Free poster sessions

Oral session XII – Preselected best posters

P-01

Clinical experience with a novel serine-protease inhibitor (MDCO-2010) in on-pump CABG surgery

Gabor Erdoes[1], Lars Englberger[1], Wulf Dietrich[2], Andreas Van De Locht[3], Susanne Lison[2], Thierry P Carrel[1], Balthasar Eberle[1]
[1]University Hospital Berne, Berne, Switzerland, [2]Ludwig-Maximilians-University, Munich, Germany, [3]The Medicines Company, Munich, Germany

Introduction: MDCO-2010, a synthetic serine-protease inhibitor, exhibits marked antifibrinolytic and moderate anticoagulant activity in vitro [1]. The aims of the study were to describe pharmacokinetics, safety and pharmacodynamics of this novel antifibrinolytic in patients undergoing coronary artery bypass grafting (CABG). Exploratory endpoints were chest tube drainage, transfusions, incidence of re-exploration and perioperative mortality.

Method: With Ethics Committee approval and patient informed consent, a double-blind placebo-controlled study was performed in 32 patients undergoing elective CABG on minimized cardiopulmonary bypass. Patients were randomized to receive placebo (cohort P: n=8), or one of the following study drug dose regimens (cohorts C1, C2 each n=3; C3-5 each n=6): a loading dose and a pump priming dose of MDCO-2010 followed by an infusion of 12.5, 25, 62.5, 109 or 219 mcg kg^{-1} h^{-1} until sternal closure. Conventional and point-of-care analyses of coagulation and fibrinolysis were used to describe pertinent properties of MDCO-2010 in vivo. Data (median [25^{th}/75^{th} percentile]) of cohorts C (all drug dose regimens) vs. P were compared (SPSS software, non-parametric tests, significance $P<0.05$).

Results: Demographics and intraoperative heparin dose did not differ between groups. Pharmacokinetics demonstrated dose-proportionality of MDCO-2010 steady-state plasma concentrations and a terminal half-life of 1 h [2]. Antifibrinolytic activity was evident at sternal closure from retardation of t-PA-induced clot lysis onset (C vs. P: P=0.02). Anticoagulant properties were apparent, after heparin neutralization, by prolongation of ACT, aPTT and ROTEM® coagulation times, which correlated positively with MDCO-2010 plasma levels ($P<0.001$). MDCO-2010 patients had significantly less 12 h chest tube drainage (C: 370 [350;488] ml vs. P: 900 [815;950] ml; $P<0.001$) and perioperative RBC transfused (C: 0 [0;0] ml vs. P: 125 [0;1188] ml; $P<0.04$). Transfusion exposure was 17% [4/24] in combined groups C and 50% [4/8] in P (P=0.15). Adverse events possibly related to the study drug were: graft failure (C: 2/24) and excessive postoperative bleeding (P: 2/8) [2]. All patients were discharged from ICU on POD 1.

Discussion: In on-pump CABG surgery, MDCO-2010 provides clinically significant antifibrinolysis combined with measurable but transient anti-coagulatory activity. Our preliminary data from this first-in-patient study of MDCO-2010 point to clinical efficacy and an acceptable safety profile at its current stage of evaluation.

References:

1. Dietrich W, Nicklisch S, Koster A, Spannagl M, Giersiefen H, van de Locht A. CU-2010 – a novel small molecule protease inhibitor with antifibrinoytic and anticoagulant properties. Anesthesiology 2009; 110 (1): 123-30

P-02

Mitral valve area determined by 3-dimensional transoesophageal echocardiography after mitral valve repair for mitral stenosis

Woon-Seok Kang[1], Ju-Deok Kim[1], Hasmizy Bin Muhammad[2], Jeong-Jong Kim[1], Seong-Yoon Kim[1], Seong-Hyop Kim[1], Tae-Gyoon Yoon[1], Tae-Yop Kim[1]
[1]Konkuk University Medical Center, Seoul, Republic of Korea, [2]Sarawak General Hospital, Kuching, Malaysia

Introduction: To evaluate the efficacy of 3-dimensional (3D) planimetry for determining mitral valve area (MVA) immediately after a mitral valve repair procedure (MVP) for severe mitral stenosis (MS) patients, authors compared MVAs determined by 3D planimetery to those by pressure half time (PHT) and multi channel computed tomography scan (CT).
Method: In MS patients undergoing MVP (n = 30), MVAs were determined by using pressure-half time (MVA-PHT) and 3D planimetry (MVA-3DTOE) before and after MVP employing posterior valvuloplasty and lifting annuloplasty under moderate hypothermic cardiopulmonary-bypass (CPB). MVA was determined by using CT (MVA-CT) before and on the 7th day after MVP in all patients. MVAs measured by each method were compared with each other and their correlations with MVA-CT were also evaluated.
Results: Mean pressure gradients in pre-CPB and post-CPB were 6.5 (5-8) mmHg and 4 (2-4) mmHg, respectively (P<0.001 by Wilcoxon's signed rank test). In pre-CPB, MVA-PHT, MVA-3D TOE and MVA-CT did not show any significant difference (P=0.059 in One Way Repeated Measures ANOVA). In post-CPB, MVA-3D TOE and MVA-PHT showed a significant difference (P<0.001 in multiple pairwise comparisons, Holm-Sidak method). MVA-CT and MVA-PHT showed a significant difference (P<0.001 in multiple pairwise comparisons, Holm-Sidak method). MVA-3D TOE and MVA-CT did not show significant difference (Table 1) and they showed a significant correlation (r = 0.84, y = 0.42 + 0.85 x), while MVA-CT and MVA-PHT did not (r = 0.36, y = 1.791 + 0.26 x).
Conclusion: These results suggest that 3D planimetric TOE is more reliable in determining MVA than PHT especially immediately post-MVP in severe MS patients.

P-03

Perioperative haemostasis in patients exposed to a high protamine-to-heparin dosing ratio: The value of the heparinase-modified thromboelastometric clotting time

Michael Meesters, Alexander Vonk, Dennis Veerhoek, Lerau van Barneveld, Johannes Romijn, Christa Boer
VU University Medical Center, Amsterdam, The Netherlands

Introduction: We studied the association of the protamine-to-heparin dosing ratio with thromboelastometric parameters and postoperative blood loss in cardiac surgical patients.
Method: The study included 182 patients undergoing elective cardiac surgery with cardiopulmonary bypass (CPB). Final protamine dosing was based on the decision of the

Table 1: Comparisons of MVA measured by PHT, 3DTOE and CT

	MVA-PHT	MVA-3D TOE	MVA-CT
pre-CPB (cm^2)	1.01 ± 0.32	1.06 ± 0.32	1.13 ± 0.23
post-CPB (cm^2)	1.96 ± 0.49	2.22 ± 0.35	2.30 ± 0.35

anaesthesiologist guided by ACT levels. Patients were divided into a low-to-normal (≤ 1) or high (>1) protamine-to-heparin dosing ratio group. Haemostatic parameters included the activated clotting time (ACT), classical coagulation tests, rotational thromboelastometry (HEPTEM, INTEM) and blood loss at 6, 12 and 24 h postoperatively.

Results: There were no differences in preoperative haemostatic or CPB characteristics or post-CPB classical coagulation tests between high and low protamine-to-heparin dosing groups. The postoperative classical coagulation tests, including the aPTT and PT, revealed no differences among groups. However, patients in the high dosing ratio group had a longer heparinase-modified intrinsic clotting time (HEPTEM CT; 346±179 vs. 256±85 s; P<0.001) than patients in the low dosing group, while there was no association of the post-CBP HEPTEM CT with heparin or protamine dosing solely. In 62% of the patients, the HEPTEM CT exceeded the INTEM CT, with a larger difference between HEPTEM and INTEM CT in the high dosing group (64±134 vs. 14±59 s; P=0.01). There was no association between the post-protamine ACT and the HEPTEM CT. Overall blood loss was higher in patients who received a high protamine-to-heparin dosing ratio when compared to the low dosing group, 570 ml (340-990) vs. 430 ml (280-714), P=0.03 respectively.

Conclusion: The findings highlight the importance of the protamine-to-heparin ratio rather than solely heparin dosing in maintenance of postoperative haemostasis in cardiac surgical patients. Moreover, the heparinase-modified thromboelastometric clotting time is sensitive to protamine overdosing, and its residual heparin-sensing capacity should therefore be re-evaluated.

P-04

Does remote ischaemic conditioning improve outcome? A systematic review

Daniel Brevoord[1], Peter Kranke[2], Marijn Kuijpers[1], Nina Weber[1], Markus Hollmann[1], Benedikt Preckel[1]

[1]Academic Medical Centre, University of Amsterdam, Amsterdam, The Netherlands, [2]University Hospital Würzburg, Würzburg, Germany

Introduction: Remote ischaemic conditioning (RIC) is an intriguing method to induce resistance against ischaemia reperfusion injury and can be used in a variety of clinical settings. Available studies mostly focus on surrogate endpoints, such as biomarker release. We performed a systematic review and meta-analysis to investigate whether RIC reduces mortality, major adverse cardiovascular events, length of stay in hospital and in the intensive care unit, as well as biomarker release, in patients who suffer from or are at risk for ischaemia reperfusion injury.

Method: Medline, EMBASE and Cochrane databases were searched for abstracts of randomized clinical trials comparing RIC, regardless of timing, with no conditioning. Abstracts were screened by two investigators, who independently selected suitable trials, assessed trial quality and extracted data.

Results: In total, 23 studies were included on patients undergoing cardiac surgery (15 studies), percutaneous coronary intervention (four studies) and vascular surgery (four studies), compromising 1878 patients. Compared to no conditioning, RIC did not reduce mortality (odds ratio 1.22 [95% confidence interval 0.48, 3.07]) or major adverse cardiovascular events (0.65 [0.38, 1.14]). However, the incidence of myocardial infarction was reduced with RIC (0.50 [0.31, 0.82], P<0.005), as was peak troponin release (mean difference -0.28 [-0.47, -0.09], P<0.01). A subgroup analysis of the different study populations was not performed, due to insufficient number of trials.

Conclusion: We found no evidence that RIC reduces mortality or the incidence of associated major adverse cardiovascular events after ischaemic injury. However, the data did show a reduction in the incidence of peri-procedural myocardial infarction, as well as reduced release of troponin after RIC.

P-05

Postoperative serum cystatin C is a rapid predictive biomarker of early acute kidney injury after cardiac surgery

Kyoung-Woon Joung, Wook-Jong Kim, Eun-Ho Lee, In-Cheol Choi
Asan Medical Center, Seoul, Republic of Korea

Introduction: Acute kidney injury (AKI) after cardiac surgery is a common complication and is associated with increased mortality. Early detection of AKI is needed to decrease morbidity and mortality. The aim of the present study is to determine whether cystatin C can predict early AKI development after cardiac surgery.

Method: Blood for serum cystatin C measurement was collected from 230 cardiac surgery patients before surgery, on arrival in the intensive care unit and on postoperative day (POD) 1. Acute Kidney Injury Network (AKIN) criteria were adopted to define AKI. To determine a cut-off value of cystatin C, a receiver operating characteristic curve was applied for AKI group before surgery and on POD 0 to 1.

Results: 135 of 230 patients after cardiac surgery developed AKI. The AKI group showed significantly higher cystatin C than non-AKI group before surgery [0.81 ± 0.38 mg/L (SD) vs. 0.67 ± 0.16 mg/L, P<0.001], on arrival in the intensive care unit (POD 0) [0.78 ± 0.39 mg/L vs. 0.61 ± 0.13 mg/L, P<0.001] and POD 1 [1.13 ± 0.54 mg/L vs. 0.65 ± 0.22 mg/L, P<0.001]. In the AKI group, on preoperative period the area under curve for cystatin C was 0.65 [95%, CI:0.58-0.72] and cut-off value was 0.65 mg/L (sensitivity 0.70, specificity 0.58); on POD 0 the area under curve for cystatin C was 0.68 [95%, CI: 0.61-0.75] and cut-off value was 0.74 mg/L (sensitivity 0.45, specificity 0.86); on POD 1 the area under curve for cystatin C was 0.84 [95%, CI: 0.79-0.89] and cut-off value was 0.76 mg/L (sensitivity 0.80, specificity 0.77). In multivariate logistic regression, cystatin C was significantly correlated with the preoperative AKI. [Odds ratio 3.09, 95% CI: 1.52-6.29, P=0.002], on POD 0 [Odds ratio 5.37, 95% CI: 2.34-12.31, P<0.001] and POD 1 [Odds ratio 16.62, 95% CI: 7.09-38.96, P<0.001].

Discussion: The results suggest that the preoperative cystatin level might be some predictor of AKI and cystatin on POD 0 and POD 1 might be early indicators of AKI diagnosis especially on POD 1 when cystatin value has a high sensitivity and specificity.

Poster session I – Intensive care

P-06

Hyperthermia post-cardiac surgery: An analysis of incidence and risk factors

Linsey E. Christie, Umair Ansari, Marc A. Cohen, Deborah L. Braham
Hammersmith Hospital, Imperial College Healthcare NHS Trust, London, UK

Introduction: Hyperthermia (>37.5°C) and hypothermia (<36°C) worsen patient outcome following cardiac surgery. We were concerned that adopting NICE guidelines [1], not intended for use in patients undergoing therapeutic hypothermia, may cause excess hyperthermia. We investigated peri-operative temperature management and the incidence of and risk factors for postoperative hyper- and hypothermia.

Method: Prospective paper record review of 112 consecutive cardiac surgery patients (Sept-Oct 2011). Temperature values were collected pre-operatively until 12 hours post-operatively.

Results: 5% of patients were hyperthermic on Cardiac ICU (CICU) admission and 37% became hyperthermic within the first 12 hours. Increased body surface area was associated with the development of post-operative hyperthermia and increased EuroSCORE was a negative predictor (both P<0.05, Mann-Whitney U test). Patients who later became hyperthermic had a higher mean CICU admission temperature (36.64 vs 36.09°C, P<0.05, Mann Whitney U test). 33 patients (29%) were hypothermic on CICU admission, of these, 8 were <35°C. None of the investigated factors correlated with hypothermia on CICU admission. Median temperature on cardiopulmonary bypass (CPB) was 32°C (IQR 32-33). Post CPB, forced air warmer use was recorded in 76%, fluid warmer in 53% and mattress-warmer in 63%. In CICU, only the forced air warmer was used. Median number of post-operative temperature recordings was 5 in 12 h (IQR 4-6). Overall, four patients in our cohort died (3.6%).

Discussion: We aim for post-operative normothermia. However over a third of patients develop postoperative hyperthermia. Further studies are warranted to determine whether outcome is affected. Vigilance for risk factors and increased postoperative recording of temperature may reduce the number of patients who develop hyperthermia. The development of cardiac surgery specific guidelines may assist in balancing the risk of hypothermia against that of hyperthermia.

Reference:

1. Perioperative hypothermia (inadvertent). NICE clinical guideline 29. National Institute for Health and Clinical Excellence, London, 2008

P-07

The analgesic and haemodynamic effects of dexmedetomidine and remifentanil during chest tube removal in cardiovascular intensive care

Funda Gumus[1], Sitki Nadir Sinikoglu[1], Kerem Erkalp[1], Nalan Sanli[1], Adil Polat[2], Berk Ozkaynak[2], Aysin Alagol[1]
[1]Bagcilar Traning Hospital, Anesthesia Department, Istanbul, Turkey, [2]Bagcilar Traning Hospital, Cardiovascular Surgery Department, Istanbul, Turkey

Introduction: Use of dexmedetomidine is gaining increased popularity in intensive care units. The efficacy of remifentanil and dexmedetomidine in alleviating pain due to chest tube removal and their tolerability in terms of sedation, pulmonary and haemodynamic responses were analysed.

Method: The study was made in a prospective, randomized, double-blind fashion. Fifty elective isolated coronary bypass patients were enrolled in the study. All of the chest tubes were removed in the postoperative 48th h as the routine protocol. Patients were randomized as the dexmedetomidine group (Group D, 0.5 μg/kg) and the remifentanil group (Group R, 0.5 μg/kg). The pain and sedation levels were assessed by numerical rating scale (NRS) and Ramsey score. Along with these measurements, blood pressure (systolic (SAP), diastolic (DAP) and mean (MAP)), respiratory rate (RR), peripheral oxygen saturation (SpO_2) and heart rate (HR) were recorded before and after drug infusions and chest drain removal and then at 2 minutes intervals. Data were compared with independent t-test and chi-squared or Fisher's Exact test where appropriate. The pain levels and sedation scores were compared with Mann- Whitney U test for the measurements of the same time points.

Results: The demographic characteristics of the two groups were alike. Pain and sedation scores were similar before drain removals. The pain scores were lower in 6^{th} (NRS= 0 vs. 2) and 10^{th} (NRS=0 vs. 2) minute measurements in Group D. Ramsey scores were found to be statistically different at all measurements after the infusions when compared with initial levels ($P<0.05$). SAP and MAP were significantly lower in Group D (2 minutes after drain removal 109.7±16.0 vs. 122.5±12.6) and the difference was more pronounced with repeated measurements (10 minutes after drain removal 102.3±11.3 vs. 118.2±14.1). The similar difference was also observed in HR measurements (2 minutes after drain removal 93.6±9.3 vs. 100.8±7.9) ($P<0.011$).

Conclusions: Dexmedetomidine provides comparable haemodynamic control to remifentanil along with better sedation and analgesia during and after chest tube removal. These effects could be provided safely without having cardiac or respiratory depression in post-cardiac surgery intensive care patients.

P-08

Estimation of renal function after cardiac surgery is important postoperatively

Yuriy Morozov, Marina Charnaya, Vera Gladysheva
Petrovsky National Research Center of Surgery RAMS, Moscow, Russia

Introduction: The aim was to study the interrelation between glomerular filtrated rate and microalbuminuria in cardio-surgical patients.

