FREE POSTER SESSIONS

Poster Session – Best Posters

P-1
Association of carotid arterial circumferential strain with left ventricular function and haemodynamic compromise during off-pump coronary artery bypass surgery

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Introduction. Large artery stiffness is closely coupled with ventricular function. A measure of common carotid arterial circumferential strain (CCA CirS) using ultrasound speckle tracking analysis is a novel indicator of vascular stiffness. We evaluated its predictive value for haemodynamic deterioration during mechanical heart displacement in off-pump coronary artery bypass graft (OPCAB) surgery.

Methods. Patients scheduled for multivessel OPCAB surgery with left ventricular ejection fraction ≥ 50% were prospectively enrolled. Intra-operative cardiac index and mixed venous oxygen saturation (SvO_2) were compared in relation to the tertile distribution of the CCA CirS.

Results. A total of 96 patients' data were analysed. Cardiac index and SvO_2 during left circumflex artery grafting and after sternum closure were significantly lower in the first tertile than those in the third tertile. Univariate logistic regression analysis revealed female, ratio of early transmitral velocity to early diastolic mitral annular velocity, pulse pressure, and the CCA CirS as predictors of haemodynamic deterioration (decrease in SvO2 ≥20%), while only the CCA CirS remained as an independent predictor after multivariate analysis (odds ratio 0.27, 95% confidence interval 0.11-0.68). The optimal cut-off value for the prediction of haemodynamic deterioration measured by receiver-operator characteristic curve was 2.016 (%) CCA CirS with a sensitivity and specificity of 71.4% and 73.7%, respectively (area under the curve: 0.730; 95% confidence interval: 0.608-0.852; $p = 0.002$).

Discussion. A measure of the CCA CirS may provide comprehensive risk stratification in patients requiring surgical coronary revascularization in a highly feasible and reproducible manner.

P-2
Ultrasound acquired cardiac power integral: minimally invasive instantaneous monitoring of cardiac energy delivery in the failing heart in pigs

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Introduction. Cardiac power output (CPO) has shown a great ability to predict outcome in a broad spectrum of cardiac disease. The cardiac power integral (PWR-integral) is an instantaneous equivalent to CPO. In a previous study, we have demonstrated that an invasively measured PWR-integral closely followed stroke work (SW) over large variations of afterload, preload and contractility in healthy porcine hearts. In this study, we aim to validate a minimally invasive method for

acquiring the PWR-integral and to test this method in failing hearts.

Methods. Seven pigs were examined using Doppler ultrasound to measure aortic flow, which was combined with brachial blood pressure to calculate a low invasive PWR-integral (uPWR-integral) during mechanically manipulated preload and afterload, before and after induced global ischaemic left ventricular failure. The uPWR integral was compared to an invasive PWR-integral obtained by a transit time flow probe and an aortic micromanometer (ttPWR-integral), and SW, calculated as the area encompassed by a pressure-volume-loop (PV-loop) acquired by an intraventricular Leycom conductance catheter.

Results. Bland-Altman limits of agreement analysis illustrate a high degree of agreement between the uPWR-integral and the ttPWR-integral, although the uPWR-integral overestimates by a factor of approximately 1.2 compared to the ttPWR-integral. Regression analysis demonstrates that the uPWR-integral follows SW both before and after induced ventricular failure, although a mitral regurgitation that followed induced failure led to a reduction of uPWR compared to SW. Pearson correlation coefficients for each animal between SW and the uPWR-integral were in the range of 0.816 and 0.963.

Discussion. The uPWR-integral seems promising for minimally invasive measurement of cardiac energy delivery and could prove to be a valuable parameter to optimize circulatory unstable patients.

P-3
Helium post-conditioning increases caveolin 1 and 3 protein levels in serum of rats

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Introduction. The noble gas helium induces pre- and post-conditioning in different models of ischaemia reperfusion in animals and in humans [1]. The exact mechanisms are still unknown. Recent data suggest a role for caveolins, structural scaffolding proteins that allow for organization of signaling molecules in caveolae, membrane invaginations enriched in lipids. Caveolin-1 and -3 are essential players in ischaemic- and volatile anaesthetic induced cardioprotection [2]. Caveolins are secreted into the bloodstream after helium inhalation in mice [3]. Here, we hypothesize that helium post-conditioning induces caveolin-1 and -3 secretion into the blood of rats.

