HKH trace is important in thromboelastographic platelet mapping . An abnormal HKH trace results be interpreted with caution and an alternative platelet function test is advisable.

References

- 1.Bochsen, Louise & Wiinberg, Bo & Kjelgaard-Hansen, Mads & Steinbrüchel, Daniel & Johansson, Pär. (2007). Evaluation of the TEG® platelet mapping™ assay in blood donors. Thrombosis journal. 5. 3. 10.1186/1477-9560-5-3.
2. Scorer, Thomas & FitzGibbon, Lucy & Aungraheeta (2020). TEG PlateletMapping assay results may be misleading in the presence of cold stored platelets. Transfusion. 60 Suppl 3. 10.1111/trf.15753.

Aortic Valve and Root Replacement in a 215kg Patient with Endocarditis

Anders Hulme, Carlos Corredor-Rosero, Stephen Shepherd, Aung Oo

St Bartholomew's Hospital, London, United Kingdom

Abstract

Severe obesity in the perioperative period presents a wide range of challenges for any anaesthetist, but the complexity of cardiac surgery and the necessary additional anaesthetic interventions further add to the intricacy of managing such patients.

A 63-year-old man presented to his local hospital with new onset fever and confusion. He weighed 215kg (BMI 74.4) and had undergone previous bariatric surgery. His delirium and body habitus made initial investigation and treatment challenging and he was initiated on antibiotic therapy for presumed meningoencephalitis. Transthoracic echo then indicated a diagnosis of infective endocarditis, with a vegetation seen on the non-coronary cusp of the aortic valve and he was subsequently transferred to a cardiac centre.

His body habitus presented significant challenges for anaesthetic, perfusion, theatre, and surgical teams, requiring a cohesive, team-based approach to his case.

Positioning on the operating table was achieved using a HoverMatt air mattress, with induction of anaesthesia and intubation performed in the ramped position using high flow nasal oxygen and videolaryngoscopy. Central venous access and suprapubic urinary catheterization proved challenging, with ultrasound used to aid both interventions. Drugs and infusions were dosed according to an adjusted bodyweight, although required heparin dose for cardiopulmonary bypass (CPB) was 300IU/kg of total bodyweight but heparin resistance may have necessitated such high dosing.

Careful insertion and manipulation of Transoesophageal Echo (TOE) - in the context of previous bariatric gastric surgery - demonstrated an aortic root abscess at risk of perforation around the non coronary aortic sinus, with a vegetation seen on the non-coronary cusp of the aortic valve.

Aortic root and tissue aortic valve replacement were performed successfully through mini-sternotomy (CPB time 226 minutes) in order to reduce risks of wound infection and dehiscence.

Standard perfusion practice was adjusted to include two oxygenators in order to maintain adequate gas exchange at the high flows required for the calculated body surface area.

The patient was transferred to ITU in a critical but stable condition; after 48 hours with CVVHDF, infusion doses were reducing and the patient was obeying commands on sedation hold. TOE on ITU demonstrated well seated AVR and preserved biventricular function. Unfortunately, the patient deteriorated rapidly over night on post-operative day three, with investigations suggesting an acute liver injury, most likely embolic in nature given the sudden onset of decline, and the patient sadly passed away on day four post-op.

While the patient did not survive this acute episode, this case demonstrates not only the challenges posed by severely obese patients, but also the feasibility of emergency cardiac surgery in this patient group.

Anaphylaxis to sugammadex: a UK case report

Soundararajan Veluchamy¹, Stephenie Pauling²

¹Golden Jubilee National Hospital, Glasgow, United Kingdom. ²University Hospitals Plymouth, Plymouth, United Kingdom

Abstract

Introduction:

We describe a case of anaphylaxis to sugammadex, following non-emergent reversal of deep neuromuscular blockade. The anaphylactic reaction was short-lived, and notably recovered, but was subsequently confirmed on skin prick testing.

Discussion:

A 78-year-old man underwent video-assisted thoracoscopy, drainage of right pleural effusion and insertion of chest drain. Previous anaesthetics were uneventful, he was not a smoker and had no history of asthma.

Intravenous and arterial cannulae were placed, and a left sided DLT inserted without any issues. One-lung ventilation was well tolerated and anaesthesia was maintained with sevoflurane. The procedure lasted 45 minutes, during which time there was no physiological derangement. At completion of surgery there was significant residual neuromuscular blockade which was reversed with 200mg sugammadex. The patient started to cough and became flushed, the systemic arterial pressure reduced from 140/88mmHg to 35mmHg systolic. The bed was inverted, and the patient was administered a fluid bolus and repeated boluses of dilute metaraminol to a total of 3mg.