Method. 209 cardio-surgical patients undergoing cardiopulmonary bypass (CPB) were selected. Blood and urine levels of urea, creatinine, sodium and potassium were measured. Glomerular filtrated rate (GFR, ml/min) by the Cockroft-Gault method, transtubular potassium gradient (TTPG, %), fractional excretions of urea (FEUr, %) and sodium (FENa, %) were calculated. In addition urine microalbuminuria (MAU, mg/min) was investigated before operation and in the early postoperative period. Renal dysfunction (RD) was considered as a decreased GFR by 33% or more of the preoperative value.

Results: Patients were divided into 4 groups according to pre-operative GFR: group 1 (n=30), GFR less than 60 ml/min; group 2 (n=38), GFR 60-80 ml/min; group 3 (n=87), GFR 80-120 ml/min; group 4 (n=54), GFR over 120 ml/min. There was a trend towards a lower age from group 1 to group 4. In groups 1 and 2 parity of male and female were 1.5-1.7:1, and in groups 3 and 4, 6.9-4.4:1. Initial hyperfiltration was associated with tubulo-pathological signs of increased TTPG, decreased FEUr, FENa. Initial hypofiltration showed a decrease in renal water secretory function. On Day 1 postoperatively most patients with RD were in group 1 (50%), and the least in group 2 (3.4%). In groups 2 and 4 RD was 21.1% and 22.2% respectively. In all groups, the number of patients with RD remained the same for the first 3 postoperative days. After coronary arteries bypass grafting, regression equations for decrease were GFR= −31.4±171.2,

r^2=0.9555 and MAU=3.07±Q20.3, r^2=08583. For patients having valve replacement the regression equations were GFR= −28.21±159.0, r^2=0.9775 and MAU= 4.72±36.0, r^2=0.983. After surgical aortic aneurysm repair the equations were GFR= −33.08±175.35, r^2=0.9546 and MAU= 10.567±3 – 74.2x^2+151.63±40.8, r^2=0.956.
Conclusion: Women older than 55 years had a marked and progressing decrease in renal function. Initial hyperfiltration was associated with tubular dysfunction, and hypofiltration with a decrease in renal water secretion. Increased MAU of 1 mg/min in the early postoperative period may indicate a decreased GFR of 4.5 ml/min after coronary artery bypass grafting, 3.8 ml/min after valves replacement and 5.4 ml/min aortic aneurysm repair. MAU can be used to estimate renal function in cardiac surgical patients.

P-09

Perioperative analgesia in adult cardiac surgery: ACTA-UK survey

Madhu Shankar Balasubramaniam, Zafarullah Mohmed, MSRG Ganugapenta
Hull Royal Infirmary, Hull, UK

Introduction: Multimodal pain management therapy is recommended for acute postoperative pain [1]. Enhanced recovery does suggest using multiple drugs (at least two) and different routes. Many analgesics such as ketamine, clonidine and gabapentinoids are used to reduce the dose of opioids used [1]. In view of these developments we undertook this survey among ACTA members.
Method: This electronic survey was undertaken via a Survey Monkey web link. There were seven key questions asked: the primary intraoperative analgesic, primary postoperative analgesic used, grade of the anaesthetist, analgesic premedication, pain evaluation methods and the use of "Fast Tracking."
Results: The response rate was 30.3% (92.6% consultants, 5.4% advanced trainees and 2% middle grades). The most often used intraoperative analgesic was fentanyl (bolus 80%), followed by morphine (30%). 20% used morphine as a bolus and 10% as an infusion. 18.8% used remifentanil. Alfentanil was used by 7.4% (bolus 4% and 3.4% infusion). 7.4% used i.v. paracetamol. Only 6.1% used a regional technique (i.e. spinal or epidural).
Morphine and paracetamol were the two most common analgesic used in the postoperative period. NSAID (46.5%) and tramadol (35.7%) were the predominant rescue analgesics.
Discussion: 33 to 75% complained of moderate to severe pain following cardiac surgery. The incidence of chronic pain after coronary surgery was 30 to 50%. This survey confirms the use of traditional opioid based intraoperative analgesia with only paracetamol added postoperatively. In spite of the opioid dose-sparing effects of other analgesics, the analgesic platform in cardiac surgery has not changed.

P-10

Postoperative risk factors associated with the conversion of colonization to infection

Daniel Lex[1], Tamás Breuer[2], Zsuzsanna Cserép[1], Roland Tóth[2], Erzsébet Sápi[2], László Ablonczy[2], Andrea Székely[1]
[1]Semmelweis University, Budapest, Hungary, [2]Gottsegen György Hungarian Institute of Cardiology, Budapest, Hungary

Introduction: The objective of this study was to identify postoperative risk factors associated with the conversion of colonization (C) to postoperative infection (I) in paediatric patients undergoing cardiac surgery.
Method: After Ethic Committee approval, patient demographics, co-morbidities, details of

surgery, transfusion requirements, inotropic infusions, laboratory parameters and positive microbial results were recorded during hospital stay and divided into three groups, those with or without the clinical signs of infection and colonization, and those having only positive cultures, but lacking infection in the postoperative period. Using propensity scores, 147 patients with infection were matched to 147 patients having positive microbial cultures without signs of infection. Our database consists of 1665 consecutive paediatric patients who underwent cardiac surgery between January 2004 and December 2008 at a single centre, 179 of whom had infection and 253 had bacterial or fungal colonization. The association between the group of patients with infection and the group with colonization was analysed after propensity score matching of perioperative variables. Data are presented as mean (standard deviation) or number (%) as appropriate.

Results: One hundred and seventy nine patients (9.3 %) had infection and 253 patients (15.2 %) had colonization. The occurrence of Gram-negative species were significantly higher in the infection group compared to the control (I: 38 (25.5%) vs. C: 22 (15%) P=0.03). The C-reactive protein levels on the first and second postoperative days were significantly higher in the infection group (I: 47 (27) vs. C: 36 (26) P=0.02 and 83 (45) vs. 70 (37) P=0.05, respectively). The sum of all positive cultures obtained in the postoperative period were higher in the infection group, compared to the colonization group (P=0.02). The length of intensive care unit stay (I:10.1 (7.6) vs. C:7.9 (6.2) P<0.001) was significantly longer in the infection group compared to the control group.

Conclusions: Our results show significant differences regarding the type of pathogens, laboratory results and overall morbidity in the postoperative period between the clinically infected and those with only colonization.

P-11

Therapeutic hypothermia after cardiac arrest: Can we make it work?

Christopher Harding, Noel Watson, Anirudda Pai
Essex Cardiothoracic Centre, Basildon, UK

Introduction: Current evidence on safety and efficacy of therapeutic hypothermia is adequate to support the use of therapeutic hypothermia in post cardiac arrest patients [1]. We have a nurse-led protocol in place for cooling patients following VF/VT arrest. Patients are cooled with a standard cooling machine within 12 h to a temperature of 32-34ºC for 24 h, followed by controlled rewarming over 8 h. The aim of this audit was to identify eligible patients, assess the compliance of our current protocol and modify our practice.

Method: This is a retrospective audit over a period of 18 months (June 2010–Dec 2011). The data collected includes 1) time of cardiac arrest and the rhythm treated, 2) cardiology intervention, 3) time to commencing cooling 4) time from initiating cooling to time target temperature was achieved, 5) complications and length of stay in critical care, 6) neurological outcome.

Results: Of 37 patients who received therapeutic hypothermia, 28 (76%) were male with a mean age of 62 yr and 9 (24%) were female with a mean age of 67 yr. Initial rhythm at the time of cardiac arrest was shockable (VF/VT) in 34 (92%) cases and the mean time duration to initiate cooling was 4 h and 24 min; 3 (8%) breached the protocol by delayed initiation of cooling. Interventional cardiology procedures were performed in 34 (92%) cases. One patient suffered uncontrolled hypothermia; 3 patients needed inotropic support and 4 patients needed to be re-cardioverted for VF/VT. Four patients were diagnosed to have hypoxic brain injury. Mean length of stay in critical care was 6 days with a 59% (22/37) survival to critical

care discharge. Sixteen (43%) patients were discharged with GCS scale 15/15.

Discussion: Our survival rate is comparable to internationally published data; neurological outcome appears to be satisfactory. Even though the average time to initiate cooling was less than 6 h, there were 3 patients who breached the protocol; coincidentally all of them died. A delay in patients reaching critical care has been attributed to time spent in optimizing haemodynamic status and revascularization. We now encourage cooling of the patient on arrival to our centre. We expect to further strengthen our protocol by the following: implementing aggressive cooling approaches to avoid delay in achieving the target temperature and better education of staff involved, including accuracy of documentation. Discussions with regional ambulance authorities for initiating cooling at the time of cardiac arrest are also being considered.

References:

1. Seupaul RA, Wilbur LG. Evidence-based emergency medicine. Does therapeutic hypothermia benefit survivors of cardiac arrest? Ann Emerg Med 2011; 58 (3): 282-3

Poster session II – Congenital & CUCH

P-12

Status of major haemodynamic parameters according to transpulmonary thermodilution in infants after correction of congenital heart disease accompanied by pulmonary hypervolaemia

Aleksandra Perevozchikova, Oleg Strunin, Aleksander Karaskov, Yurii Gorbatih, Stanislav Prohorov, Lubov Kniazkova
Academician E.N Meshalkin Novosibirsk State Research Institute of Circulation Pathology, Novosibirsk, Russia

Introduction: The prevention of large haemodynamic changes rather than treatment of complications, becomes very important in infants after cardiac surgery today. The rapid progress of safe circulation monitoring technology (transpulmonary thermodilution method combined with pulse contour analysis), is a new approach to postoperative haemodynamic management.

Method: After local ethic committee approval, 26 infants (aged 2-12 month), with congenital heart disease accompanied by pulmonary hypertension, undergoing cardiac surgery with cardiopulmonary bypass were involved in the study. Inotropi support: epinephrine 0.01-0.05 μg kg^{-1} min^{-1} and milrinone 0.3 μg kg^{-1} min^{-1}. The myocardial function and pre- and afterload parameters were assessed by transpulmonary thermodilution (PICCOplus by PULSION). The stages of the study: 1) just after modified ultrafiltration procedure; 2) 12 h after surgery; 3) 24 h after surgery; 4) 48 h after surgery.

Results: The most critical point was a period from the 12th-24th h, when a decline in cardiac function was observed. SVI (stroke volume index) significantly decreased to 12th h by 36% to 24.1 ± 8.9 ml/m^2 (P=0.006) and was minimal for all the time of the study. CFI (cardiac function index) and GEF (global ejection fraction) showed similar dynamics. At the same time, an indicator of contractility such as the maximal rate of ventricular pressure rise (dPmax), remained at 711.5±242.6 mmHg/sec at 12 h, which even exceeded, albeit with low degree of certainty, the previous stage. The decrease of cardiac index with an increased lactate, BNP and pro-BNP-levels, in spite of the good performance of contractility, dPmax, was explaining by high systemic vascular resistance index (SVRI) 2175.5±796 dyn sec cm^{-5} m^{-2})

and relative hypovolaemia. The highest predictive value for mechanical ventilation time was a sum of (dPmax), CFI and extravascular lung water (EVLW), registered also at the most critical period (12 h point). SVRI had an independent prognostic value r_s +0.61 ($P<0.05$) for prolonged ventilation time.

Discussion: In infants after cardiac surgery, haemodynamic management should be based on a comprehensive analysis of preload and afterload, cardiac output and the accumulation of EVLW with a dynamic control of the effectiveness of the therapy. Experience of application of this technology in paediatrics is still limited. Normal values for infants have not been formed yet [1].

References:

1. Fakler U, Pauli Ch, Balling G, Lorenz HP, Eicken A, Hennig M, Hess J. Cardiac index monitoring by pulse contour analysis and thermodilution after pediatric cardiac surgery. J Thorac Cardiovasc Surg 2007; 133 (1): 224-8

P-13

Risk assessment for cardiac surgery in adult congenital heart disease

Satoshi Kurokawa, Kenji Doi, Yuko Tomita, Yusuke Seino, Minoru Nomura
Tokyo Women's Medical University, Department of Anesthesiology, Tokyo, Japan

Introduction: In adult congenital heart disease (ACHD), patients with single ventricle (SV), tetralogy of Fallot (TOF) or systemic right ventricle (RV) were likely to suffer from congestive heart failure (CHF). These pathophysiologies and a history of coronary transplantation were known to have a high probability of silent myocardial ischaemia. Pulmonary hypertension, cyanosis, New York Heart Association (NYHA) class 3 or 4 were considered as risk factors for poor outcome after cardiac surgery. The aim of this study was to investigate whether brain natriuretic peptide (BNP) measurement, myocardial perfusion imaging (MPI), or exercise tolerance test (ETT) were useful for risk assessment for cardiac surgery in ACHD.

Method: Seventy-six ACHD patients who underwent cardiac surgery from January 2009 to July 2011 at our hospital were enrolled in this study. The patients were classified into three groups, mild, moderate or severe, based on complexity of the CHD defined by the American College of Cardiology. Medical charts were retrospectively reviewed. BNP was measured in 69, ETT was undertaken in 16, and myocardial perfusion was evaluated in 14. Data are expressed as mean ± SD. Difference among groups was analysed using one-way ANOVA. $P<0.05$ was considered statistically significant.

Results: Whereas BNP was significantly higher in the moderate group, the patients who died or had major complication did not have a high BNP compared with the remaining patients. Myocardial damage was detected in 6 in the severe group. All of them had either a systemic RV, SV, TOF, or a history of coronary transplantation. ETT revealed the discrepancy between severity of exercise intolerance and NYHA class. Even in 9 patients with moderate-severe exercise intolerance, who had actually a high prevalence of mortality or major complication (27.2%), NYHA class was 1 or 2.

Conclusion: BNP and NYHA class did not seem to be reliable in risk assessment for cardiac surgery. An ETT should be used for patients at high risk of CHF or have risk factors for poor outcome. MPI should be performed in patients with high risk of myocardial ischaemia.

P-14

Clinical features of cardiac surgery in adult congenital heart disease

Satoshi Kurokawa, Yuko Tomita, Kenji Doi, Yusuke Seino, Minoru Nomura
Tokyo Women's Medical University, Department of Anesthesiology, Tokyo, Japan

Introduction: The adult congenital heart disease (ACHD) population in Japan has explosively increased over the last 4 decades and now numbers more than 400,000. The aim of this study is to document clinical feature of cardiac surgery in ACHD.
Method: Seventy-six CHD patients, 15 years of age or older, who underwent cardiac surgery under cardiopulmonary bypass from January 2009 to July 2011 at our hospital were enrolled in this study. The patients were classified into three groups, mild, moderate or severe, based on complexity of the CHD by the definition established by a Task Force in the American College of Cardiology. Medical charts, operation records, and anaesthetic records were retrospectively reviewed. Difference among groups was analysed using a one-way ANOVA. $P<0.05$ was considered statistically significant.
Results: Age distribution at surgery peaked in the patients' twenties (32.9%). 42% were reoperations and 28.9% had severe complexity. Operations for L-R shunt made up about half of cases (51%), followed by valve operations (20%) and operations for RVOT lesions (9%). Clinical features of the ACHD patients were very similar to those reported in other studies from the developed countries, except for a high proportion of Fontan revision in our series (13%). Bleeding was significantly greater in the severe group (965±1026 ml). CPB time (246±260 min), aortic clamp time (129±41 min), operation time (653±250 min), length of ICU stay (9.1±5.8 days), and hospitalization (42.7±18.7 days) were significantly longer in the severe group. Whereas the overall 30-days mortality of 2.7% and the overall morbidity of 35.1% were comparable with those in the above mentioned reports, mortality of 13.6% and the major complication rate of 31.8% were remarkably high in the severe group.
Conclusion: A retrospective review of 76 ACHD patients revealed that cardiac surgery in ACHD could be safely performed. In ACHD with severe complexity, however, the risks at bleeding, mortality, and morbidity were markedly increased, and the length of ICU stay and hospitalization were obviously prolonged.

P-15

Chylothorax in children after congenital heart surgery

Bodine Belderbos, Roos Kok, Johnny Millar
Royal Childrens Hospital, Melbourne, Australia

Introduction: A gold standard for the treatment of postoperative chylothorax has not been developed yet. A retrospective study of our experience from 2005-2011 was carried out. This is a preliminary report of our first 61 cases.
Method: The case records of 61 patients with a median age of 7 months (range 1-27 months) diagnosed to have postoperative chylothorax, were studied. Severity of disease, therapeutic approaches and outcome were noted.
Results: Among the 49 survivors the mean duration and mean daily chyle production was 15 days (range 9-23 days) and 9.4 ml kg^{-1} day^{-1}. Twelve patients died after a mean duration of 34 days, their mean chyle production was 30.9 ml kg^{-1} day^{-1} (range 20.5-75.5). In 6 patients the major cause of death could not be attributed to existence of the chylothorax. Sepsis developed in 10 patients (17%) and thrombosis in 7 (12%).
The initial general approach was a modification of feeding (low fat diet, medium chain triglyceride diet or total parenteral nutrition). This approach was successful in 72% of the

patients. Three patients resolved their chylothorax before modification of diet was started. In six patients octreotide therapy was initiated after failure of diet modification, which was successful in four. Three patients died after surgery was performed at the end of the spectrum of therapies.

Conclusion: Initial modification of feeding was successful in 72% of the patients with postoperative chylothorax. Octreotide may be a useful adjunctive therapy. A high volume of chyle production is associated with increased mortality.

Poster session III – Thoracic & non-cardiac

P-16

Tissue perfusion biomarkers and liberalized fluid management: A prospective trial in lung resection surgery

Sherif Assaad, Melissa Perkal, Tassos Kyriakides, George Tellides, Anthony Kim, Michael Ditillo, Albert Perrino
VA CT Healthcare Systems, West Haven, CT, USA

Introduction: Perioperative fluid management for lung resection surgery is a challenging task. Excess positive fluid balance has been associated with postoperative pulmonary oedema [1] while restrictive fluid management may result in impaired tissue perfusion and acute kidney injury (AKI). Recently, protective lung ventilation has been found to decrease the incidence of pulmonary oedema after lung resection surgery [2]. We hypothesize that by employing protective lung ventilation, the use of a liberalized fluid protocol targeting normovolaemia would avoid tissue hypoperfusion and AKI.