Methods. Rats were subjected to 25 min of cardiac ischaemia and 5, 15 or 30 min of reperfusion. He5 (n = 6), He15 (n = 8) and He30 (n = 8) groups inhaled 5, 15 and 30 min of 70% helium during reperfusion and were compared with controls not inhaling helium (IR5, IR15 and IR30). Serum of the rats was analysed by Infrared Western Blotting for expression of caveolin 1 and 3. Statistical analysis was performed by Student's t-test. Data are mean ± SD of arbitrary units of light intensity.

Results. He15 post-conditioning increased caveolin-3 significantly in the serum compared with the IR15 group (7.6 ± 0.37 vs. 6.4 ± 0.37, $p \leq 0.05$). He30 was associated with significant higher levels of caveolin-1 in

the serum compared with IR30 group (3.3 ± 0.23 vs. 2.2 ± 0.18; $p \leq 0.01$). Caveolin-1 levels at 15 minutes and caveolin-3 levels at 30 minutes were not significantly different. In He5 and IR5 animals, no differences were found.

Discussion. These data suggest that post-conditioning with 70% helium for 15 and 30 minutes causes higher caveolin-1 and -3 levels in the serum of rats.

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P-4
A comparison of the efficacy and adverse effects of double-lumen endobronchial tubes and bronchial blockers for lung isolation: a systematic review and meta-analysis

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Introduction. Bronchial blockers (BBs) and double-lumen endotracheal tubes (DLTs) may be used to obtain lung isolation. However, controversy exists as to which is easier to use and has fewer adverse outcomes. Randomized controlled trials (RCTs) have been undertaken but they have small study population sizes so inflating their risk of Type II statistical error. The aim of this study was to compare the efficacy and adverse effects of BBs and DLTs by systematic review and meta-analysis of RCTs.

Methods. A comprehensive literature search was conducted for RCTs comparing BBs and DLTs using Google Scholar, Ovid Medline and Cochrane library databases up to October 2013. Inclusion criteria were RCTs comparing BBs and DLTs, intubation carried out by qualified anaesthetists or trainee specialists and outcome measures relating to either efficacy or adverse effects. Studies that were not published in English were excluded.The systematic review of papers used the PRISMA 27-step checklist. Mantel-Haenszel fixed-effect meta-analysis of recurring outcome measures was performed using RevMan 5 software.

Results. Seven hundred and ninety one participants were included in the 13 RCTs that were published between 1996 and 2013. DLTs were quicker to place (mean difference: 51; 95% CI: 8.48-93.62 seconds; p = 0.02) and less likely to be incorrectly positioned (odds ratio (OR) 2.70; 95% CI 1.18-6.18; p = 0.02) than BBs. BBs resulted in less postoperative sore throat (OR): 0.39; 95% CI: 0.23-0.68; p = 0.0009), less hoarseness (OR: 0.43, 95% CI 0.24-0.75, p = 0.003) and fewer airway injuries (OR: 0.40, 95% CI 0.21-0.75, p = 0.005) than DLTs.

Discussion. Whilst BBs are associated with a lower incidence of airway injury and a lower severity of injury, DLTs take less time to place correctly and are easier to do so.

P-5
The relationship between hospital surgery volume and surgical outcomes following oesophageal cancer resection

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Introduction. The relationship between the number of operations conducted in a hospital (HSV: Hospital Surgery Volume) and the mortality of surgery in a hospital were investigated in many countries. Some studies suggested more HSV was related to less mortality, especially in complicated surgery. However, other studies did not show that HSV were significantly related with mortality. There have been numerous studies investigating the relationship between HSV and other surgical outcomes, but the results were controversial. We investigated the effects of HSV on in-hospital mortality and postoperative length of stay (LOS) following oesophageal cancer resection.

Methods. We identified 3,918 patients who underwent oesophageal cancer resection in Japan. The data were taken from national reimbursement database called Japanese Diagnoses Procedure Combination which had 5.85 million inpatient data. Patients were divided into four groups in order of HSV; high (H), medium-high (MH), medium-low (ML) and low (L). The size of each group was designed to be equal. Multivariate regression analyses were conducted to analyse the concurrent effects of patient demographic and medical factors and surgical types on postoperative outcomes.

Results. Overall in-hospital mortality was 4.1%, and was significantly lower in group H, MH and ML compared with group L (1.6%, 4.1%, 4.7%, and 5.9%, respectively; $p < 0.001$). LOS was shorter in higher-volume groups than in group L (mean of H 26.0 days, MH 28.0 days, ML 28.0 days and L 32.0 days, respectively; $p < 0.001$). The Hazard Ratio of group H, MH and ML of discharge from hospital compared with group L were 1.34, 1.31 and 1.21, respectively.