Following administration of 50mg intravenous frusemide (due to the suspicion of pulmonary oedema), 100mg intravenous hydrocortisone and 10mg intravenous chlorpheniramine, the patients' blood pressure improved. During this time, he developed new atrial fibrillation with fast ventricular response. He did not receive adrenaline boluses or an adrenaline infusion at any point and, aside from the coughing, was not difficult to ventilate or oxygenate. He woke up and extubated as soon as the blood pressure had stabilised. Amiodarone 300 mg IV given over 10 minutes. Mast cell tryptase measurements were performed at 1 hr after the event which showed a rise to 9.0ng/ml with a subsequent fall to 4.8ng/ml (both values within normal range).

On subsequent skin prick testing at the perioperative allergy clinic, the patient showed a strongly positive reaction to sugammadex. The clinical history and skin prick reaction make sugammadex the most likely culprit in this instance.

Notably, anaphylactic reactions have been reported to sugammadex, rocuronium and the sugammadex/rocuronium complex, raising the possibility that our patient exhibited anaphylaxis only briefly to sugammadex before the drug formed complexes with the remaining rocuronium in his circulation, thereby removing the antigen from his circulation before the full anaphylaxis cascade reaction had been triggered. In effect, this could represent the opposite of the effect observed when rocuronium anaphylaxis is treated with sugammadex.

Conclusion:

The mechanism of sugammadex hypersensitivity and anaphylaxis is still poorly understood, which raises the question of the safety profile of the rocuronium/sugammadex combination, and that further investigation may be required as the use of sugammadex frequency increases worldwide.

Novel Scalp Cooling Method During Deep Hypothermic Circulatory Arrest: A Case Report

Cheng Whye Yeo, Jonathan Kendall

Liverpool Heart and Chest Hospital, Liverpool, United Kingdom

Abstract

Deep Hypothermic Circulatory Arrest (DHCA) is used during aortic arch surgery to improve cerebral protection. This reduces metabolic rate and oxygen requirements of the brain allowing interruption of blood supply necessary to undertake surgery. Topical head cooling continues to be a widely practiced complementary measure to enhance cerebral protection during DHCA as there is some evidence to suggest better neurological outcome associated with its use. Traditionally, this was achieved by simply placing ice packs around the head to prevent gradual temperature rise during the no flow period which may last up to 30 minutes. However, the efficacy of its cooling effect remains questionable due to poor surface contact particularly the posterior cerebral territory.

The Paxman cooling cap is a device licensed for use in preventing chemotherapy-induced hair loss. Ethylene glycol at -4 degrees Celsius circulates continually around the entire scalp surface providing uniform cooling.

We have employed this technology in a novel way during DHCA to provide improved scalp cooling compared to conventional methods in our institution for the last 18 months (Figure1). It has been successfully used with existing monitoring without compromise in over 40 patients and not been associated with any untoward events.



We present one of many cases in our center indicated for DHCA. This case involves a 38-year-old male who suffered an extensive type A acute aortic dissection from the root to the iliac bifurcation. He underwent a dissection repair with root and total arch replacement requiring a slightly prolonged DHCA time of 61 minutes. Intraoperatively, the Paxman cooling cap was applied to the head for scalp cooling alongside systemic cooling down to 20 degrees Celsius prior to circulatory arrest. Other neuroprotective measures i.e., Selective Antegrade Cerebral Perfusion (SACP) and barbiturate coma were also instituted. There was no significant cerebral desaturation observed using Near Infrared Spectrophotometry (NIRS) monitoring throughout the procedure. The patient was successfully extubated 14 hours postoperatively and subsequently discharged from the hospital without any neurological sequelae.

We conclude that the Paxman cooling device can be used as a novel adjunct for scalp cooling during DHCA with the theoretical advantage of more effective cooling while possibly avoiding some of the drawbacks associated with conventional methods using ice packs.

Figure1: Paxman cooling cap in position prior to start of surgery

References

1. Bridie O'Neill, Haris Bilal, et al. *Interactive Cardiovascular and Thoracic Surgery* 2012; 15: 696–701
2. Dina Hagigeorges, Laura J. Burns, et al. *JCO Oncology Practice* 2020; 16: 522-524

Hypoxia post endobronchial stenting: is intubation always the answer?