Method: After our institutional review board approval, patients (pts) scheduled for lung resection surgery were asked to enroll in a prospective observational trial, excluding those for planned pneumonectomy, ejection fraction <40% or serum creatinine >2 mg/dL. Biochemical markers of tissue perfusion (serum creatinine, lactic acid, brain natriuretic peptide (BNP) and central venous oxygen saturation) were measured through postoperative day (POD) 3. A protective lung ventilation protocol was implemented. Intraoperative fluids consisted of balanced salt crystalloid solution for maintenance (1.5 ml kg^{-1} h^{-1}), deficit replacement and replacement of the insensible loss (1 ml kg^{-1} h^{-1}). Blood loss was replaced 1:1 with colloid solution or packed red blood cells. The protocol was continued postoperatively until the pts began oral intake. AKIN criteria defined AKI. Data is presented as median (interquartile range) with non-parametric analysis to compare variables.

Results: Fourteen pts consented but 3 surgeries were cancelled. The 11 remaining pts were males (65 ± 6.0 yr.). 8 had a lobectomy, 2 a wedge resection and 1 an unplanned pneumonectomy. One-lung ventilation time was 233 ± 110 min. Intraoperative fluids averages were crystalloid 2200 ± 593 ml and colloid 472 ± 403 ml. On PODs 1-3, pts received 1260 ± 796 ml/day of crystalloids in addition to oral intake. Central venous oxygen saturation (SvO_2) and lactic acid were within the normal range postoperatively. BNP increase (NS) while, serum creatinine ($P<0.05$) decreased compared to baseline and no pts met AKIN criteria as shown in the Table.

Conclusion: These preliminary data did not detect AKI or tissue hypoperfusion post lung resection surgery in patients administered a liberalized fluid protocol in conjunction with protective lung ventilation anaesthesia. No patients show clinical or radiological signs of

	Pre-op	Day 0	POD 1	POD 2	POD 3	P
Creatinine (mg/dl)	0.9 (0.3)	0.9 (0.3)	0.8 (0.2)	0.8 (0.6)	0.7 (0.5)	
Lactate (mg/dl)		0.9 (1.1)	1.1 (1.2)	1.0 (0.5)	0.65 (0.2)	
SvO_2 (%)		76 (15)	72 (11)	72 (14)	71 (6)	
BNP	112 (183)				182 (109)	NS

*Comparison between median (Day of surgery + POD 1-3) to baseline serum creatinine

acute lung injury. These findings suggest future randomized controlled trials to assess liberal versus restrictive fluid management's impact on tissue perfusion in lung resection surgery.

References:

1. Parquin F, Marchal M, Mehiri S, Hervé P, Lescot B. Post-pneumonectomy pulmonary edema: analysis and risk factors. Eur J Cardiothorac Surg 1996; 10 (11): 929-33
2. Licker M, Diaper J, Villeger Y et al. Impact of intraoperative lung-protective interventions in patients undergoing lung cancer surgery. Crit Care 2009; 13 (2): R41

P-17

Anaesthesia for transcatheter aortic valve implantation: The way of approach seems more important than the type of valve

N. Patrick Mayr, Klaus Martin, Peter Tassani
Deutsches Herzzentrum München, Technische Universität München, Munich, Germany

Introduction: Currently two different transcatheter aortic valves are primarily used in Europe, the *CoreValve* (Medtronic) and the Sapien respectively. The development of the *Sapien XT* (also Edwards) is CE certified. With growing experience in these procedures over the years we wanted to evaluate whether there is a difference in anaesthesia for patients receiving a *CoreValve* or a *Sapien* transcatheter valve.

Method: We analysed the anaesthesia protocols of all patients undergoing a TAVI procedure since the beginning of our TAVI programme.

Results: Between July 2007 and October 2011 (48 months) 663 TAVI procedures were performed in our university hospital. Mostly the *CoreValve* transcatheter valve was inserted n=415 (63%). Primarily a transfemoral approach (n=355, 86%) was chosen. In 46 patients (11%) a subclavian approach was used. For the *Sapien* and *Sapien XT* transcatheter valves (233 valves, Sapien n=162, *Sapien XT* n=71) the transapical approach was primarily chosen (n=192, 82%). Over the time when a smaller introducer system became available, more *Sapien XT* valves were inserted the transfemoral way (40%, 40/71 XT valves). Although sedation was chosen for some patients, the majority received general anaesthesia. Especially in patients with a transapical approach intubation is mandatory. A double lumen intubation was only used in the early period. 60% (n=249) of the *CoreValve* patients were classified as ASA ≥ 4, while "only" 49% (n=145) of the *Sapien* patients were classified in this category. Inotropic support by epinephrine was needed in 8.6% (n=36) of the *CorValve* and in 19.7% (n=46) of the *Sapien* patients. Vasopressor therapy with norepinephrine was needed in 68% (n=282) of the *CoreValve* and 85% (n=199) of the Sapien patients. A blood transfusion was needed in 31% (n=128) of the *CoreValve* patients. On the contrary every second *Sapien* and *Sapien XT* patient was in need of a blood transfusion (n=118, 50%).

Conclusion: Patients undergoing a TAVI procedure are "high-risk". In a high proportion of patients classified as ASA 4 and above, numerous blood transfusions, and a need for inotropic or vasopressor therapy are only some of the characteristics for these patients. Cardiac anaesthesiologists are responsible for

these patients and should be a member of the TAVI team.

P-18

Anaesthesiological view of surgery for patients with lung echinococcosis with multiorgan infection

Yergali Miyerbekov, Mukhtar Batyrkhanov, Vladimir Mutagirov
National Scientific Centre of Surgery, Almaty, Kazakhstan

Background: 25% of echinococcosis in Kazakhstan involves both lungs or lungs and liver. There are two surgical strategies in these pts: routine multi-stage and modern one-stage surgery. The aim of study was to compare two surgical strategies in patients with lungs echiniococcosis with multiorgan infection from the anaesthetist's point of view.

Method: We prospectively studied 82 cases in pts with multiorgan echinococcosis (lung+liver, both lungs, both lungs+liver) undergoing surgical treatment in 2000-2007. We made a comparative analysis of the frequency of perioperative complications between multi-stage (group 1, n=39) and one-stage (group 2, n=43) surgery. All patients were operated under general anaesthesia and lung ventilation using a low tidal volume.

Results: There was no mortality in either group and no postoperative morbidity in group 2. In group 1 there were 5 cases of rupture of the residual hydatid in the non-operated lung, due to coughing in the postoperative period. Suppuration of the residual hydatid has occurred in 5 pts. In pts of group 2 ICU stay was decreased by 56.2% in comparison with pts of group 1. Total blood loss during surgery was decreased 2.5 times in group 2. Summarized results of the study are presented in the table.

Discussion: Despite the fact that one-stage surgery is a longer and more traumatic procedure, short-term outcome seems to be better in comparison with multi-stage surgery.

P-19

Safety and patient comfort for endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) sedation

Laura Paula Sarmiento, Maria José Arguis, Maria José Jiménez, Irene Rovira, Purificación Matute, Carmen Lucena, Guillermina Fita, Carlos Agustí
Hospital Clínic, Barcelona, Spain

Introduction: Endoscopic ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) provides a real-time ultrasound-guid-

Table. Complications and duration of intensive care in patients underwent combined echinococcosis surgery

Data	Group 1	Group 2
Airway infection	51.3%	16.3%*
Total blood loss (ml)	1134.3±76.2	342.6±26.1*
Total ICU stay (h)	64.8±10.1	28.4±10.1*
Total mechanical ventilation (h)	7.5±2.6	3.1±1.1*
Residual hydatid rupture	12.8%	0*
Residual hydatid suppuration	12.8%	0*

*P<0.05 between groups

ed sampling of lymph nodes adjacent to the trachea that are commonly involved in lung cancer [1]. Its diagnostic yield is at least as good as mediastinoscopy. Several issues must be considered when performing EBUS-TBNA such as sharing the airway with the bronchoscopist and the bigger size of the ultrasonic bronchoscope. Therefore, different anaesthesia techniques have been used for this procedure [2]. The aim of this study was to assess whether EBUS–TBNA performed under moderate sedation with propofol and remifentanil while maintaining spontaneous breathing is safe and comfortable for the patient and for the bronchoscopist.

Method: We performed EBUS-TBNA in 98 patients, ASA II-IV, aged 64 yr (SD±12.9). Patients were in a semi-recumbent position. Electrocardiogram, non-invasive blood pressure, pulse oximetry and respiratory rate were monitored. While breathing O_2 through a mouthpiece, patients were sedated with a continuous infusion of propofol and remifentanil. Lidocaine was instilled through the bronchoscope into the glottis and the tracheobronchial tree. We recorded respiratory and haemodynamic tolerance, level of sedation assessed by the Ramsay scale and patient and bronchoscopist satisfaction recorded by a 5 points scale performed at the end of the procedure. After an observational period patients were discharged.

Results: EBUS-TBNA was successfully performed in all patients, 10 during admission and 88 as outpatients. The duration of the procedure was 95 min (SD±29.5). Ramsay score was between 3 and 5. Six patients coughed, most of them during the introduction of the echo-bronchoscope. 90.2% of patients had no complications. The remaining 9.8% presented minor complications: SpO_2<90% in 4% of patients, one of whom required manual ventilation, hypertension in 3 patients and tachycardia in 2. Two patients presented transient bacteraemia and were admitted, and 1 patient had mild bronchospasm. In the scale, patients' satisfaction was 4.89 (SD±0.3) and 4.7 (SD±0.4) for the bronchoscopist' Outpatients were discharged 149 min (SD±35) after the end of the technique without any later complication.

Conclusions: EBUS-TBNA can be safely performed under moderate sedation plus topical anaesthesia, allowing spontaneous breathing, and permits a more cost-effective diagnosis. It is associated with high patient and physician satisfaction.

References:

1. Khoo KL, Ho KY. Endoscopic mediastinal staging of lung cancer. Respir Med 2011; 105 (4): 515-8
2. Sarkiss M, Kennedy M, Riedel B, Norman P, Morice R, Jimenez C, Eapen G. Anesthesia technique for endobronchial ultrasound-guided fine needle aspiration of mediastinal lymph node. J Cardiothorac Vasc Anesth 2007; 21 (6): 892-6

P-20

Impact of sevoflurane vs. propofol on patients' satisfaction after non-cardiac surgery: A randomized controlled trial

Giovanna A.L. Lurati Buse[1], Esther Seeberger[1], Jorge Kasper[1], Regina M. Schumann[1], Miodrag Filipovic[2], Daniel Bolliger[1], Manfred D. Seeberger[1]

[1]University Hospital Basel, Basel, Switzerland, [2]Kantonspital St. Gallen, St. Gallen, Switzerland

Introduction: The aim was to evaluate the effect of sevoflurane compared to propofol on patients' satisfaction after major non-cardiac surgery.

Method: This is a secondary analysis of a multicentre randomized controlled trial of sevoflurane vs. propofol to reduce perioperative ischaemia in patients at cardiovascular risk. Patients' satisfaction was a prespecified tertiary endpoint and was collected systematically by visual analogue scale in 2 study centres. The scale ranges from 0 to 10 with low values indicating low satisfaction. Patients were induced by etomidate and maintained

by sevoflurane or propofol as randomized. Research staff visited the patients on postoperative days 1, 2, and day 7 or discharge day whichever occurred first, and assessed satisfaction. We tested for differences in the VAS distribution across treatment groups by Mann-Whitney U test. We tested for dichotomous variables by chi-squared or Fisher's exact test, as appropriate. The big majority (97%) of the patients was enrolled in one of the centres; therefore, we did not stratify the satisfaction analysis by centre.

Results: We analysed 284 patients, thereof 57.7% underwent major vascular surgery. Four patients dropped out (2 patients in the sevoflurane group) leaving 137 patients in the sevoflurane and 143 patients in the propofol groups. VAS data were missing in 2% of the patients on day 1, 1% on day 2, and 15% on day 7. Four percent (11/280), 5% (14/280) and 3% (9/280) of the patients were not able to quantify their satisfaction by VAS on postoperative days 1, 2 and 7, respectively. These proportions did not differ across treatments. The median VAS was 7 (interquartile range [IQR] 5-8) on days 1 and 2 in both the sevoflurane and the propofol group. On day 7 the median VAS was 8 (IQR 6-9) in the sevoflurane and 7 (IQR 5-9) in the propofol group. The VAS distribution did not differ across the two groups at any time-point (P= 0.173 on day 1, P=0.734 on day 2, P=0.122 on day 7).

Conclusion: The choice of sevoflurane or propofol did not affect the patients' satisfaction after major noncardiac surgery.

P-21

Impact of sevoflurane vs. propofol on side-effects after noncardiac surgery: A randomized controlled trial

Giovanna A.L. Lurati Buse[1], Esther Seeberger[1], Philip Schumacher[3], Regina M. Schumann[1], Miodrag Filipovic[2], Daniel Bolliger[1], Manfred D. Seeberger[1]

[1]University Hospital Basel, Basel, Switzerland, [2]Kantonsspital St. Gallen, St. Gallen, Switzerland, [3]Bürgerspital Solothurn, Solothurn, Switzerland

Introduction: The aim was to evaluate the effect of sevoflurane compared to propofol on the incidence of postoperative nausea and vomiting (PONV), headache, and vertigo after major non-cardiac surgery.

Method: This is a secondary analysis of a randomized, controlled, multi-centre trial of sevoflurane vs. propofol to reduce myocardial ischaemia. PONV, headache and vertigo were pre-specified, systematically collected tertiary endpoints. PONV was defined as nausea or vomiting or postoperative use of antiemetics. Patients were induced with etomidate and maintained with sevoflurane or propofol as allocated. Side effects were assessed by visits on postoperative days 1, 2 and 7 or discharge day whichever occurred first. We tested for differences across treatment groups by chi-squared or Fisher's exact test as appropriate.

Results: We enrolled 385 patients. Five patients dropped out (3 patients in the sevoflurane group), leaving 181 patients in the sevoflurane and 199 patients in the propofol groups. Side-effect data were missing in 1% on days 1 and 2, and in 11% on day 7. Sex (P=0.547), smoking (P=0.561), surgery duration (P=0.489), and choice of opioids (fentanyl P=0.508, alfentanil P=0.950, sufentanil P=0.596, remifentanil P=0.507, methadon P=0.573) did not differ between groups. None of the patients underwent procedures typically associated with PONV [1].The table

		Sevoflurane	Propofol	P
PONV	day 1	29 (16%)	18 (9%)	0.042
	day 2	17 (9%)	15 (8%)	0.544
	day 7	6 (4%)	6 (4%)	0.983
Headache	day 1	7 (4%)	4 (2%)	0.288
	day 2	5 (3%)	7 (4%)	0.655
	day 7	4 (2%)	4 (2%)	1.00
Vertigo	day 1	7 (4%)	4 (2%)	0.288
	day 2	6 (3%)	6 (3%)	0.888
	day 7	3 (2%)	7 (4%)	0.336

reports the results (percentages refer to patients with available data).

Conclusion: Compared to propofol, anaesthesia maintenance with sevoflurane was associated with increased PONV on postoperative day 1 but without persistence thereafter. In contrast, the type of anaesthesia did not affect the incidences of headache or vertigo.

Reference:

1. Apfel C, Kranke P, Katz MH, Goepfert C, Papenfuss T, Rauch S, Heineck R, Greim CA, Roewer N. Volatile anaesthetics may be the main cause of early but not delayed postoperative vomiting: a randomized controlled trial of factorial design. Br J Anaesth 2002; 88 (5): 659-68

P-(O-68)

The effect of a pre-emptive alveolar recruitment strategy on arterial oxygenation during one lung ventilation with different tidal volumes

Sang Hun Kim[1], Keum Young So[1], Hyun Young Lee[1], Ki Tae Jung[2]
[1]Chosun University Medical School, Gwangju, Republic of Korea, [2]Chosun University Hospital, Gwangju, Republic of Korea

Introduction: Arterial hypoxaemia is one of the main problems during one lung ventilation (OLV). We compared the effects of a pre-emptive alveolar recruitment strategy (ARS) on arterial oxygenation and pulmonary mechanics during OLV with a low tidal volume (LTV) and positive end-expiratory pressure (PEEP) or a high tidal volume (HTV).

Method: Eighty patients were randomly assigned to 4 groups; Group 1 received a HTV (10 ml/kg) (n = 20), Group 2 received a HTV (10 ml/kg) with pre-emptive ARS, Group 3 received a LTV (6 ml/kg) with 8 cmH_2O PEEP (n = 20) and Group 4 received a LTV (6 ml/kg) with 8 cmH2O PEEP with pre-emptive ARS (n = 20). ARS was performed by using 10 manual breaths with a peak inspiratory pressure of 40 cmH_2O followed by 15 cmH_2O PEEP until OLV started. The patient's haemodynamics, pulmonary mechanics and arterial blood gases were measured before ARS (T0) and 5 (T1), 15 (T2), 30 (T3) and 45 min (T4) after OLV. Kruskal-Wallis test was used for statistical analysis and if a significant difference was found, Mann-Whitney test for post-hoc test was used.

Results: The PaO_2 was significantly reduced during OLV and PaO_2 of group 3 was significantly lower than that of group 1, 2 and 4 (31.6 ± 5.9 vs. 42.3 ± 5.6 vs. 43.1 ± 5.0 vs. 36.4 ± 3.2 kPa after 5 min of OLV and 32.2 ± 4.6 vs. 38.7 ± 5.2 vs. 48.1 ± 2.8 vs. 41.7 ± 3.2 kPa after 45 min of OLV, $P<0.05$). Especially, the PaO_2 of group 2 was significantly highest among them ($P<0.05$). In pre-emptive ARS groups, the PaO_2 of group 2 were significantly higher than that of group 4 ($P<0.05$).