Discussion. Higher HSV was associated with significantly lower in-hospital mortality and shorter postoperative LOS following oesophageal cancer resection in Japan. The differences in LOS between group H and group L may be large enough to consider centralization of oesophagectomy surgery to utilize limited medical resources effectively although geographic factors may become obstacles of implementation.

Poster Session – Cardiac Anaesthesia: Risk Factors & Outcome

P-6
Does volatile anaesthetic exposure lead to an improvement in patient outcome after cardiac surgery: a meta-analysis

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Introduction. Cardiac surgery is associated with myocardial ischaemia and the release of cardiac enzymes. The use of volatile anaesthetics may reduce myocardial damage but randomized studies have shown conflicting **Results.** We have conducted an updated review to determine if volatile anaesthetic exposure leads to an alteration in troponin levels and optimization of cardiac outcomes compared with an intravenous anaesthetic control.

Methods. Institutional approval was obtained prior for the conduct of this analysis. The full protocol conformed to the PRISMA guidelines for meta-analysis design. PubMed, clinicaltrials.gov and the Cochrane Library databases were searched with limitation to prospective randomized trials. There were no restrictions in the language or date of publication. Trial quality was assessed

using Eggers methodology. The outcome variables were blood troponin, cardiac index and mortality at 30 days. Analyses were completed with REVMAN5 software on an intention to treat basis. Heterogeneity was assessed with the I2 statistic with a value of > 75% regarded as high. Publication bias was assessed through the use of the funnel plot.

Results. A literature search identified 59 studies enrolling 5687 patients. Overall volatile anaesthetic exposure was associated with a reduction in troponin values (Table 1). A sub-group analysis for troponin T did not meet criteria for statistical significance (p = 0.23). Cardiac indices in the volatile exposed group were elevated after the ischaemic insult until 12 h postoperatively compared to intravenous controls. There was no difference in 30 day mortality (Odds Ratio 0.75 [0.44-1.29]). The I^2 values were elevated indicating heterogeneity between studies. Funnel plot review revealed significant publications bias with a lack of negative studies.

Discussion. Our data revealed that volatile anaesthetic exposure corresponds to lower troponin values and an increase in postoperative cardiac indices. This was not associated with any significant change in postoperative mortality. There were significant differences between studies which cannot be explained by random chance alone. Publication bias also exists with a distinct lack of negative publications.

P-7
Pre-operative IABP to reduce mortality in CABG surgery: a meta-analysis of randomized controlled trials

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Introduction. Intra-aortic balloon pump (IABP) is routinely used in heart failure patients undergoing cardiac surgery. However its impact on clinical outcome is yet a matter of debate. We performed a meta-analysis of all the randomized controlled trials (RCTs) that investigated the use of pre-operative IABP in adult high-risk patients undergoing coronary artery bypass grafting (CABG).

Methods. Eligible trials were identified by searching Medline, Embase, Scopus, ISI Web of Knowledge and the Cochrane Library. Analysis was performed using STATA 11.0 Software (StataCorp LP, College Station, TX, USA). The primary endpoint was mortality at the longest follow-up available and the secondary endpoint was 30-days mortality.

Results. Eight pertinent RCTs were identified and included in the meta-analysis, for a total of 625 enrolled patients (312 assigned to receive IABP and 313 controls). Pre-operative IABP implantation was found to be associated with a significant reduction in mortality risk (11 of 312 [3.5%] in the IABP group versus 33 of 313 [11%] in the control group, RR 0.38 [95% CI 0.20-0.73], p for effect = 0.004, p for heterogeneity = 0.7, I^2 = 0). The benefit on mortality reduction was confirmed when restricting the analysis to trials with low risk of bias, to those reporting 30-days follow up and to patients undergoing on-pump CABG surgery.

Discussion. Prophylactic intra-aortic balloon pump can reduce peri-operative and 30-days mortality in high-risk patients undergoing coronary artery bypass grafting.

P-8
On-pump vs. off-pump coronary artery bypass graft surgery (CABG): outcomes after 10 years of experience

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Introduction. We aim to describe our experience in CABG with cardiopulmonary bypass vs. without cardiopulmonary bypass (on pump vs. off pump technique) comparing intra-operative and postoperative outcomes.