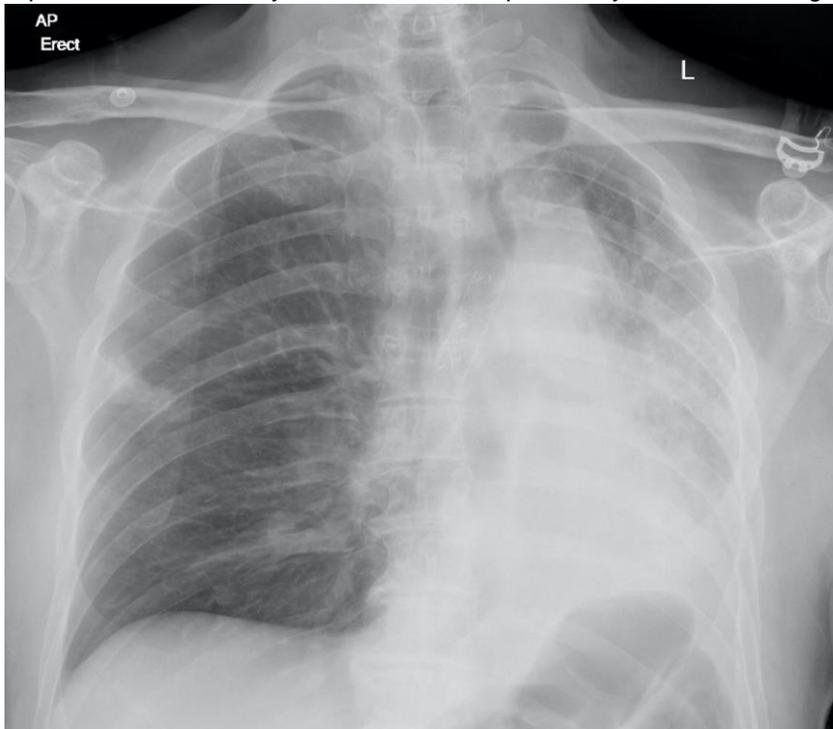
Siew-Ling Harrison, VedaHari Ponnaiah

Guy's and St Thomas' NHS Foundation Trust, London, United Kingdom

Abstract

Well-recognised complications of rigid bronchoscopy for endobronchial tumours are haemorrhage and hypoxia [1]. Stenting to tamponade a bleed and protect the non-bleeding lung may come at the expense of viable lung. Decision making whether to intubate a hypoxic patient with a tracheal stent is multifactorial.

A 69-year-old gentleman with a T4N2M0 lung cancer with left main bronchus (LMB) involvement presented with recurrent haemoptysis. Past medical history included left vocal cord palsy and angina. A plan was made for rigid bronchoscopy with a view to debulking and insertion of a LMB stent. He was the final patient on an all-day list. Bronchoscopy under general anaesthetic revealed exophytic lesions in the distal trachea and the proximal LMB. The tumour was friable and manipulation led to bleeding. Covered stenting of the distal trachea into the RMB was performed urgently to achieve tamponade of the bleed, protect the right side from soiling and maintain tracheal patency. Post stent placement the patient was intubated and the tube positioned above the stent using a flexible bronchoscope. Saturations were 100% on FiO₂ of 0.4 and it was felt safe for extubation. 20 minutes post-extubation his saturations were 70% on FiO₂ 1. High flow oxygen therapy (HFOT) was initiated at 50lmin⁻¹ FiO₂ 0.7 with a PaO₂ 6.8. He was not struggling clinically and was able to expectorate. Chest Xray demonstrated the previously aerated left lung now collapsed but good expansion right lung (fig1).



A multidisciplinary team decision was made to avoid intubation, continue HFOT, nebulised iloprost, mucolytics and chest physio. 12 hours later saturations were 98% on 4l. He was stepped down to the wards day one and discharged home day two postoperative.

The decision to intubate a hypoxic patient post stent insertion is not straightforward and requires input from the anaesthetist, intensivist and surgeon. The cause of hypoxaemia was three-fold; intentional sacrifice of left lung with associated shunt, soiling of right lung from bleeding and difficulty expectorating due to vocal cord palsy. Avoiding intubation would aid spontaneous airways clearance and avoid risk of stent migration. Although his PaO₂ was 6.8 he was not in respiratory distress. Hypoxia alone is rarely an indication for intubation and HFOT proved to be of benefit in avoidance of intubation. Timing and personnel play a role; this case was last on the list, had the intensivist not been also an anaesthetist there may have been increased pressure to intubate early.

References

1. Stahl DL, Richard KM, Papadimos TJ. Complications of bronchoscopy: A concise synopsis. *Int J Crit Illn Inj Sci.* 2015;5(3):189-195.

Off Pump CABG after TAVI - Hybrid approach to optimise outcomes in frail and high-risk patients with Ischemic Heart disease and Severe Aortic stenosis

Jeeji Ravish, Prakash Nanjaiah, Karim Ratib, Goutham Puranik, Simon Duckett, Mark Gunning, James Nolan
University Hospital North Midlands, Stoke on Trent, United Kingdom

Abstract

82 year old patient presented with worsening Angina & signs of congestive heart failure. He was diagnosed recently with Bowl cancer which is surgically respectable and is expected to have good prognosis with surgical resection.

On investigation he had Impaired LV with hibernating myocardium, angiogram showed severe multivessel coronary disease.