Conclusion: Application of HTV maintains a more improved arterial PaO_2 than LTV with PEEP during the entire period of OLV, and pre-emptive ARS provides the most effective improvement of arterial oxygenation during the OLV with a high tidal volume.

Poster session IV – Patient blood management

P-22

Is the EuroSCORE as accurate as the Transfusion Risk and Clinical Knowledge score (TRACK score) to predict red cells transfusions in cardiac surgery?

Anne-Sophie Dincq, Dana Bosinceanu, Edith Collard, Sébastien Voisin, Isabelle Michaux
Centre Hospitalier Universitaire de Mont-Godinne, YVOIR, Belgium

Introduction: The Transfusion Risk and Clinical Knowledge score (TRACK score, a simple risk model based on five predictors (age, weight, gender, complex surgery and haematocrit) [1] allows identification of patients at higher risk for receiving transfusions, in order to apply specific strategies to decrease this risk. In our centre, we observed that a EuroSCORE >4 represents a relative risk of 1.91 for red cell (RC) transfusions in the operating room and/or during the first 72 h of intensive care unit (ICU) stay for patients undergoing cardiac surgery. We tested if this widely used mortality score would predict transfusions risk in cardiac surgery as accurately as the TRACK score.

Method: From February 2010 to June 2011, we recorded prospectively all the cardiac surgical patients operated on in our institution. The data were prospectively recorded in the institutional database. We calculated the additive EuroSCORE and TRACK scores for each patient. We constructed Receiver Operating Characteristic (ROC) curves for each test and compared the areas for statistical significance.

Results: Five hundred and seventy-one patients underwent cardiac surgery: 426 isolated coronary artery bypass graft (CABG) or isolated valves, 145 complex surgery (CABG + valve, emergency surgery, double valve surgery, ascending aorta or redo surgery). Area under the ROC curve was the largest for the TRACK score (AUC 0.81, 95% CI: 0.78-0.84 vs. AUC 0.75, 95% CI: 0.71-0.78 for the additive EuroSCORE, P=0.001). Applying the ROC curve to our population, a TRACK score >8 was predictive of RC transfusions with a sensitivity of 73.2% and a specificity of 77.3%. Patients with a TRACK score >8 had a relative risk of 2.35 (95% CI: 1.98-2.79; P<0.0001) for RC transfusions. A EuroSCORE cut-off value >4 provided a sensitivity of 71.5% and specificity of 66.8%; patients with a EuroSCORE >4 had a RR of 1.91 (95% CI: 1.63-2.25; P<0.0001).

Conclusion: The TRACK score is more accurate than the additive EuroSCORE to predict RC transfusions. A TRACK score >8 predicts RC transfusions with an acceptable sensitivity and specificity.

References:

1. Ranucci M, Castelvecchio S, Frigiola A, Scolletta S, Giomarelli P, Biagioli B. Predicting transfusions in cardiac surgery: the easier, the better: the Transfusion Risk and Clinical Knowledge score. Vox Sang 2009; 96 (4): 324-32

P-23

Red cells requirements in EuroSCORE low, medium and high-risk patients in cardiac surgery

Anne-Sophie Dincq, Maximilien Gourdin, Edith Collard, Laurent Verstraeten, Isabelle Michaux
Centre Hospitalier Universitaire de Mont-Godinne, YVOIR, Belgium

Introduction: Transfusion remains a major concern in cardiac surgery due to the risks and costs related to red cell (RC) transfusions. Preoperative detection of patients at high risk of RC transfusions allows application of specific strategies to decrease this risk. We hypothesized that a high EuroSCORE is associated with a high risk of RC transfusions in the operating room and/or during the first 72 h of intensive care unit (ICU) stay.
Method: From February 2010 to June 2011, 571 patients underwent cardiac surgery in our institution. 426 patients underwent isolated coronary artery bypass graft (CABG) or isolated valve surgery, 145 complex surgery (CABG + valve, emergency surgery, double valve surgery, ascending aorta or redo surgery). The data were prospectively recorded in our institutional database. Fifty-seven percent of the patients left the ICU before or at 72 hours. We divided the population according to the additive EuroSCORE [1] (0-2 low risk; 3-5 medium risk; ≥ 6 high risk) and considered RC transfusions in the operating room and/or during the first 72 h of ICU stay. The data were compared using chi-squared test.
Results (table): Applying the Receiver Operating Characteristic (ROC) curve to our population, a EuroSCORE cut-off value >4 provided a sensitivity of 71.5% and a specificity of 66.8%. Patients with a EuroSCORE >4 had a relative risk of 1.91 (95% CI: 1.63-2.25; P<0.0001) for RC transfusions.
Conclusion: In this single centre experience, the rate of RC transfusions was higher in the patients with a high EuroSCORE. Moreover, patients with a EuroSCORE >4 carry a relative risk of 1.91 for RC transfusions.
Reference:

1. Nashef SA, Roques F, Michel P, Gauducheau E, Lemeshow S, Salamon R. European system for cardiac operative risk evaluation (EuroSCORE). Eur J Cardiothorac Surg 1999; 16 (1): 9-13

P-24

Appropriate preoperative haemoglobin for acute normovolaemic haemodilution in on-pump cardiac surgery

Mojtaba Mansouri, Sasan Habibakhyari
Anesthesiology and Critical Care Research Center, Isfahan University of Medical Sciences, Isfahan, Iran

Introduction: Current data suggest that basal haemoglobin (Hb) of 12 mg/dl is suitable for practicing acute normovolaemic haemodilution (ANH) [1]. This level seems to be too low when using cardiopulmonary bypass (CPB) and causes increased complications during CPB. The objective was to study the relationship between Hb level before ANH and the nadir of Hb during CPB for elective coronary artery bypass graft (CABG) surgery.
Method: This prospective, cross-sectional and nonrandomized clinical trial included

EuroSCORE	RC transfusions	No RC transfusions	P value
0-2	33	81	<0.0001
3-5	111	90	
≥ 6	207	49	

603 patients who were candidates for elective CABG surgery. Patients with preoperative Hb greater than 12 mg/dl had undergone ANH. For ANH, after induction of anaesthesia we collected 450 ml blood from a radial arterial catheter into a standard blood bag. The level of Hb before anaesthesia and during CPB was measured and recorded. Data were analysed by Chi-squared, one-way ANOVA, partial correlation, ROC curve, bivariate correlation and one-sample t-test.

Results: In ANH group 356 men and 108 women with mean body weight 74.02±11.58 Kg and mean age 58.2±9.3 year and in no-ANH group 55 men and 62 women with mean body weight 71.02±14.08 Kg and mean age 60.1±9.4 year were evaluated. There was significant correlation between basal Hb and first Hb after going on-pump, nadir Hb during bypass and mean Hb during bypass in both ANH and no-ANH groups ($P<0.001$). The minimum level of suitable basal Hb for practicing ANH during on-pump CABG, was calculated to be 14.55 mg/dl (sn=77%, sp=70% and AUC=0.805) and 12.95 mg/dl (sn=71%, sp=64% and AUC=0.686) for on-pump CABG without ANH.

Discussion: According to previous studies, a basal Hb of 12 mg/dl is suitable for ANH practice. But ANH performance during CPB, based on this concept, leads to Hb dropping lower than 7 mg/dl. Assuming 7 mg/dl Hb as the lowest Hb during on-pump CABG, a minimum level of 13 mg/dl of basal Hb ($65<sn<71$ and $64<sp<68$) was suggested for clinical use. If ANH is not undertaken this means that patients with Hb lower than 12.95 mg/dl usually required blood transfusion during CPB. A minimum level of 14.55 mg/dl of basal Hb ($77<sn<79$ & $65<sn<70$) was suggested for clinical use for practicing ANH during on-pump CABG.

References:

1. Goodnough LT, Monk TG. Autologous Transfusion, Recombinant Factor VIIa and Bloodless Medicine. In: Miller RD ed. Miller's Anesthesia. Philadelphia, Pennsylvania: Elsevier, Churchill, Livingstone. 7th edition, 2009; 3808-34

P-25

Use of tranexamic acid in cardiac surgery: An audit of dosage regimes and postoperative outcomes

Elizabeth Ogilvie, Daniel Quinn, Mario Cibelli, Hanif Meeran
St George's Hospital, London, UK

Introduction: The antifibrinolytic agent tranexamic acid is commonly used in cardiac surgery. In our institution we have a tranexamic acid loading dose and infusion guideline, adjusted for patient weight and renal function. However, practice varies, and recent concern has been raised regarding the incidence of seizures related to high dose tranexamic acid [1]. We audited our use and post operative outcomes.

Method: Data was collected over a six month period in 2011. We included demographic and surgical details, dose regimens, and postoperative seizure incidence, transfusion requirements, blood loss, and time to discharge from intensive care. Regimens were grouped as tranexamic acid (TXA) bolus only (B), bolus plus infusion (BI), infusion only (I) and none (N).

Results: (see table)

Discussion: The use of tranexamic acid remains variable in our institution. No postoperative seizures were reported, despite the doses used being considerably higher than those previously recommended [2]. Our data suggests that using tranexamic acid either as a bolus dose alone or bolus plus infusion has a minimal effect on postoperative blood loss or red cell transfusion requirements, and that use of an infusion alone may be associated with a worse outcome. However, we interpret these results with extreme caution, particularly as group I was small and thus the results were susceptible to outliers.

	n	TXA mean (mg/kg)	Seizures	Blood loss (ml)*	Red cell transfusion*
B	53	33.1	0	680 (460-1110)	0 (0-1)
BI	34	43.3	0	780 (580-1260)	0 (0-1)
I	12	24.1	0	1160 (765-1965)	1 (0-4.5)
N	97	0	0	810 (580-1230)	0 (0-1)

*Median (95% CI)

References:
1. Murkin JM, Falter F, Granton J, Young B, Burt C, Chu M. High-dose tranexamic acid is associated with nonischemic clinical seizures in cardiac surgical patients. Anesth Analg 2010; 110 (2); 350-3
2. Fox MA. Tranexamic Acid: How Much is Enough? Anesth Analg 2010; 111 (2): 580-1

P-26

Desmopressin haemostatic therapy during aortic valve replacement for severe aortic valve stenosis: Effects on blood-loss, use of blood products and postoperative recovery

Eva Hooghiemstra[2], Emma Rademaker[3], Wim Stooker[1], Hans Lauwers[1], Jos Wester[1], Bart Rademaker[1]

[1]Onze Lieve Vrouwe gasthuis, Amsterdam, The Netherlands, [2]Vrije Universiteit, Amsterdam, The Netherlands, [3]Universiteit van Amsterdam, Amsterdam, The Netherlands

Introduction: Patients with severe aortic valve stenosis frequently suffer from a haemostatic disorder partly due to an acquired defect in von Willebrand factor (VWf). Because desmopressin is a pro-haemostatic agent known to increase levels of VWf during aortic valve replacement, its use may be beneficial in the course of surgery. We studied the effects of desmopressin on postoperative blood loss, use of blood products and indices of postoperative recovery; intensive care unit (ICU) stay, hospital stay and in-hospital mortality.

Method: 179 patients who underwent aortic valve replacement for severe aortic valve stenosis were included. Standardized cardiopulmonary bypass (CPB) techniques without active cooling were used for all patients. Anticoagulation consisted of heparin (300 U/kg) and antifibrinolytic therapy was administered to all with tranexamic acid 2 gm before CPB and 2 gm after reversal of anticoagulation with protamine sulphate (1 mg/100 U heparin). Data were analysed using SPSS statistics 18.0, (ANOVA) and presented as mean ± standard deviation or median with 5th and 95th percentiles where appropriate.

Table (see next page).

Conclusions: In this non-randomized, retrospective cohort study significantly less desmopressin patients received packed red cells during their ICU stay. We were not able to delineate a significant reduction in indices of postoperative recovery. The relatively high percentage of patients who received thrombocytes during operation may have obscured possible effects of desmopressin on blood loss and recovery.

Table

	No desmopressin n=138	**Desmopressin n= 39**
Age (yr)	69 ± 9	70 ± 13
Sex (female)	75	14
BMI (kg/m^2)	27.2 ± 4.7	26.7 ± 5
CPB time (min)	87.6 ± 24	87±23
Aorta cross-clamp time (min)	63 ± 20	62±22
Hb before CPB (mmol/l)	7.3 ± 1.0	7.4±0.8
Cellsaver-blood administered (ml)*	231 (0-981)	100 (0-650)
pts receiving packed red cells amount during operation (ml)*	N = 60 (43%) 0 (0-1120)	N = 23 (39%) 0 (0-1120)
pts receiving thrombocytes	47 (34%)	10 (26%)
Blood loss during I.C.U. stay (ml)*	290 (61-1335)	350 (120-1120)
pts receiving packed red cells amount during I.C.U. stay (ml)*	N = 35 (25%) 0 (0-560)	N = 4 (10%)** 0 (0-560)
Hb at entry I.C.U. (mmol/l)	6.1 ± 0.9	6.1+0.7
ICU stay (hours)	21 (14-110)	20 (14-139)
Hospital stay (days)	9 (5-26)	9 (5-27)
In-hospital mortality	3 (2%)	0

Data are numbers (%), mean ± standard deviation; *data are median (5th - 95th percentiles); **P=0.007; [Hb mmol/L x 1.612 = Hb g/dl]

P-27

Fibrinogen concentrate in complex cardiac surgery: A retrospective study

Süleyman Bilecen[1], Linda M. Peelen[3], Cor J. Kalkman[2], Alexander J. Spanjersberg[1], Karel G. M. Moons[3], Arno P. Nierich[1]
[1]Department of Cardiothoracic Anaesthesia and Intensive Care, Isala Clinics., Zwolle, The Netherlands, [2]Division of Anesthesiology, Intensive Care and Emergency Medicine, University Medical Center., Utrecht, The Netherlands, [3]Julius Center for Health Sciences and Primary Care, University Medical Center., Utrecht, The Netherlands

Introduction: Fibrinogen concentrate is increasingly used to treat coagulopathic bleeding in cardiac surgery, although its effectiveness and safety have not been demonstrated. We conducted a cohort study to quantify the effects of fibrinogen concentrate on postoperative blood loss, transfusion of blood products and the occurrence of clinical adverse events in complex cardiac surgery patients.
Method: This study is a retrospective cohort study using prospectively collected data of the years 2007 to 2010. Complex cardiac surgery was defined as coronary artery bypass grafting (CABG) with valve(s) procedures or aortic surgery (root, ascending, arch or descending aorta). The cohort included a non-randomized intervention with fibrinogen concentrate during complex cardiac surgery. Fibrinogen concentrate was given when conventional haemostasis medication was ineffective and a surgical source of bleeding was excluded. The propensity score method was used to adjust for confounders.

Results: Of the 1075 patients, 264 (25%) received fibrinogen concentrate during surgery. In the adjusted analysis, the effect of fibrinogen concentrate on blood loss and transfusion in the ICU showed a ratio of geometric means of 1.02 (0.91-1.14) and an odds ratio of 1.14 (0.83-1.56), respectively. For the risk of 30-day mortality, myocardial infarction, CVA/TIA, renal insufficiency or failure, total infections and prolonged mechanical ventilation the adjusted odds ratios were 0.96 (0.48-1.92), 1.10 (0.53-2.28), 1.16 (0.50-2.71), 0.62 (0.29-1.32), 1.18 (0.72-1.95) and 1.44 (0.83-2.48) respectively.
Conclusions: Fibrinogen concentrate infusion during surgery did not reduce postoperative blood loss and transfusion and no increased risk for clinical adverse events was measured. The relatively lower doses and the relatively late intervention with fibrinogen concentrate might have attenuated the haemostatic effect of fibrinogen concentrate. This study reports the initial clinical use of fibrinogen concentrate in complex cardiac surgery. A randomized clinical trial has been initiated to investigate the haemostatic role of fibrinogen concentrate in cardiac surgery.

P-28

Definition of acetylsalicylic acid resistance using Multiple Electrode Aggregometry in patients following coronary artery bypass grafting influences antiplatelet therapy management

Mate Petricevic[1], Sanja Konosic[2], Bojan Biocina[1], Ivan Burcar[1], Visnja Ivancan[2], Lucija Svetina[1], Stjepan Ivankovic[1], Hrvoje Gasparovic[1]
[1]Department of Cardiac Surgery, University Hospital Center Zagreb, Zagreb, Croatia, [2]Department of Anesthesiology, University Hospital Center Zagreb, Zagreb, Croatia

Introduction: A beneficial effect of acetylsalicylic acid (ASA) on vein graft patency has been described, but some patients experience adverse cardiac events despite appropriate ASA treatment. The study aim was to define ASA resistance using Multiple Electrode Aggregometry (MEA) preoperatively in a group of patients undergoing coronary artery bypass grafting (CABG).
Method: A prospective observational study enrolled 131 patients scheduled for CABG. Patients were consecutively recruited and divided into 4 groups with respect to their preoperative APT management. Patient group allocation was made with respect to antiplatelet therapy management as administered by the referral cardiologist. Group 1 received 100 mg ASA per day, Group 2, 100 mg ASA + 75 mg clopidogrel per day, Group 3, 75 mg clopidogrel per day, and Group 4 did not receive any APT. MEA with ASPI test (sensitive to ASA) and ADP test (sensitive to clopidogrel) were performed prior to surgery and values were compared between groups. In Group 1, patients were characterized as ASA resistant if their ASPI test value exceeded the 75th percentile distribution.
Results: The study enrolled 131 patients. Significant differences both in the ASPI ($P<0.001$) and the ADP test ($P=0.038$) were observed between patients in different APT

groups. In Group (1) ASPI test value of 30 AUC presented 75th percentile of distribution, thus indicating ASA resistance. Group 2 patients had slightly lower ADP test values, but no significant difference occurred (mean 60.05 vs. 63.32 AUC, P=0.469). In Group 1 and 2, significant correlations between the ADP test and both platelet count (r=0.347, P<0.001) and fibrinogen level (r=0.364, P<0.001) were observed.