Methods. From January 2003 to June 2013, 3,097 patients underwent consecutive emergency and scheduled CABG surgery. 1,770 underwent on-pump CABG and 1,327 off-pump CABG according to surgeon´s criteria. Patients undergoing on-pump without aortic clamping, receiving other concomitant procedures or re-operations were excluded. A propensity score matching was performed to identify appropriate matched pair patients between groups by building a binary logistic regression model with the main pre-operative risk variables and comorbidities. Univariate and multivariate logistic regression analysis was performed to assess significant predictors of 30 day morbidity composite endpoint (renal, pulmonary, cardiovascular and neurological) and mortality composite endpoint.

Results. We identified 1004 patients in each group. The average of grafts performed was higher in the on-pump group, 3.50 ± 0.96 vs. 2.87 ± 0.99 ($p < 0.001$). There were no significant differences in mortality between groups, 2.8% vs. 3.8%, respectively ($p = 0.21$). ICU and hospital length of stay (LOS) were higher in the on-pump group, 4.1 ± 2.6 vs. 3.4 ± 2.3 ($p < 0.001$) and 9.7 ± 5.8 vs. 7.8 ± 4.1 ($p < 0.001$). Cardiovascular, neurological, respiratory and renal complications were more frequent in the on-pump CABG group, 13.9% vs. 8.7% ($p < 0.001$), 3.9%vs. 2.2% (p 0.03), 13.5% vs. 7.5% ($p < 0.001$), 7.1% vs. 5.3% ($p = 0.095$). In both uni-and multivariate analysis pre-operative renal failure, chronic obstructive pulmonary disease and on-pump CABG were independent predictors of morbidity and mortality composite endpoints.

Discussion. Both coronary revascularization techniques are safe options. However, off pump CABG is associated with less postoperative mortality and shorter hospital and ICU LOS. It would be important to assess the long term impact of a reduced number of grafts performed in the off-pump CABG.

P-9
Propofol and survival: a meta-analysis of randomized clinical trials

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Introduction. One of the most commonly used hypnotics is propofol, which is well known to non-anaesthesiologists because of its white colour and to the large public because of Michael Jackson's death. Propofol is widely used in different settings because of its characteristics: fast induction, rapid elimination, short duration of action, smooth recovery from anaesthesia, few adverse effects, and no teratogenic effects, characteristics that undoubtedly contributed to its popularity. However, its effect on survival is unknown, with meta-analyses reporting an increased mortality in cardiac surgical patients receiving a propofol-based total in-

travenous anaesthesia. Furthermore, the possibility of infections and the "propofol syndrome" have suggested that this drug might be dangerous. We decided to carry out a meta-analysis of all randomized controlled studies ever performed on propofol versus any comparator in any clinical setting.

Methods. Pertinent studies were independently searched in BioMedCentral, PubMed, Embase, and the Cochrane Central Register of clinical trials by expert investigators. The following inclusion criteria were used: random allocation to treatment and comparison between propofol and any comparator in any clinical setting. Computations were performed with Stata (release 11, College Station, TX) and SAS 2002-08 program (release 9.2, SAS Institute, Inc, Cary, NC). Outcomes from individual studies were analysed to compute individual and pooled risk ratio (RR) with pertinent 95% confidence interval (CI), by means of inverse variance method and with a fixed-effect model.

Results. One hundred and thirty-three studies randomizing 16,026 patients were included. No difference in mortality between patients receiving propofol (335/7,758 [4.30%]) versus any comparator (324/8,268 [4.0%]) were observed in the overall population (RR 1.04, [95% CI 0.92 to 1.18], $p = 0.5$) and in several subanalyses.

Discussion. In spite of theoretical concerns, propofol has no detrimental effect on survival according to the largest meta-analysis of randomized controlled trials ever performed on this hypnotic drug.

P-10
Estimating plasma oncotic pressure and its relationship with early morbidity in postoperative cardiac surgery: preliminary study

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Introduction. The stress caused by cardiac surgery provokes an increase of cytokines that alter the functioning of vascular endothelium and produces capillary leak into the interstitial space. It is associated with increased postoperative morbidity and mortality. The balance between plasma hydrostatic and colloid osmotic pressures is the key to maintaining water distribution in the interstitial and extravascular spaces. Different methods for calculating these pressures have been developed without a clear superiority of one over the others. However, the Landis-Pappenheimer equation shows a better correlation in critical patients. The objective of this study is to estimate the peri-operative colloid osmotic pressure (COP) through the use of Landis-Pappenheimer formula and find out if it is related to the development of complications. We present the preliminary analysis of the first 20 enrolled patients.