Ideally this patient needs Aortic valve replacement and coronary artery grafting. Surgical AVR and CABG is high-risk due to his age, impaired LV function, asthma and impaired renal function so will have longer recovery time which will delay his bowl surgery.

Our Heart team discussed all options, surgeon and anaesthetist had discussion with the patient and his family and the decision was made to offer the patient TAVI followed by Off pump CABG.

This strategy was proposed to help his myocardium to recover and achieve full revascularisation with Off pump CABG. Avoiding cardiopulmonary bypass is important for this patient to decrease the chance of post-op organ dysfunction and rapid recovery to allow the bowl surgery to be scheduled as soon as possible. CABG is better compared percutaneous revascularisation in this patient as it avoids stent related issues in peri-operative period.

Patient had uneventful TAVI with excellent results and was followed by Off pump CABG 17 days after TAVI. He was discharged to ward from ICU within 48 hours and discharged home on 5th post-op day after CABG.

References

1. Hybrid coronary artery bypass &TAVI - J.M, de mol et al : Journal of Thoracic and Cardiovascular surgery Feb2013
2. TAVI combined with elective coronary stenting - Axel Unbehaun et al: *European Journal of Cardio-Thoracic Surgery*, Volume 47, Issue 6, June 2015

Pyrexia at Induction of Anaesthesia for Coronary Artery Bypass Graft (CABG) Surgery: proceed or postpone?

Sean Bennett¹, Muneeb Alnouri², Jose Fernandez¹

¹King Abdulaziz Medical City, Jeddah, Saudi Arabia. ²King Adbulaziz Medical City, Jeddah, Saudi Arabia

Abstract

A raised WBC and/or pyrexia postpones routine surgery. CABG surgery has the risk of myocardial infarction caused by postponement. We raise this dilemma in a high-risk patient at induction of anaesthesia further compromised by acute right ventricular (RV) dysfunction.

Adult, diabetic, with end-stage renal failure, chest pain and a NSTEMI. Previously he refused surgery. Now for urgent CABG. 1mg midazolam for lines. During central line insertion he started shivering, feeling cold but warm to touch, no chest pain. Blood pressure (BP) 190/80 mmHg and HR 110 bpm. iv glyceryl nitrate and fentanyl controlled the BP. Cerebral oximetry (rSO₂) probes placed pre-induction. Post-intubation; temperature 38.1°C, EtCO₂ 9.2 kPa, HR 120 bpm. Surgeons informed and surgery started.

During internal mammary artery (IMA) harvesting rSO₂ decreased from 63% towards 40% and central venous pressure from 12 to 16 cmH₂O. TOE showed the IMA retractor (IMAR) compressing the RV. Despite adjustment rSO₂ continued to fall, noradrenaline started. rSO₂ recovered on IMAR removal, remaining above baseline on cardiopulmonary bypass (CPB). 1st wean off CPB failed due to RV dysfunction. 2nd attempt on adrenaline and noradrenaline (0.05 µg/kg/min), milrinone (0.23 µg/kg/min), AV pacing and IABP was successful but TAPSE 5 mm. On ICU vasopressin (0.04µg/kg/min) and nitric oxide (10 ppm) added.

Sequential results in Table

Blood culture: Gram-negative, Enterobacter Cloacae, sputum: Serratia Marcescens. Later: Stenotrophomonas maltophilia.

Leucocytosis pre-operatively is strongly associated with poor outcomes following cardiac surgery.¹ Gram-negative cultures are 26-fold commoner in dialysed patients. Was the RV dysfunction caused by the IMAR or secondary to septicaemia? The reduction in cerebral perfusion was first detected by a fall in rSO₂. RV dysfunction can occur due to sepsis.² In early sepsis tracking TAPSE or troponin, 48% of septic patients suffered RV dysfunction.

Pyrexia, tachycardia and hypercapnia at induction of anaesthesia, during surgery RV dysfunction. On ICU sepsis and RV dysfunction caused prolonged but full recovery. In future, postpone surgery and pay closer attention to the IMAR if rSO₂ fall. Neither points are widely discussed in the literature.

Infection and Cardiac markers

	Preop	Intraoperative		POD 1	POD 3/4	POD 14
Temp°C	36.5	38.1		36.5	36.6	38.2
White Blood Cells	7.1			25.4	43.6	10.7
CRP				231	273	71
Procalcitonin (0.25-2.0µg/l)				160	52	9.1
Lactate (0.7-2.0mmol/l)				12.1	3.2	0.8
TAPSEmm	25	11 pre-CPB	5 post-CPB	4	11	13
Troponin	583			4,245	1,393	318

References

1. Mahmood E. Pre-operative asymptomatic leukocytosis and postoperative outcome in cardiac surgery patients. PLoS ONE 2017;12(9):e0182118
2. Poveda R. Heart Dysfunction in Sepsis. J Cardiothorac Vasc Anesth 2021;35(1):298-309