Discussion: In patients with preoperative ASPI test exceeding 30 AUC, postoperative ASA dose adjustment or clopidogrel addition according to MEA results should be considered. ASA resistance detection, both in the pre and postoperative phase could help to distinguish permanent from temporary ASA resistance due to postoperative transitory platelet hyperactivity. Our study provides a definition of ASA resistance in a laboratory setting. Further studies are needed in order to test ASA resistance MEA cut-off value for clinical outcome and to provide cut-off values according to both laboratory and clinical findings.

P-29

Transfusion needs in patients with acute Standford type A aortic dissection

Antje-Christin Deppe, Yeong-Hoon Choi, Stefanie Heinen, Oliver J. Liakopoulos, Elmar W. Kuhn, Ingo Slottosch, Jens Wippermann, Thorsten Wahlers
University Hospital of Cologne, Cologne, Germany

Introduction: A retrospective analysis was performed to evaluate the impact of preoperative risk factors and the perioperative rotational thromboelastometry (ROTEM®) analysis on increased bleeding and extensive requirement of blood products transfusion in patients with acute Stanford type A (AAD) aortic dissection.

Method: A total of 111 consecutive patients (2006-2011) undergoing surgical repair for AAD were analysed. The patients were divided into two groups, ROTEM (n=22) and Control (n=89). The influence of preoperative risk factors was analysed by multivariate analysis.

Results: Mean requirement of blood products was 32.9 ± 20.4 units. Significant correlating predicting factors for mass transfusion of blood products were the duration of circulatory arrest (r = 0.287; P=0.004), aortic cross-clamp time (r = 0.363; P<0.0001), cardiopulmonary bypass time (r = 0.489; P<0.0001) and incision to closure time (r = 0.512; P<0.0001). Neither pre-operative measured clotting parameters, degree of aortic dissection nor general condition were related to the amount of chest tube drainage or transfused blood units.

However, the amount of transfused blood products was significantly reduced in ROTEM patients (9.3±12.6 vs.18.2±17.6; P = 0.017).

Conclusion: The present data demonstrate the impact of extracorporeal circulation and circulatory arrest on haemostasis. Haemostasis management by using ROTEM® reduced the requirement of blood products and therefore, may reduce transfusion associated morbidity.

P-30

The association of changes in post-CPB values of standard coagulation tests and thromboelastography with early bleeding following adult cardiac surgery: Is there a difference?

Ajeet D. Sharma[1], Antoine Al-Achi[2], Hope Trettin[1], John F. Seccombe[1], Richard T. Hummel[1]
[1]St Vincent's Hospital Heart Center, Green Bay, USA, [2]Campbell University, Dept of Pharmaceutical Sciences, Buies Creek, USA

Introduction: CPB coagulopathies lead to bleeding, blood component consumption and increased patient morbidity and mortali-

ty. Association of standard coagulation tests (SCT) and bleeding is controversial. TEG® measures clot formation, strength and lysis under physiologic low shear forces. Parameters measured are R time, K time, alpha angle, and Maximum Amplitude (MA). Prolonged R and K times, and smaller angle or MA are indicative of hypocoagulability. Our hypothesis was that bleeding was closely associated with changes in SCT and TEG parameters when post-CPB values were compared to baseline and expressed as percent change (PC) in SCT as SCTPC and PC in TEG as TEGPC rather than single post-CPB SCT and TEG values.

Method: Retrospectively, 235 patients who received no intra-operative blood products were studied. Baseline (B), and immediate (I) ICU SCT (PT, INR, PTT, fibrinogen and platelet count) were recorded. SCTPC for PT, INR, PTT, and platelet count expressed as PT(+)%Δ=PT(I) or PTT(I) or INR(I)-PT(B) or PTT(B) or INR(B) /PT(B) or PTT(B) or INR(B) x100; platelet%Δ=platelet(B)-platelet(I)/ platelet(B)x100. (Only patients with +%Δ in PT, INR, PTT and -%Δ in platelet count included). Kaolin heparinase TEG® R, K, Angle, and MA values were recorded at baseline (b) [TEG® Rb, Kb, Angleb, and MAb, and post-protamine (pp) [TEG® Rpp, Kpp, Anglepp, and MApp]. (+%) or (-%) TEGPC was calculated as follows: TEG® Rpp or Kpp or Anglepp or MApp (-) TEG® Rb or Kb or Angleb or MAb/TEG® Rb or Kb or Angleb or MAb x 100. (Only patients with +%Δ in R and K and -%Δ in Angle and MA included). Patient characteristics, SCT/TEG parameters and post-op. chest tube drainage (mean±sd); Age, 66.22±11.59 yr; CPB time 111±42.1 min; creatinine 1.07±0.33 mg/dL; platelet count, 242.36±67 10^9 L^{-1}; PT 13.19±7.56; PTT, 28.38±6.23; INR, 1.22±1.85 haematocrit, 40.41±5.10; TEG R min, 7.34±1.8; K min, 1.78±0.53; Angle, 65.51±6.32; MA 64.45±6.05 mm; Chest tube output at 4 h, 224.8±164 ml; 8 h, 372±265.4 ml.

Results: 1) Higher ICU platelet count (P=0.01) and fibrinogen was associated with less bleeding (P<0.001). 2) No association with ICU PT, INR, and PTT with bleeding (P>0.40). 3) SCTPC in PT(+%), INR (+%), and (-%) in platelet count associated with increased bleeding (P<0.01). 4) No association with SCTPC in PTT and bleeding (P>0.03) (table 1).

5) Post-protamine, increased TEG Angle and MA associated with less bleeding (P=0.01). 5) No association with post-protamine TEG R and K with bleeding (P>0.10). 5) No association between TEGPC (+R%Δ or +K%Δ or -Angle%Δ or -MA%Δ) and bleeding (P>0.2) (table 2).

Discussion: Increased post-operative bleeding was associated with SCTPC in PT and

Table 1

SCT	SCTPC	Association with + bleeding
PT	+35.82%±32.75%	YES
INR	+34.20±30.03%	YES
Platelets	-32.64%±35.28%	YES

Table 2

TEG	TEGPC	Association with + bleeding
R	+21.96%±14.79%	NO
K	+15.98%±12.77%	NO
Angle	-9.63%±9.73%	NO
MA	-10.98%±13.13%	NO

INR rather than absolute post-CPB ICU values of PT and INR. With regards to TEG the opposite was true, TEGPC was not associated with increased post-operative bleeding but absolute post protamine values of TEG Angle and MA were.

P-31

Does the use of postoperative thoracic drainage and cell saver device reduce the need for homologous red blood cell transfusion in cardiac surgery patients?

Luc Puis, Kurt Staessens, Tine Ghysens, Kenny Van Zwam
Algemeen Stedelijk Ziekenhuis, Aalst, Belgium

Introduction: The use of the cardioPAT® device (CPT) that combines postoperative chest drainage with cell saving of the recovered blood, might reduce blood transfusion in cardiac surgery patients.

Method: We reviewed retrospectively data from a cohort of our patients undergoing cardiac surgery (CABG, valve(s) or combined). We sought whether the CPT could reduce homologous red blood cell (RBC) transfusion overall. We looked for parameters that might predict the usefulness of the CPT and used the TRACK score for guidance.

Results: After reviewing patient records, 410 patients were included in the analysis. In 284 patients, the CPT was used (CPT-group), while in 126 of them, the CPT was not used (N-CPT group). Average RBC transfusion for the CPT group until 7 days postoperatively was 1.98 units (±2.2) and 1.77 units (±1.8) in the N-CPT group. During the perioperative period, haematocrit levels were slightly lower in the CPT-group, while it stabilized to an equal, or even somewhat higher level than in the N-CPT-group at the first and second postoperative day.

Discussion: Although RBC transfusion was not reduced overall, the CPT-group showed a higher risk profile, as reflected by a higher Transfusion Risk and Clinical Knowledge (TRACK) score [1] (9.4 in CPT vs. 6.8 in N-CPT), and by the more frequent use of blood products in cardiopulmonary bypass priming (16.5% in CPT vs. 7.1% in N-CPT). Due to the inability to perform a randomized clinical trial for this setting and the retrospective nature of the analysis, we were unable to point out parameters that could predict the usefulness of the CPT. There is a tendency that the CPT is useful in older, female patients with a lower preoperative haematocrit and undergoing higher risk surgery, to reduce the need for RBC transfusion.

Conclusion: Although the CPT device did not reduce the need for RBC transfusion in the setting of cardiac surgery, we believe it is useful in a carefully selected group of high-risk patients. Datasets of larger patient groups are needed to be more conclusive.

Reference:

1. Ranucci M, Castelvecchio S, Frigiola A, Scolletta S, Giomarelli P, Biagioli B. Predicting transfusions in cardiac surgery: the easier, the better: the Transfusion Risk and Clinical Knowledge score. Vox Sanguinis 2009; 96 (4): 324-32

Poster session V – Intensive care

P-32

Initial serum creatinine and long-term mortality after cardiac surgery: When does it get risky?

Martin H. Bernardi[1], Robin Ristl[2], Mohamed Mouhieddine[1], Michael Hiesmayr[1], Andrea Laßnigg[1]
[1]Division of Cardiothoracic and Vascular Anaesthesia and Intensive Care, Medical University of Vienna, Vienna, Austria, [2]Department of Medical Statistics, Medical University of Vienna, Vienna, Austria

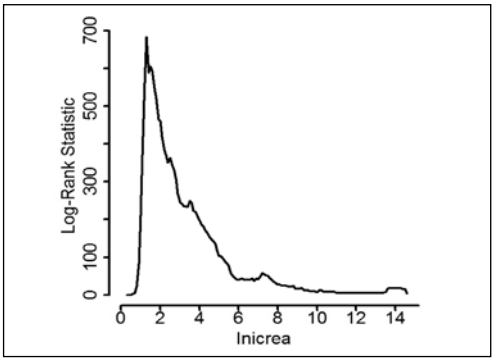


Figure 1: Log-Rank test statistic as function of potential Inicrea cut-off values.

Introduction: Higher preoperative serum creatinine (Inicrea) is a risk factor for late postoperative death after cardiac surgery independent of other established risk factors [1,2]. We tried to find a cut-off value of Inicrea that might predict a progressive increase in long-term mortality.

Method: 9,490 cardiac surgical patients (3,322 female), from 1997 to 2008 (follow-up until 2010) were included. Inicrea was the value recorded before surgery. The best cut-off was determined from maximal difference in non-parametric Log-Rank, Wilcoxon and log likelihood-ratio statistics using PROC LIFETEST in SAS9.3 obtained by separating the cohort in steps of 0.1 mg/dl (8.84 µmol/l) Inicrea into two groups between minimal (0.3 mg/dl) and maximal Inicrea (14,6 mg/dl).

Results: The ideal cut-off value for Inicrea was found to be 1.3 mg/dl (115 µmol/l) representing 20% of the cohort.

Conclusion: Inicrea >1.3 mg/dl a value much lower than in the EuroScore, predicts longterm outcome. Avoiding factors interfering with renal function may improve longterm outcome.

Reference:

1. Lassnigg A, Schmidlin D, Mouhieddine M, Bachmann LM, Druml W, Bauer P, Hiesmayr M. Minimal changes of serum creatinine predict prognosis in patients after cardiothoracic surgery: a prospective cohort study. J Am Soc Nephrol 2004; 15 (6): 1597-605
2. Lassnigg A, Schmid ER, Hiesmayr M, Falk C, Druml W, Bauer P, Schmidlin D. Impact of minimal increases in serum creatinine on outcome in patients after cardiothoracic surgery: Do we have to revise current definitions of acute renal failure? Crit Care Med 2008: 36 (4): 1129-37

P-33

Preoperative hypoalbuminaemia is a major risk factor for acute kidney injury following off-pump coronary artery bypass surgery

Jae Ouk Bang, Eun Ho Lee, Kyung-Don Hamn
Asan medical center, Seoul, Republic of Korea

Introduction: Hypoalbuminaemia has been shown to be an important risk factor for acute kidney injury (AKI) in various clinical conditions. However, the effect of preoperative hypoalbuminaemia on the risk of AKI after off-pump coronary artery bypass surgery (OPCAB) remains uncertain.

Method: We assessed preoperative and perioperative risk factors, and preoperative

	No AKI n=848	AKI n = 334	P-value
Preoperative eGFR	79 [64-90]	74 [60-90]	0.001
Preoperative eGFR			
< 60 mL min^{-1} 73 m^{-2}	76 (8.96)	57 (17.07)	< 0.001

serum albumin concentration in 1182 consecutive adult patients with preoperative normal renal function who underwent elective OPCAB surgery. Each patient was categorized by maximal Acute Kidney Injury Network (AKIN) criteria based on Cr changes within the first 48 hours after OPCAB. Logistic regression and propensity analyses were performed to evaluate the association between preoperative hypoalbuminaemia and postoperative AKI.

Results: Of the 1182 patients, 334 (28.3%) developed AKI. Risk factors for AKI were age, diabetes mellitus, total crystalloid volume infused during surgery, maximal cardiovascular component of the sequential organ failure assessment score, perioperative transfusion, and postoperative C-reactive protein concentration. Preoperative hypoalbuminaemia (<4.0 g/dL) was independently associated with postoperative AKI (odds ratio [OR] 1.83; 95% confidence interval [CI] 1.27 to 2.64; P=0.001 after multivariable logistic analysis; OR 1.62; 95% CI 1.12 to 2.35; P=0.011 after propensity analysis). AKI was associated with prolonged ICU and hospital stay and high mortality rate.

Conclusions: Preoperative hypoalbuminaemia is an independent risk factor for AKI and postoperative AKI is associated with poor outcomes after OPCAB in patients with preoperative normal renal function.

P-34

Post-cardiac surgery delirium risk factors and clinical outcome

Judita Andrejaitiene, Edmundas Sirvinskas, Milda Svagzdiene

Cardiology Institute of Lithuanian University of Health Sciences, Department of Cardiothoracic and Vascular Surgery, Lithuanian University of Health Sciences, Medical Academy Hospital, Kaunas, Lithuania

Introduction: Patients who undergo cardiac surgery have an increased risk of delirium, which is associated with many negative consequences. Delirium has been reported to occur in 10 to 60%. However, the incidence of delirium in older surgical patients may be as high as 73% [1]. Therefore, the purpose of this study was to identify the post-cardiac surgery delirium risk factors and to evaluate clinical outcome.

Method: In this retrospective study, the Intensive Care Delirium Screening Checklist, the Richmond Agitation-Sedation Scale and The Confusion Assessment Method for the Intensive Care Unit criteria were used after surgery to assess whether delirium had developed. The patients who underwent coronary artery bypass surgery on CPB were divided into two groups by evaluating the severity of the delirium: light and moderate delirium group (n=74) and severe delirium group (n=16). The difference was considered to be statistically significant when the significance level was P<0.05.

Results: The incidence of early post-cardiac surgery delirium was 4.17%. We have determined that delirium prolonged the length of stay in the ICU (8.4 (8.6)) and hospital stay

(23.6 (13.0)) days. The patients had higher preoperative risk score, their age being 71.5 (8.9) years. The majority were male (72.2%). Multivariable logistic regression has indicated that increasing the dose of fentanyl over 1.4 mg during surgery also increased the possibility of developing severe delirium (OR=9.9, CI 1.5-65.1) while longer aortic clamping time could be independently associated with severe postoperative delirium (OR=1.02, CI 1.0-1.05).

Discussion: Our data suggest that early postcardiac surgery delirium was not a common complication, but it significantly prolonged the length of ICU and hospital stays. The delirium risk factors such as longer aortic clamping time and the dose of fentanyl could be modified and could rapidly indicate a postoperative delirium.

Reference:

1. Afonso A, Scurlock C, Reich D, Raikhelkar J, Hossain S, Bodian C, Krol M, Flynn B. Predictive model for postoperative delirium in cardiac surgical patients. Semin Cardiothorac Vasc Anesth 2010; 14 (3): 212-7

P-35

Risk factors for postoperative atrial fibrillation after off-pump coronary artery bypass grafting: A retrospective analysis

Iamshid Ali, Anil Karlekar, Y. K. Mishra, Z. S. Meharwal
Asian Institute of medical Sciences, Faridabad, Haryana, India

Introduction: Postoperative atrial fibrillation (POAF) causes significant morbidity in cardiac surgical patients. It occurs in 27-40% of coronary artery bypass graft surgery (CABG) patients [1]. The exact pathogenesis of postoperative AF in CABG patients is still not understood. Off-pump coronary artery bypass (OPCAB) offers an important alternative to cardiopulmonary bypass (CPB). Its effect on postoperative AF has yet to be conclusively evaluated.

Method: We did a retrospective cohort analysis of OPCAB patients in our institution using Critical Care data from our hospital information system database (Track Health Australia). Total number of patients selected was 156 (78 in each cohort).We identified the cases of POAF after OPCAB surgery during the current year and stratified them according to age, sex and ejection fraction. The control group, matched for age, sex and ejection fraction, was extracted from the database. All patients are monitored with continuous alarm triggered electrocardiogram; Post operative AF of more than 5 minutes duration is considered as POAF

Results: In our study we could not identify any demographic factor other than gender in OPCAB, associated with increased risk of POAF. Preoperative use of ACE inhibitors (ACES) and amiodarone was associated with decreased risk of POAF. Intraoperative beta blocker use was associated with statistically significant reduction in the incidence of POAF as was postoperative use of ACES.

Conclusion: POAF also occurs in a considerable number of OPCABS and adds to postoperative morbidity and the overall cost of treatment. Its exact aetiology still remains elusive, though elderly male patients are at a higher risk. Preoperative use of ACES and amiodarone, intraoperative beta blockade or postoperative ACES in a selected group of patients may reduce the incidence of POAF in OPCABS.