Methods. This is a prospective cohort study in patients undergoing any kind of cardiac surgery not meeting any of the exclusion criteria such as renal, intestinal or hepatic disease, gammopathies, apart from malnutrition.

Results. The pre-operative COP was 30.50 mmHg, a typical deviation of 8.63 producing a significant statistical reduction ($p < 0.0001$) of the COP of 43% in the immediate postoperative period. There was no improvement of this value measured 48 h after surgery. We did not find significant differences between a decrease of COP and

the development of complications after 48 h. The most frequent observed complication was SIRS defined by the ACCP/SCCM [3] criteria with an incidence of 30% in our series and we did not find significant statistical differences in the COP values of the SIRS patients in the first 48 h compared to the rest of the patients. However, in our sample, we observed that all patients with COP over 18.6 mmHg after 48 h, did not have SIRS criteria. After the first 48 h, we observe an average weight gain of 2.5 kg (standard deviation of 2.2 kg). With the available data, we did not find any relationship between the weight gain and the PCO decrease after 48 h and the development of complications.

Discussion. The incidence of SIRS in our analysis is similar to those found by other authors. The Landis-Pappenheimer formula for pre-operative COP does not predict the development of complications, nor did we find a relationship between the COP decrease and the development of complications after 48 h, but it seems that COP values over 18.5 mmHg after 48 h can predict that the patient will not have inflammatory complications according to the ACCP/SCCM criteria. The fluid overload increased the weight by an average of 2.5 kg after 48 h, without any relationship with complications.

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P-11
Association between red blood cell storage duration and clinical outcome in patients undergoing off-pump coronary artery bypass graft surgery

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Introduction. Prolonged storage of red blood cells (RBCs) leads to fundamental changes in both the RBCs and the storage medium. We retrospectively evaluated the relationship between the RBC age and in-hospital and long-term postoperative outcomes in patients undergoing off-pump coronary artery bypass surgery (OPCAB).

Methods. The electronic medical records of 1,072 OPCAB patients were retrospectively reviewed and information on the transfused RBCs and clinical data were collected. The effects of RBC's age (mean age, oldest age of transfused RBCs, any RBCs older than 14 days) on various in-hospital postoperative complications and long-term major adverse cardiovascular and cerebral events (MACCEs) over a mean follow-up of 31 months were investigated using multivariate analysis. Correlations between RBCs age and duration of intubation, intensive care unit, or hospital stay, and base excess at the first postoperative morning were also analysed.

Results. After adjusting for confounders such as total number and oldest age of transfused RBCs, hypertension, intra-aortic balloon pump, diabetes mellitus and body mass index, there was no relationship between the RBC's age and in-hospital and long-term clinical outcomes except for postoperative wound complications. Thus, additional adjusted model for wound complications was constructed using the oldest age of transfused RBCs as quartile. There were a significant linear trend between the oldest age quartiles of transfused RBCs and the postoperative

wound complications (quartile 1 vs. 2, 3 and 4: OR, 8.92, 12.01 and 13.79, respectively; p for trend = 0.009). The oldest transfused RBCs showed significant relationships with a first postoperative day negative base excess (p = 0.021), postoperative wound complications (p = 0.001), and length of hospital stay (p = 0.008).

Discussion. In patients undergoing OPCAB, the oldest age of transfused RBCs was associated with a postoperative negative base excess, increased wound complications, and a longer hospital stay, but not with the other in-hospital outcomes or long-term MACCEs.

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Poster Session – Mitral Valve and Vascular

P-12
Anaesthesia management for MitraClip device implantation: a case series at National Heart Centre, Singapore

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Introduction. Percutaneous MitraClip implantation has been demonstrated as an alternative procedure in high-risk patients with symptomatic severe mitral regurgitation (MR) who are not suitable (or) denied mitral valve repair/replacement due to excessive comorbidity. The MitraClip implantation was performed under general anaesthesia and with 3-dimensional transoesophageal echocardiography (TOE) and fluoroscopic guidance.

Methods. Peri-operative patient data were extracted from the electronic and paper medical records of 32 patients who underwent MitraClip implantations.