Reference:

1. Giri S, White CM, Dunn AB, Felton K, Freeman-Bosco L, Reddy P, Tsikouris JP, Wilcox HA, Kluger J et al. Oral amiodarone for prevention of atrial fibrillation after open heart surgery, the Atrial Fibrillation Suppression Trial (AFIST) a randomised placebo-controlled trial. Lancet 2001; 357 (9259); 830-6

P-36

Outcome of long stay cardiac surgery patients in a specialised cardiac intensive care unit

Anna Simpson, K. Nickell, James Hillier
Bristol Heart Institute, Bristol, UK

Introduction: Some patients have a complicated recovery following cardiac surgery and require a longer stay in the intensive care unit (ICU). Previous studies have demonstrated significant mortality amongst this group, but after discharge good long term survival rates and quality of life [1]. We investigated how our specialised cardiac ICU was performing with reference to these data.

Method: This was a retrospective single centre case note review of all patients admitted to the cardiac ICU over a 12 month period from 1/7/2010. Patients with ICU stay >14 days were included. Patients undergoing non-cardiac surgery were excluded. Data on age, procedure, EuroSCORE, left ventricular function, hospital mortality and unit length of stay were recorded. For patients discharged home, general practitioner (GP) surgeries were asked about any new complications, readmissions or deaths. Results are reported as median and interquartile range.

Results: Thirty six patients met the criteria. Age was 74.5 yr (67-77), EuroSCORE 9.2 (7-11.25). 8 patients underwent coronary artery bypass graft alone, 8 single valve surgery, 8 surgery involving the aorta and 13 had 2 or more procedures. 4 were repeat sternotomies. Left ventricular function data was available for 34/36 patients, with 3/34 patients having a severely impaired ventricle, 12/34 moderately impaired and 19/34 a good ventricle. Reasons identified as contributing to the prolonged stay were as follows: acute lung injury/pneumonia 22/36 patients; sepsis 7/36; acute kidney injury 5/36; acute brain injury (including stroke) 4/36; cardiogenic shock 3/36; major haemorrhage/tamponade 2/36; acute abdominal crisis 2/36 (multiple factors identified in several patients). ICU length of stay was 25 days (19-38). 8/36 patients died on our ICU, with 4 later deaths. 24 patients survived to discharge. Post-discharge data was unavailable for 3; of the remaining 21, only 1 patient had died at the time of follow up. There were no new complications of surgery or ICU stay, or hospital readmissions following discharge.

Discussion: The vast majority of deaths occurred in the ICU or before hospital discharge. Few or no complications were reported by GP surgeries in patients surviving to discharge. Our results compare favourably with those previously reported. We aim to extend our follow up by examining quality of life indicators in these patients.

References:

1. Lagercrantz E, Lindblom D, Sartipy U. Survival and quality of life in cardiac surgery patients with prolonged intensive care. Ann Thorac Surg 2010; 89 (2): 490-495

P-37

Incidence and risk factors for pre-operative anaemia in cardiac surgery patients

Esther Hogervorst[1], Peter Rosseel[2], Anneke Brand[1], Mohamed Bentala[2], Anske van de Bom[1], Leo van de Watering[1], Nardo van der Meer[2]
[1]Sanquin, Leiden, The Netherlands, [2]Amphia Hospital, Breda, The Netherlands

Introduction: Pre-operative anaemia is stated as a significant risk factor for patients undergoing cardiac surgery. Therefore, it is of importance to know the characteristics of patients presenting with pre-operative anaemia. In this study we assessed the incidence and pre-operative risk factors in patients presenting with preoperative anaemia, undergoing cardiac surgery.

Method: In a single centre cohort of 5737 patients scheduled for cardiac surgery, we assessed the incidence of pre-operative anaemia in relation to pre-operative vari-

ables. Pre-operative anaemia was defined as a haemoglobin (Hb) level <13 g/dl in men and <12.0 g/dl in women according to WHO definitions. We examined the association of potential risk factors with pre-operative anaemia in logistic regression models.

Results: In our population 796 (19.9% of men) had Hb levels below 13.0 g/dl while 472 (27.3% of women) had Hb levels below 12.0 g/dl. Endocarditis (men OR 25.35/women OR 46.90), chronic renal failure (men OR 7.28/women OR 3.14), anti-coagulant drug use (men OR 1.32/women OR 1.46), diabetes (men OR 1.19/women 1.45) and EuroSCORE (men OR 1.11/women OR 1.12) were all independently associated with pre-operative anaemia. Additionally, in men an association with peripheral vascular disease (OR 1.37) and NYHA >2 (OR 1.37) was found. In women pre-operative anaemia was associated with acute renal failure (OR 5.62) or use of clopidogrel (OR 1.57).

Conclusion: More than one in five patients scheduled for cardiac surgery suffered from pre-operative anaemia. We identified several risk factors which were independently associated with preoperative anaemia, including: endocarditis, chronic renal failure, anti-coagulant drug use, diabetes and EuroSCORE.

P-38

Goal-directed therapy after coronary artery bypass grafting improves outcome in patients with severe left ventricular dysfunction

Hisham Hosny Abdelwahab[1], Ahmed Fikry Attaalla[2], Gerald Hobbs[3]
[1]Faculty of Medicine, Cairo University, Cairo, Egypt, [2]West Virginia University, West Virginia, USA, [3]Department of Community Medicine, West Virginia University, West Virginia, USA

Introduction: Despite the poor prognosis of advanced ischaemic cardiomyopathy, coronary artery bypass grafting (CABG) remains an option for selected subsets of patients. These patients with severe left ventricular dysfunction carry a high mortality rate (10% to 37%) and a very delicate Intensive Care Unit (ICU) course in the early postoperative period. We evaluated our experience with the use of a postoperative goal-directed haemodynamic management protocol, in order to identify its clinical benefit on the outcome measures, for CABG patients with severe left ventricular dysfunction.

Method: This is a retrospective review in which we analysed our database of 138 consecutive patients with severe left ventricular dysfunction (Ejection Fraction 35%) who underwent isolated coronary artery bypass grafting with cardiopulmonary bypass during a 4-year period (2001-2005). We grouped patients in two groups, Group A (n=74 - before 2003) where the normal routine postoperative ICU protocol was used based on vital signs, and Group B (n=64 - from 2003) when we started a tighter and more invasive ICU protocol. This approach implied the insertion of a pulmonary artery catheter (PAC) and frequent echocardiography studies (on admission and every 6 h for the first 24 h) to guide inotropic support needs and fluid management therapy.

Results: The patients in both groups had similar preoperative characteristics, were operated by the same surgical teams, and had no significant operative differences. By using PAC measurements and echocardiographic studies to guide inotropic support and volume needs, a marked reduction in morbidity and mortality was observed and a shorter ICU stay. The mortality for group A was 10.8% (8 patients expired) while for group B was 3.1% (only 2 patients expired).

Conclusion: PAC and echocardiographic guided therapy following coronary artery bypass grafting in patients with severe left ventricular dysfunction appear to be superior to routine care. Further prospective studies are needed to draw firm conclusions.

Poster session VI – Cardiac protection

P-39

Effect of NOS blockade on helium induced early preconditioning in human endothelium

Kirsten Smit, Gezina Oei, Daniel Brevoord, Markus Hollmann, Benedikt Preckel, Nina Weber
Academic Medical Centre, Amsterdam, The Netherlands

Introduction: We demonstrated that helium (He) induces preconditioning in human endothelium in vivo by attenuating post-ischaemic endothelial dysfunction after forearm ischaemia/reperfusion (I/R) in healthy volunteers [1]. Experimental data in rabbits showed that the non-selective nitric oxide synthase (NOS) inhibitor N-nitro-L-arginine methyl esther L-NAME abolished helium induced cardioprotection, indicating that helium preconditioning (He-EPC) is mediated by NO generated by endothelial NOS in vivo [2]. By using the eNOS blocker N-monomethyl-L-arginine (L-NMMA), we investigated whether He-EPC is mediated by eNOS production.

Method: After ethical approval, eight volunteers were included and underwent 20 min of forearm ischaemia followed by 15 min of reperfusion. Endothelial function was measured by venous occlusion plethysmography and endothelium-dependent vasodilation was determined after intra-brachial infusion of acetylcholine (Ach) (0.1-5.0 µg/100ml forearmvolume/min) before and after ischaemia, respectively. He-EPC was given by inhalation of 3 x 5 min He (79%He, 21%O_2) 5 min before ischaemia. L–NMMA (dosage of 0.4 mg/100ml forearmvolume/min) was started 5 min before He inhalation and was continued during preconditioning (35 minutes in total). Forearm I/R started after forearm blood flow (FBF) was restored to baseline values.

Results: In this study (male/female 1/7, age 23±5 yr, body mass index 21.7±2.1, systolic and diastolic blood pressure 122±19 mmHg and 69±9 mmHg, respectively), L-NMMA reduced FBF (61±8%, mean±SEM), indicating eNOS blockade during administration of He-EPC. This blockade however did not abolish the protective effect of helium preconditioning as the post ischaemic response to Ach was preserved (maximal increase in FBF was 460±113% after I/R, versus 232±39% at baseline).

Conclusion: In this study eNOS blockade by infusion of L-NNMA during helium inhalation did not abolish helium induced preconditioning. Further investigation is needed to elucidate the mechanism behind helium preconditioning in humans.

References:

1. Smit KF, Weber NC, Stroes ES, Oei G, Hollmann M, Preckel B. Helium induces early and late preconditioning in human endothelium in vivo. Anest Analg 2010; 110 (3): S99
2. Pagel PS, Krolikowski JG, Pratt PF Jr, Shim YH, Amour J, Warltier DC, Weihrauch D. The mechanism of helium-induced preconditioniing: a direct role for nitric oxide in rabbits. Anesth Analg 2008; 107 (3): 762-8

P-40

Feasibility of non-invasive helium inhalation for organ protection in cardiovascular emergency situations

Benedikt Preckel[1], Kirsten F. Smit[1], Sanne M. Zinkstok[1], Daniel Brevoord[1], Janneke Horn[1], Tim P. van de Hoef[1], Jose P.S. Henriques[1], Jelle de Kruijk[2]
[1]Academic Medical Center, Amsterdam, The Netherlands, [2]Tergooiziekenhuizen, Blaricum, The Netherlands

Introduction: The non-anaesthetic noble gas, helium, induces profound cardio-protection

while having in itself no cardiovascular risk. Helium protects against endothelial dysfunction after forearm ischaemia in healthy human volunteers. In patients subjected to coronary artery bypass surgery, helium pre- and postconditioning by helium inhalation via an endotracheal tube during total intravenous anaesthesia could be performed without problems. In addition, invasive helium ventilation during prolonged hypothermia after cardiopulmonary resuscitation has been performed without complications. Here we describe our first experience with non-invasive helium inhalation in patients with acute cardiovascular emergencies, e.g. stroke and myocardial infarction.

Method: With ethical approval two clinical studies have been initiated (Helium in ischaemic stroke HIS, NTR-2231; Helium after acute myocardial infarction HAMI-trial, NTR-2691) to investigate possible organ protective effects of helium in the human central nervous system and the human heart. In both studies, 79% helium together with 21% O_2 (adjusted to a maximum of 50% O_2 along with 50% He) was administered using a non-invasive ventilation mode on a suitable helium ventilator (Servo-I, Marquette; HelontixVent, Linde therapeutics).

Results: The first experience demonstrated that in two patients with ischaemic stroke, non-invasive helium ventilation was not well tolerated, because of the non-invasive ventilation mode in these neurological disturbed patients. In contrast, in patients with myocardial infarction, non-invasive helium ventilation during percutaneous coronary intervention was performed without problems in two patients. One additional patient did not tolerate non-invasive ventilation during PCI because he was claustrophobic.

Conclusion: The organ protective noble gas Helium can be applied by invasive ventilation during anaesthesia and intensive care therapy. The actual experience shows that non-invasive helium ventilation can easily be induced during myocardial infarction, while patients with stroke do not tolerate the non-invasive ventilation strategy.

P-41

Comparison of preconditioning effects of propofol and desflurane for myocardial protection in cardiac surgery

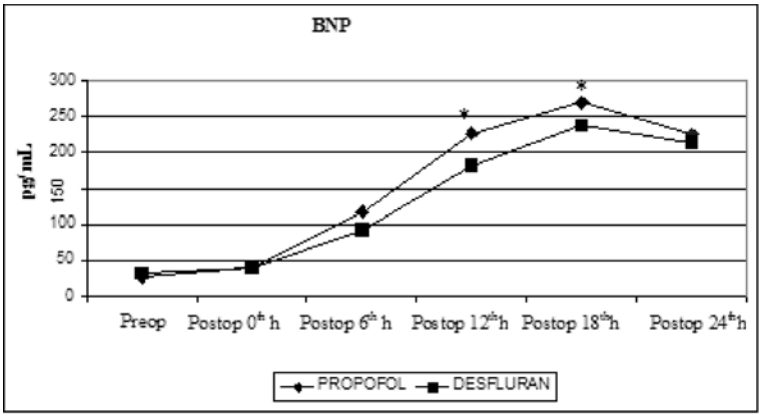
Ceren Koksal, Turkan Kudsioglu, Nihan Yapici, Yasemin Altuntas, Zuhal Aykac
Siyami Ersek Thoacic and Cadiovascular Surgery Center, Istanbul, Turkey

Introduction: Myocardial dysfunction, developing after CABG surgery, seriously effects morbidity and mortality. The purpose of this study was to compare the protective effects of propofol or desflurane anaesthesia on the myocardium during the CPB.

Method: After approval of the hospital scientific committee, 60 ASA III patients; including 47 male and 13 female, between the age of 18 and 69, to whom the elective CABG was planned, were divided into 2 groups randomly, desflurane (group D, n=30 patients) and propofol (group P, n=30 patients). After induction, group D were given desflurane (Suprane, Baxter) between 0.5 and 2 MAC and group P were given propofol (Propofol 2%, Fresenius) 1.5-4 mg kg-1 h-1 until the end of the surgery. The unconsciousness level was determined with loc–View (Index of Consciousness -IoC, Morpheus Medical, Spain) as the surgical anaesthetic level (40-60). BNP, cardiac troponin, CK and CK-MB samples were taken at determined time points. The One-way Anova test was used. The results have been evaluated in 95% confidence interval, and significance of $P<0.05$.

Results: (see figure next page)

Conclusions: The levels of troponin-I, CK, CK-MB and BNP, as the myocardium damage markers, increased more in the propofol group than those in the desflurane group. Therefore, we concluded that desflurane may be preferred in patients whose ischaemia risk is high intraoperatively.



*Mann-Whitney U test and Wilcoxon signed rank test was used. *P<0.05*

References:

1. De Hert SG, Cromheecke S, ten Broecke PW, Mertens E, De Blier IG, Stockman BA, Rodrigus IE, Van der Linden PJ. Effects of propofol desflurane, and sevoflurane on recovery of myocardial function after coronary surgery in elderly high-risk patients. Anesthesiology 2003; 99 (2): 314-23

P-42

The efficacy of amiodarone and lidocaine for prevention of reperfusion ventricular fibrillation

Hashem Jarineshin, Saeed Kashani, Hossein Montazerghaem, Majid Kabiri, Omid Asar, Mohammad Khaledi, Eiman Eidy, Maliheh Fadaee, Neda Soltani, Mehran Mohyaddin
Hormozgan University of Medical Sciences, Bandar Abbas, Iran

Introduction: Reperfusion ventricular fibrillation (RVF) after release of the aortic cross-clamp (ACC) in patients undergoing cardiac surgery is reported to occur in 60% to 100% of cases. The purpose of this study was to compare and evaluate the efficacy of a single-dose of amiodarone with a bolus of lidocaine administered through the cardiopulmonary bypass pump circuit (CPB) before releasing the ACC in preventing the occurrence of RVF.

Method: In this prospective clinical trial, 40 coronary bypass patients were randomly divided into 2 equal groups: 20 patients received 300 mg of amiodarone through the CPB 10 minutes before releasing the ACC and 20 patients received 1.5 mg/kg of lidocaine 2 minutes before releasing the ACC. Demographic,haemodynamic and intra-operative variables were analysed with an unpaired Student's t test. Discrete variables, such as incidence of RVF, were compared using the Chi-squared test. P<0.05 was considered statistically significant.

Results: The demographic data of the two groups were similar. Intra-operative variables were not significantly different between the two groups. There was no significant difference between the haemodynamic parameters of the two groups determined 15 minutes either after the induction of anaesthesia or after weaning from the CPB.

In the lidocaine group, the incidence of RVF was 30% which was significantly less at 10% in the amiodarone group. The incidence of atrial fibrillation and premature ventricular contraction were significantly lower in the amiodarone than the lidocaine group.

Conclusion: These findings suggest that a single dose of amiodarone administered through the CPB 10 minutes before ACC release can safely decrease the incidence of RVF and other arrhythmias.

P-43

Changes in electrocardiographic patterns and troponin concentrations after off-pump coronary surgery (OPCAB)

Tine Vandendriessche, Luc De Baerdemaeker, Patrick Wouters, S. De Hert
UZ Gent, Gent, Belgium

Introduction: Currently the diagnosis of perioperative myocardial infarction (PMI) is based on the occurrence of electrocardiographic (ECG) changes and/or increases in postoperative troponin (Tn) levels [1]. To assess the value of ECG and Tn values for the diagnosis of PMI we prospectively studied serial postoperative ECGs and Tn values after OPCAB surgery.

Method: After ethical approval, and patients' written informed consent, data of 131 patients scheduled for elective OPCAB surgery were included. Blood for Tn I and T measurements was sampled preoperatively, at arrival on the intensive care unit and then 6, 12, 24, and 48 h later. Twelve lead ECGs were obtained pre-operatively, on arrival at the intensive care unit and then 1, 2 and 5 days postoperatively. ECGs were analysed by an independent observer, who was unaware of the clinical situation and the Tn values of the corresponding patient and of the sequence and identification of the different ECGs. Data from repeated Tn measurements were compared with the ANOVA for repeated measurements followed by the Tukey post-hoc test to evaluate differences between the individual times of measurement. Receiver operating characteristic (ROC) curves were calculated.

Results: Postoperatively, 46 patients developed ECG signs of a PMI: 7 patients (5%) a Q-wave PMI and 39 patients (30%) a non-Q-wave PMI. All but one patient (86%) with a Q-wave PMI had postoperative increased Tn values above the level defined by the "Joint ESC/ACCF/AHA/WHF Task Force [1] as indicative for PMI after coronary artery surgery (type 5 myocardial infarction). Of the 39 patients with an ECG diagnosis of a non-Q-wave PMI, only 14 (36%) had postoperative Tn values above these level. From the 85 patients with normal postoperative ECGs, 28 patients (33%) had postoperative Tn values above this level.

In the group of patients with a diagnosis of a non-Q-wave PMI the area under the ROC curve was 0.51 and in the group of patients with a diagnosis of Q-wave PMI, the area under the ROC curve was 0.85, hence Tn measurements in these patients may help to diagnose the occurrence of a PMI. The highest sensitivity and specificity for the diagnosis of a Q-wave PMI was found for a TnT cut-off value of 0.6 ng mL^{-1} and a TnI value of 6.46 ng mL^{-1}.

Conclusions: The results of the present study indicated that postoperative Tn values may be elevated without ECG evidence of PMI and conversely ECG changes indicative of PMI may be observed in the absence of increased Tn values. Only with new Q-waves, was the ECG diagnosis of PMI consistently supported by a concomitant increase in postoperative Tn values.

Reference:

1. Thygesen K, Alpert JS, White HD. Universal definition of myocardial infarction. Circulation 2007; 166 (22): 2634-53

P-44

Cost-effectiveness of intraoperative transoesophageal echocardiography in cardiac surgery

Carlos Moreno, João Viterbo, André Lourenço, Jorge Almeida
Centro Hospitalar de São João, Porto, Portugal

Introduction: Intraoperative transoesophageal echocardiography (TOE) is indicated in open-heart and thoracic aorta surgery,

and should also be considered in coronary artery bypass grafting (CABG) [1]. The aim of this study was to assess cost-effectiveness of TOE use for evaluation of surgical success after cardiac procedures and, secondarily, to determine the incidence of preoperative surgical diagnosis modification using TOE after anaesthesia induction.

Method: Retrospective analysis of medical records and TOE reports of 134 consecutive elective adult cardiac surgery patients treated by the same anaesthesiologist over a 12 months period, regarding ASA physical status, logistic EuroSCORE, left ventricular ejection fraction (LVEF), preoperative diagnosis and its modification by TOE, as well as the detection of residual lesion and immediate need for repair. Global surgical fee (GSF) was obtained for patients who needed immediate re-intervention and compared with TOE fee (institutional data) [2]. Continuous variables are presented as mean ± SD.

Results: Of the 134 patients (62 ± 14 years, 57.5% male, 1.5% ASA II, 72.4% ASA III, 26.1% ASA IV, 5.4 ± 6.1% logistic EuroSCORE, 74.5% with LVEF >55%), 54.5% underwent valve intervention, 16.4% CABG, 19.4% both and 9.8% other procedures (89.6% of all cases on cardio-pulmonary bypass). Nine (6.7%) presented residual lesions: 2 after aortic valve replacement (AVR), 2 after triple valve surgery, 2 after CABG, 2 after mitral valve (MV) repair and 1 after thoracic aorta surgery; 5 of them (3.7%) required immediate correction: 1 MV regurgitation after MV repair, 2 perivalvular leaks after AVR, 1 severe tricuspid regurgitation and 1 superior vena cava stenosis after triple valve surgery. GSF for these 5 patients was €85,723.22. TOE fee for 134 patients was €40,119.60. Preoperative diagnosis was modified in 24 (17.9%) patients after TOE, warranting mostly additional myectomy and tricuspid valve annuloplasty during AVR (41.6%) and MV repair/replacement (29.2%), respectively.

Discussion: Our results show that, after one year, GSF for patients in whom delayed re-intervention was avoided outweighed the TOE fee. Further than being cost-effective, routine intraoperative TOE in cardiac surgery also avoids additional patient discomfort and simplifies postoperative management, frequently modifying preoperative surgical diagnosis, particularly in AVR.

References:

1. American Society of Anesthesiologists Task Force on Perioperative Transesophageal Echocardiography; Practice Guidelines for Perioperative Transesophageal Echocardiography. Anesthesiology 2010; 112 (4): 1-13

Poster session VII – Prevention & prediction

P-45

Intraoperative determination of left ventricular end-systolic elastance: Level of agreement between an invasive and noninvasive approach

Chantal A. Boly[1], Koen D. Reesink[2], M. Petrousjka van den Tol[1], Evert K. Jansen[1], Christa Boer[1], R. Arthur Bouwman[1]
[1]VU University Medical Center, Amsterdam, The Netherlands, [2]Imperial College, Londen, UK

Introduction: Left ventricular end-systolic elastance (Ees), the slope of the end-systolic pressure-volume relation (ESPVR), is an index of cardiac contractility. The invasive nature of its determination and the loading intervention, commonly inferior vena cava compression (IVCC), limit application in perioperative care. Here we assessed Ees combining arterial blood pressure and left ventricular volume measurements (transoesophageal echocardiography, TOE) and investigated agreement between an invasive and non-invasive blood pressure-based approach. In addition, we studied whether phenylephrine-induced afterload increase provides an alternative to preload reduction by IVCC.
Method: In 15 patients undergoing open abdominal (n=7) or cardiac surgery (n=8), end-systolic pressure was determined by invasive (IBP) and non-invasive continuous arterial blood pressure measurements (Nexfin, BMEYE, Amsterdam, the Netherlands). End-systolic volume was determined with TOE, using Teichholz formula. Pressure and volume measurements were performed simultaneously before and after 10 seconds preload reduction by clamping the IVC. After a bolus of 100µg phenylephrine, measurements were repeated. ESPVRs were constructed for invasive and non-invasive pressure-volume points. Agreement between methods was determined using Bland-Altman plots.
Results: The invasive and non-invasive median slopes of the ESPVR were 0.85 (0.31-1.32) mmHg mL^{-1} and 0.73 (0.38-1.12) mmHg mL^{-1}, respectively. Bland-Altman analysis revealed a bias of -0.03 (±0.13) mmHg mL^{-1} with limits of agreement of -0.29 - +0.23 mmHg mL^{-1}. Comparing phenylephrine to IVCC as a loading intervention, Bland-Altman analysis revealed a bias of -0.15 (±0.74) mmHg mL^{-1} with limits of agreement of -1.59 -+ 1.30 mmHg mL^{-1}.
Conclusions: In the intraoperative setting, there is an acceptable level of agreement between invasive and non-invasive arterial blood pressure-based approaches of Ees assessment, which may contribute to non-invasive Ees determination. However, our data indicate that phenylephrine cannot substitute for IVCC as a loading intervention.

P-46

Predicting hyperlactataemia after cardiac surgery using indirect calorimetry

Amelie Hebrard, Marie Cecile Fevre, Jules Greze, Charlotte Casset, Myriam Casez-Brasseur, Michel Durand, Pierre Albaladejo
University Hospital, Grenoble, France

Introduction: Hyperlactatemia (HL) after cardiac surgery is associated with an increased mortality [1]. During tissue hypoxia, CO_2 production (VCO_2) decreases less than does O_2 consumption (VO_2) [2] as an anaerobic CO_2 production occurs, thus increasing the VCO_2/VO_2 ratio (RQ). The aim of this study was to test the hypothesis that RQ could identify anaerobic metabolism defined as a lactate level above the normal value (1.6 mmol/l) early after cardiac surgery.

	AUC	95 CI	p/RQ
CaO_2 (ml)	0.622	0.505 to 0.729	0.27
CI (l/min/m_2)	0.541	0.424 to 0.655	0.24
DO_2 (ml/min)	0.559	0.442 to 0.671	0.32
O_2ER (%)	0.676	0.560 to 0.778	0.75
SVO_2 (%)	0.682	0.567 to 0.783	0.71
RQ	0.647	0.531 to 0.752	-

Methods: After IRB approval, 37 patients undergoing elective cardiac surgery under CPB and monitored by a Swan Ganz catheter were included. On arrival in ICU, patients were connected to an Engstrom Carestation (General Electric, Madison, WI) equipped with the M-CAiOVX metabolic module to measure VO_2 and VCO_2. Arterial and central venous blood gases, hemodynamic data, VO_2 and VCO_2 were obtained after arrival in ICU, 1 and 2 h later. The diagnostic values of the different parameters were analysed with ROC curves.

Results: 82 paired data were obtained. HL was associated with a decreased SvO_2 (0.65 ± 0.07 vs. 0.70 ± 0.08, p=0.005), increased O_2 extraction (0.35 ± 0.08 vs. 0.30 ± 0.1, p=0.011) and RQ (0.76 ± 0.09 vs. 0.72 ± 0.01, p=0.036). The best cut-off value for RQ was 0.73 with a sensibility of 59 % and a specificity of 69 %.

Conclusion: RQ may be a non invasive tool for the early diagnosis of hyperlactatemia after cardiac surgery.

References:

1. Maillet JM, Le Besnerais P, Cantoni M, Nataf P, Ruffenach A, Lessana A, Brodaty D. Frequency, risk factors, and outcome of hyperlactatemia after cardiac surgery. Chest 2003; 123 (5): 1361-6
2. Lamia B, Monnet X, Teboul JL. Meaning of arterio-venous PCO2 difference in circulatory shock. Minerva Anestesiol 2006; 72 (6): 597-604

P-47

ECMO in cardiac surgery: Outcome, mortality and costs

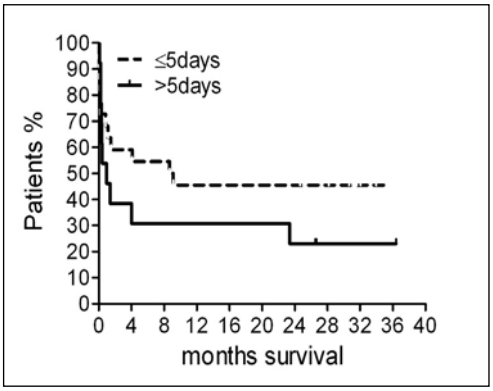
Franz Josef Nierscher[1], Julia Zaludik[1], Michael Hiesmayr[1], Marek Ehrlich[2], Andrea Laßnigg[1]

[1]Department of Cardio-Thoracic- Vascular Anaesthesia & Intensive Care, Medical University of Vienna, Vienna, Austria, [2]Department of Cardiac Surgery , Medical University of Vienna, Vienna, Austria

Introduction: Recently, extracorporeal membrane oxygenation (ECMO) for cardiopulmonary resuscitation became a last escalation instance. The incidence of cardiogenic shock in cardiac surgical patients ranges from 0.5% to 1.5%, but highly depends on the surgical case load [1]. Overall rates of survival to discharge from hospital vary from 30% to 45% after ECMO.

Method: This is an observational study using data collected in our prospective database. In 2008, 35 patients (mean age 61.6 yr, 26 male) underwent ECMO after CABG (n=7), valve operation (n=8), HTX (n=8), LVAD (n=1), combined procedure (n=10) or aortic dissection (n=1).

Results: Overall mortality was 62%, 14 patients died within 30 days (40%). Reasons for ECMO were bleeding (n=11), ventricle-rupture (n=2), cardiogenic shock (n=19) or myocardial infarction (n=3). Mean ECMO duration was 5.6 days (range 1-26). All patients received AV cannulation, either peripheral (n=23), central (n=7) or subclavian artery (n=5) cannulation. Events noted were 14 oxygenator-changes (€12.000), 4 centrifugal



blood pump changes (€1.400) and 15 cannulation complications. 21 events happened after >5 days. Survival probabilities were estimated by Kaplan-Meier plots.

Conclusion: Longer duration of ECMO is associated with an increased complication rate and costs, but also with higher mortality.

Reference:

1. Rastan AJ, Dege A, Mohr M, Doll N, Falk V, Walther T, Mohr FW. Early and late outcomes of 517 consecutive adult patients treated with extracorporeal membrane oxygenation for refractory postcardiotomy cardiogenic shock. J Thorac Cardiovasc Surg 2010; 139 (2): 302-11

P-48

Plasma levels of interleukin-10: comparison between retroperitoneal with transperitoneal approaches in abdominal aorta surgery procedures

Kerem Erkalp[1], M. Gokhan Teker[4], Funda Gumus[1], Bekir Inan[2], Gokcen Basaranoglu[3], Yusuf Kalko[6], Yesim Abut[5]

[1]Bagcilar Traning Hospital, Anesthesia Department, Istanbul, Turkey, [2]Bezmialem Vakif University, Department of Cardiovascular Surgery, Istanbul, Turkey, [3]Bezmialem Vakif University, Department of Anesthesiology and Reanimation, Istanbul, Turkey, [4]Arnavutkoy Hospital Department of Anesthesiology and Reanimation, Istanbul, Turkey, [5]Kanuni Sultan Süleyman Traning Hospital, Department of Anesthesiology and Reanimation, Istanbul, Turkey, [6]Medical Park Bahcelievler Hospital, Department of Cardiovascular Surgery, Istanbul, Turkey

Introduction: Abdominal aorta surgery can be performed by using the retroperitoneal or the transperitoneal approach. Interleukin-10 (IL-10) is an anti-inflammatory cytokine that is release enhanced depending on the severity of injury. The aim of this study was to ascertain whether the retroperitoneal and transperitoneal approaches affect plasma IL-10 levels differently.

Method: From May 2005 through January 2010, 100 consecutive patients underwent elective aortic surgery. Patients were randomized: the transperitoneal approach was used in 50 patients (TP group) and the other 50 patients had a retroperitoneal approach (RP group). An anaesthesia protocol was standardized for all patients. Demographic data, risk factors, perioperative and postoperative data and IL-10 levels were analysed in two groups. Peripheral blood samples were taken before surgery (T0), before unclamping the aorta (T1) and 60 min after declamping (T2). Blood samples were centrifuged and plasma

was frozen at -70°C with liquid nitrogen. Enzyme-linked immune-sorbent assays were used to measure the concentration of IL-10 levels. The Mann-Whitney U test was used to evaluate differences of perioperative parameters without time running between TP and RP groups. Student's t-test was used to evaluate differences of the IL-10 values in TP and RP groups at each time point. P<0.05 was considered to be statistically significant.

Results: There was no statistically significant difference in demographic data and risk factors. Mean duration of anaesthesia was 139.8±20.9 (RP group) and145.190±28.090 (TP group) min; mean cross-clamping time of aorta was 27.8±7.9 (RP group) and 28.1±6.9 min (TP group); mean perioperative blood loss was 780±320 (TP group) and 740±350 ml (RP group) and duration of mechanical ventilation was 0.74±2.7 (RP group) and 1.14±3.03 (TP group) h, with no statistically significant differences respectively. Plasma concentrations of IL-10 were significantly lower at T1 and T2 in the RP group compared with the TP group (P<0.05). Pulmonary complication, ileus and hospital stay were analysed as lesser in the RP group (P<0.001).

Conclusion: The retroperitoneal approach, associated with significantly low postoperative pulmonary complications, ileus and short hospital stay, may be related to lower increases of IL-10 levels.

P-49

Sodium bicarbonate in the prevention of AKI in adult cardiac surgical patients with preoperative chronic renal failure

Dejan Markovic, Sonja Crkovic, Zeljko Bradic, Aleksandar Mikic, Vladimir Tutus, Svetozar Putnik
Clinical Centre of Serbia, Belgrade, Serbia

Introduction: Acute kidney injury is a common complication in cardiac surgery with cardiopulmonary bypass use. Sodium bicarbonate can protect the kidney from oxidative injury by slowing pH dependent free radical production, directly scavenging peroxinitrite and other reactive oxygen species and protects from free haemoglobin and free iron mediated injury.

Method: This prospective study included 30 adult patients with pre-op. serum creatinine level above 132 µmol/l. Patients were divided in two groups (control group - 15 patients who received normal saline 4 ml kg^{-1} 24 h^{-1} in total and bicarbonate group – 15 patients who received sodium bicarbonate 4 ml kg^{-1} 24 h^{-1} in total, diluted in 1000 ml 5% glucose). Infusions of normal saline or sodium bicarbonate started after induction of anaesthesia. Postoperative AKI was diagnosed as

	NaHCO3 (n=15)	0.9%NaCl (n=15)	P
Age (yr)	72±8	74±8	0.5
CPB (min)	110±10	116±18	0.27
Ao. cross clamp	75±8	78±7	0.28
CABG pts	8	9	>0.05
Ao valve	3	4	>0.05
Mitral valve	2	0	>0.05
CABG/Valve	2	2	>0.05
Preop. Cr (µmol/l)	197±29	194±26	>0.05
Postop Cr (µmol/l)	237±33	287±48	=0.0025
Haemodialysis	0	2	>0.05

an increased creatinine level of more than 50% from baseline.

Results: Between group comparisons were performed with the use of Student`s t-test and Chi-squared test. P<0.05 indicates statistical significance.

Conclusion: Infusion of sodium bicarbonate in a dose of 4 ml kg-1 24h-1 can prevent acute kidney injury in cardiac surgical patients with preoperative chronic renal failure. This is a small pilot study and larger randomized, controlled studies are needed to support these findings.

P-50

Percent error of glycaemia measurement with a glucometer in ICU after cardiovascular surgery

Géraldine Culas, Philippe Gaudard, Jacob Eliet, Loubna Abrakhi, Pascal Colson
Pole Coeur Poumon, CHRU Montpellier, Montpellier, France

Introduction: Hyperglycaemia is associated with deleterious effects in critically ill patients [1,2]. The benefit of strict glycaemia control may depend on the quality of glycaemia measurements. Our objective was to evaluate the precision and bias of glycaemia measurement at the bedside using a glucometer in ICU after cardiothoracic and vascular surgery.

Method: The observational study was conducted on 83 patients including 21 diabetics. The blood glucose level was measured repeatedly by a glucometer (Accu-Chek®) in ICU to maintain glycaemia close to 5-9 mmol/l. An additional glycaemia measurement was obtained from the biochemical laboratory each morning and was used as glycaemia reference (GL). At the same time, blood samples for glucometer measurements were obtained from the arterial line of the blood pressure monitoring (Gma) and from finger pricks (Gmc). Gma and Gmc were compared to GL using linear regression analyses, Bland-Altman method and percent of error (PE) as [GL – Gma or Gmc] / GL x 100].

Results: 263 triplets of glycaemia were obtained from 23 women and 60 men, age 65±13 y. GL was 8.34±2.56 mmol/l; Gma 8.10±2.55 mmol/l and Gmc 7.92±2.49 mmol/l. Gma and Gmc correlate with GL with r at 0.70 and 0.65, respectively. 52% of Gma measurements have a PE <10%, 28% are between 10 and 20%, but 20%, >20%. Mean Gma PE is 2.5%. 52% of Gmc measurements have a PE <10%, 26% are between 10 and 20%, and 22%, >20%. Mean PE for Gmc is 1.11 %. The Bland - Altman method gives a bias of +0.27 mmol/l and precision ±1.96 mmol/l for Gmc; bias is +0.42 mmol/l and precision ±2.10 mmol/l for Gma.

Conclusions: The results suggest that Gmc is at least as good as Gma for assessing glycaemia. However, Gma and Gmc lack precision in at least 20% of measurements. This imprecision should be kept in mind when insulin therapy protocol is intended for tight control of glycaemia.

References:

1. van den Berghe G, Wouters P, Weekers F, Verwaest C, Bruyninckx F, Schetz M, Vlasselaers D, Ferdinande P, Lauwers P, Bouillon R. Intensive insulin therapy in the critically ill patients. N Engl J Med 2001; 345 (19): 1359-67
2. Furnary AP, Gao G, Grunkemeier GL, Wu Y, Zerr KJ, Bookin SO, Floten HS, Starr A. Continuous insulin infusion reduces mortality in patients with diabetes undergoing coronary artery bypass surgery. J Thorac Cardiovasc Surg 2003; 125 (5): 1007-21

Poster session VIII – Cardiac anaesthesia

P-52

Ketamine and haemodynamic stability during induction of anaesthesia: what is the contribution of vascular tone increase?

Irina Tolstova, Boris Akselrod, Nina Trekova, Armen Bunatyan
National Recearch Center of Surgery, Moscow, Russia

Introduction: The aim of the study was to evaluate the influence of isolated ketamine administration to volaemic status and its effect on haemodynamics during induction to anaesthesia.
Method: We randomized 30 patients scheduled for CABG into two groups. At first all patients received midazolam 0.05 -0.07 mg/kg. Then in Gp. 1 (control, n=15) propofol 1.0-1.5 mg/kg and fentanyl 0.003 mg/kg were administered. In Gp. 2 (ketamine, n=15) patients received ketamine 1.0 mg/kg and then propofol and fentanyl were given. We evaluated central haemodynamic parameters using a transpulmonary thermodilution (PiCCO) method and assessed frequency of hyper- and hypotension. For comparing the two groups we used Student's t-test.
Results: Patients didn't differ in central haemodynamic parameters after admission to the operation room. HR, SVI and CI did not change in either group at all the stages. Ketamine administration led to an increase of MAP (from 95±10 to 113±14 mmHg; P<0.05), SVRI (from 2389±387 to 2840±460; P<0.05) and GEDI (from 690±96 to 756±83 mmHg; P<0.05). After induction of anaesthesia MAP and SVRI were higher in Gp. 2, while other parameters did not differ. No hypotension episodes were registered during induction in Gp. 2, whereas in Gp. 1 the frequency of hypotension was 33% (P<0.05). After intubation in both groups MAP and SVRI significantly increased, but the frequency of hypertension (MAP>100 mmHg) was higher in Gp. 2 (60% vs. 13%, P<0.05). In the period of minimal surgical intervention (from intubation to skin incision) MAP was higher in Gp. 2 (85±10 vs. 76±11 mmHg, P<0.05), and the frequency of hypotension had a tendency to be lower in Gp. 2 (13% vs. 33%, P=0.39).
Conclusion: 1. Ketamine increases MAP due to the increase of tone of resistance and capacitance vessels without changes of CI. 2. Ketamine administration during induction of anaesthesia contributed to the lower frequency of hypotension episodes, but caused a higher incidence of hypertensive response to tracheal intubation. 3. Ketamine administration helps to maintain a higher level of MAP during the period of minimal surgical aggression.

P-53

Antibiotic prophylaxis in adult cardiac surgery: What is it all about?

Gyanesh Namjoshi[1], Rahul Bose[2], Anirudda Pai[1]
[1]Essex CTC - Basildon & Thurrock University Hospital NHS Trust, Basildon, Essex, UK, [2]Nottingham University Hospitals NHS Trust, Nottingham, UK

Introduction: Surgical site infection (SSI) following cardiac surgery can be a devastating complication. Currently there is no published guideline on perioperative antibiotic prophylaxis by ACTA/EACTA or SCTS/EACTS. A β-lactam antibiotic is recommended as first line, while a glycopeptide antibiotic is suggested for β-lactam allergy and MRSA positive status [1]. Antibiotic prophylaxis of ≥ 24 h may be more efficacious in preventing sternal SSI compared to shorter regimens. Appropriate timing and dosage, ease of admin-

istration and the local resistance patterns are the vital factors when considering an optimal prophylaxis regimen. We therefore aimed to establish if there was consistency in approaches to antibiotic prophylaxis in adult cardiac surgery.

Method: A postal questionnaire was sent to the cardiac anaesthesia departments in 39 centres across the UK. The following data was collected: 1) presence/absence of locally agreed prophylaxis guideline, 2) antibiotic regimen used and duration of prophylaxis, 3) timing of antibiotic administration, 4) choice of antibiotic in non-β-lactam cases and the associated rationale, 5) antibiotic regimen used for non-CABG cases.

Results: We recorded a 74% response rate. 96% had a locally agreed protocol in place. A 48 h prophylaxis was followed in 70% of centres compared to 24 h in 14% of centres. Flucloxacillin combined with gentamicin was used in 70%, while Cefuroxime alone was used in 22% of centres. Teicoplanin (52%) was the preferred choice over Vancomycin (37%) in MRSA positive and in β-lactam allergy cases. Teicoplanin users preferred it over Vancomycin for ease of administration, single dosage and fewer complications. A separate protocol was followed in 33% of centres for non-CABG cases.

Discussion: Most centres have locally agreed protocols. Dual agent prophylaxis was used by the majority but with many inconsistencies. More centres appear to be moving towards Teicoplanin as an alternative to beta lactam antibiotics for its similar spectrum of cover to Vancomycin and inherent advantages. A complex regimen, missed doses, inappropriate timing and duration may further escalate the risks of mediastinitis and endocarditis. Bringing in a uniform guideline for antibiotic prophylaxis in cardiac surgery is imperative.

Reference:

1. Engelman R, Shahian D, Shemin R, Guy TS, Bratzler D, Edwards F, Jacobs M, Fernando H, Bridges C; Workforce on Evidence-Based Medicine, Society of Thoracic Surgeons. Antibiotic prophylaxis in cardiac surgery, part II: Antibiotic choice. Ann Thorac Surg 2007; 83 (4): 1569-76

P-53

Evaluation of effects of H1 and H2 blockers on haemodynamic changes after protamine administration in coronary artery bypass graft surgery

Mojtaba Mansouri, Keivan Bagheri, Mohammad Taghi Ebrahimian
Anaesthesiology and Critical Care Research Canter, Isfahan University of Medical Sciences, Isfahan, Iran

Introduction: Adverse reaction to protamine range from seemingly innocuous hypotension to a more profound and haemodynamically significant reaction that has been linked to increased hospital mortality.

Method: In a prospective, randomized and double blind clinical trial, 86 patients were studied in two groups (1-β=80%). Patients in an antihistamine group (n=43) received an oral H2 blocker (famotidine 0.1 mg/kg) and oxazepam (10 mg) in the night before surgery and intramuscular H1 blocker (promethazine 0.5 mg/kg) and morphine (0.1 mg/kg) half an hour before surgery. Patients in a control groups (n=43) were pre-treated with oral oxazepam (10 mg) the night before surgery and intramuscular morphine (0.1 mg/kg) half an hour before surgery. After termination of the extracorporeal circulation heparin was neutralized by administration of protamine (during 5 minutes). Haemodynamic measurements (pulmonary artery pressure, arterial blood pressure, heart rate and central vein pressure) were made before and 2, 5, 10 and 15 minutes after protamine administration.

Results: After protamine administration; in the antihistamine group heart rate decreased and central vein pressure did not change significantly. However a significant progressive increase in systemic arterial pressure ($P<0.007$) and decrease in pulmonary artery

Table 1: Haemodynamic changes (mmHg, mean±ST) after protamine administration in two groups

		Protamine				
		5 min before	**2 min after**	**5 min after**	**10 min after**	**15 min after**
ABP	Antihistamine	70 ±11.3	77.1±12.4	79±10.5*	80.5±11*	81.8±12 *
	Control	74.5±12.4	70±14.6*	72.5±13.1	75.5±12.5	76.7±9.8
PAP	Antihistamine	18.5±6.75	17.02±4.5	17.56±4.5	16.6±4.3*	16.5±3.9*
	Control	17.56±4.5	17.9±6.77	18.57±6.7	17.7±6	17.1±5.9

*P<0.05; ABP: Arterial Blood Pressure, PAP: Pulmonary Arterial Pressure

pressure (P<0.002) occurred in these patients (Table 1).

Discussion: Despite some reports, this study revealed that pre-treatment with histamine blockade prevents some adverse reactions to protamine such as systemic hypotension and pulmonary hypertension. These finding confirm our experience about our centre's pre-treatment regimen.

Reference:

1. Welsby IJ, Newman MF, Phillips-Bute B, Messier RH, Kakkis ED, Stafford-Smith M. Hemodynamic changes after protamine administration: association with mortality after coronary artery bypass surgery. Anesthesiology 2005; 102 (2): 308-14

P-54

Evaluation of a new software version (Version 3.02) of the FloTrac during OPCAB

Marco Covotta, Paola Vaccaro, Riccardo Barchetta, Gloria Riitano, Flavio Gargano, Mauro Falco, Franco Turani
Cardiac Anaesthesia, European Hospital, Rome, Italy

Introduction: Off-pump coronary artery bypass is frequently used in cardiac surgery and may be useful in some clinical situations. During OPCAB, rotating and compressing the beating heart may result in acute deterioration of haemodynamics and monitoring of CO in continuous mode (CCO) is clinically useful. The FloTrac/Vigileo is a minimally invasive system to monitor CCO without calibration. The aim of this study on OPCAB patients was 1) to assess the accuracy of the new third generation (version 3.02) FloTrac/Vigileo software; 2) to compare the new version with the previous one (version 1.10).

Method: Twenty patients submitted to OPCAB were included in this study. The CO was measured simultaneously with FloTrac/Vigileo (version 3.02) and by single-bolus thermodilution (in triplicate) at 5 time points: T1, after anaesthesia induction; T2, left anterior descending anastomosis; T3, obtuse marginal anastomosis; T4, posterior descending anastomosis; T5, sternal closure. Bland Altman analysis was used to compare Trac / Vigileo and Thermodilution measurements. Percentage Error (PE), concordance rate, and correlation coefficient were also evaluated.

Results: Table 1 shows the main results of the study. CCO FloTrac well correlated with ther-

Table 1

Number of data pairs	120
Number of patients	20
Bland & Altman	
Mean CO L min^{-1} m^{-2}	5.2 ± 1.2
Bias L min^{-1} m^{-2}	0.38
Limits of agreement	-1.1 to 1.9
Percentage error %	35
Correlation coefficient for r line	0.82
Concordance rate %	92

modilution measurements although PE was little higher then 30 %.

Conclusions: The new version of software shows a good correlation with thermodilution but accuracy and precision is little below the current benchmark. The new algorithm provides improvement over the previous version. In the light of the recent meta-analysis on minimal invasive CO [1] and of data of this study, FloTrac Vigileo may be a valuable tool during OPCAB.

References:

1. Peyton PJ, Chong SW. Minimally invasive measurement of cardiac output during surgery and critical care: a meta-analysis of accuracy and precision. Anesthesiology 2010; 113 (4): 1220-35

P-55

Effects of intraoperative monitoring of cerebral oximetry on postoperative neurocognitive functions of patients after CABG surgery

Senem Girgin[1], Murat Aksun[2], Nagihan Karahan[1], Birzat Emre Golboyu[1], Atilla Sencan[1], Ismail Yurekli[3], Tevfik Gunes[1], Gulcin Aran[1], Ali Gurbuz[4]

[1]Ataturk Training and Research Hospital Anesthesiology and Reanimation Clinic, Izmir, Turkey, [2]Ataturk Training and Research Hospital and Katip Çelebi University Anesthesiology and Reanimation Clinic, Izmir, Turkey, [3]Ataturk Training and Research Hospital Cardiac Surgery Clinic, Izmir, Turkey, [4]Ataturk Training and Research Hospital and Katip Celebi University Cardiac Surgery Cilic, Izmir, Turkey

Introduction: NIRS(Near infrared spectroscopy)is a noninvasive method of neuromonitoring which allows the measurement of cerebral regional oxygen saturation. Knowledge of oxygen saturation in this region provides early warning for potential cerebral ischaemia [1]. In this study we evaluated the effects of intraoperative NIRS usage on postoperative neurocognitive functions in patients who had undergone CABG.

Method: One hundred patients between 18-65 yr of age were included in our study. After the approval of the ethical committee and patients' consent, patients were randomized into two groups, Group I and Group II (control group) with equal numbers. INVOS were used for cerebral oximeter monitoring and basal NIRS measurements were taken in both groups. During surgery, pump blood flow was between 2.2-2.4 L min^{-1} m^{-2} and mean arterial pressure was between 50-80 mmHg. Despite adequate depth of anaesthesia, in cases of high blood pressure, a vasodilator and with low levels, a vasopressor (ephedrine) were used. Intraoperative haematocrit was targeted to be between 20-25%. In group I when a 20% decrease from baseline NIRS monitor was detected, FiO_2 was raised to 100%, $PaCO_2$ aimed to be 40-45 mmHg and mean arterial pressure to be 70-80 mmHg. The pump blood flow was increased to 2.5 L min^{-1} m^{-2}, depth of anaesthesia increased, and 10-30 μg kg^{-1} min^{-1} nitroglycerine was started in order to increase cerebral blood flow. Erythrocytes were given when the haematocrit was below 20%. In group 2, without any evidence of NIRS values, management was maintained in accordance with clinical practice and experience. In case of hypotension, the mean arterial blood pressure aimed to be increased to 70-80 mmHg. For this purpose, pump blood flow was raised to 2.5 L min^{-1} m^{-2}, if necessary ephedrine or epinephrine was administered, FiO_2 was 100%, and erythrocytes were given when the haematocrit value was below 20%. The preoperative and postoperative neurocognitive tests were performed in all patients at the 5^{th} day.

Results: Although significant statistical differences were not detected between the two groups except at certain periods, extubation time, ICU length of stay and duration of total hospitalization were statistically significantly shorter in group I. CPB time and operation time were shorter coincidentally and postop-

erative blood loss was significantly less in these cases. Additionally, when NIRS values were examined again, except 80th min. values, we obtained high values of group I during the entire operation.

Discussion: It is really difficult to say that these differences have come from the use of NIRS. We think that this study should be repeated and supported with studies that have more patients.

References:

1. Roach GW, Kunchuger M, Mangano CM, Newman M, Nussmeier N, Wolman R, Aggarwal A, Marschall K, Graham SH, Ley C. Adverse cerebral outcomes after coronary bypass surgery. N Engl J Med 1996; 335 (25): 1857-63

P-56

The influence of carbon dioxide field flooding in mitral valve procedures using extracorporeal circulation on S100B marker in blood plasma

Pawel Slozowski, Mariusz Listewnik, Miroslaw Brykczynski
Pomeranian Medical University, Szczecin, Poland

Introduction: Neurocognitive deficits after cardiac surgery are described in 4 to 33% of patients in the first 7 days. Postulated explanations are microembolization of small brain arterioles with air or solid particles and use of the extracorporeal circulation (ECC). Despite de-airing in valve surgery, some air always remains captured in pulmonary veins and evacuates only after weaning from ECC. Field flooding is a technique which aims to replace air in the surgical wound cavity with carbon dioxide, which should pose less danger of microemboli because of its greater solubility. Conducted research studies have shown various results, but the matter remains unresolved. S100B is a small astroglial protein and is released to blood plasma after brain injury. Its increase after cardiac surgery has been connected with neurocognitive dysfunction.

Method: We conducted a randomized controlled clinical trial on mitral valve procedures in a study group of 49 patients and 51 in a control group. Exclusion criteria were: minimal invasive operations, concomitant aortic valve and aorta procedures or brain damage incidents in the past. All the operations were performed by classic access and most of them were combined cardiac procedures. Carbon dioxide insufflation at 6 litres per minute was administered by a multiperforated drain with closed end in the study group, starting 60 seconds before opening the left atrium. Blood samples for S100B measurement were taken before the operation, 2 h after cross-clamp release and 24 h postoperatively.

Results: There were no statistically valid differences between groups in S100B increase at 2 h and 24 h postoperatively, despite a 13% higher short term marker increase in the control group. Increase of S100B at 2 h was statistically greater in patients after mitral valve replacement (MVR) compared to plasty (MVP) group and correlated with concomitant tricuspid valve plasty (TVP), although the TVP group had greater bypass times.

Conclusion: Lack of strong evidence makes routine use of CO_2 slightly unjustified, but the matter requires further studies. MVP patients may have better neurologic outcome than MVR, but have different organic valve disease.