Results. Thirteen MitraClip implantations were performed in the catheterization laboratory; the remaining 19 were performed in the hybrid operating theatre. In 2 patients, the procedure was aborted, in one due to migration of the Chiari network into the left atrium and in the other, the leaflets and chords of the mitral valve tore during clipping resulting in consideration for open surgery. In the remaining 30 patients, MitraClip was implanted and the patients showed acute reduction of severe MR to mild-moderate MR. All the patients had invasive blood pressure monitoring and the initial 6 patients had central venous catheterization prior to the procedure. Intravenous heparin was administered after the guiding catheter was introduced through the inter-atrial septum and activated clotting time was maintained beyond 250s throughout the procedure. Protamine was administered at the end of the procedure. All the patients were monitored in ICU after the procedure.

Discussion. Percutaneous MitraClip implantation is a feasible alternative in high-risk patients with symptomatic severe MR. Anaesthesia management requirements are similar to open surgical mitral valve repair or replacement. TOE plays a vital role during the MitraClip implantation.

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P-13
Minimally invasive mitral valve surgery: the largest Russian experience

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Introduction. It is believed that minimally invasive mitral valve surgery (MIMVS) has

multiple benefits as compared to median sternotomy. In Russia, little is known about clinical implications of MIMVS due to lack of experience.

Methods. We retrospectively analysed the clinical course of 146 patients operated with MIMVS (75) or median sternotomy (71). Peri-operative characteristics and complication rates were studied. ANOVA, logistic regression, chi-squared or Fisher's exact tests were used for the analysis. Data are median (25; 75 percentile) or number (%). $p < 0.05$ was considered statistically significant.

Results. MIMVS patients were younger than those operated with sternotomy ($p = 0.01$). No other differences in patients' baseline characteristics were observed. Bypass times were 180 (139; 224) and 84 (69; 117) min in the MIMVS and sternotomy groups, respectively, $p < 0.01$. Aortic cross-clamping times were 111 (87; 145) and 62 (49; 81) min in the two groups. Heart failure (HF) occurred in 17 (22.7%) and 7 (9.9%) cases in MIMVS and sternotomy groups, respectively, $p = 0.06$. Odds ratio (95% CI) for HF associated with MIMVS was 2.7 (1.1-6.9), $p = 0.03$. Respiratory failure occurred in 6 (8%) cases in the MIMVS and was not observed in the sternotomy group, $p = 0.03$. Re-exploration for bleeding was required in 4 (5.3%) and 3 (4.2%) cases in the MIMVS and sternotomy groups. No infection complications occurred in either group. Two (2.7%) patients died in the MIMVS group and none in the sternotomy group, $p = 0.50$. Hospitalization times did not differ between the groups.

Discussion. Our experience with MIMVS started in 2011 and at the moment it is the largest in Russia. Our data suggest that MIMVS is inferior to sternotomy in terms of cardiovascular and respiratory complications. The former might be attributed to the longer ischaemic period as compared to sternotomy while the latter may be due to one-lung ventilation used with MIMVS. Sparse bleeding data and absence of infection cases do not permit conclusions on these matters. As the cohort matures data on long-term outcomes will become available.

P-14
Assessment of the mitral ring geometry after MitraClip procedure using Real Time 3D transoesophageal echocardiography

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Introduction. MitraClip procedure is a new treatment option for high risk patients with severe mitral regurgitation. In contrast to surgical mitral valve repair, no annuloplasty ring is inserted during the procedure. The aim of our study was to examine the change in mitral annulus area after implantation of a MitraClip with the help of Real Time 3D.

Methods. After induction of general anaesthesia a 3D TOE probe (iE 33, Philips Amsterdam, The Netherlands) was inserted and a comprehensive 2D examination was performed. In addition a full volume dataset was recorded. With the help of a special software (Qlab®, Philips, Netherlands) the mitral annulus area and the latero-medial distance were measured pre- and post MitraClip insertion. Values are expressed as mean with standard deviation.

Results. Twenty three patients with secondary mitral regurgitation were included. The mean mitral annulus area post-interventionally was only slightly reduced (12.9 $cm^2 \pm 2.8$ cm^2 pre- vs. 12.1 $cm^2 \pm 2.7$ cm^2 post-). In addition, the latero-medial diameter changed only minimally (4.5 cm ± 0. 5 cm and 4.4 cm ± 0.5 cm). In 9/23 patients a minimal increase in latero-medial diameter (4.28 cm ± 0.18 cm to 4.69 cm ± 0.43 cm) was observed, which was associated with an increase in annulus area (11.75 $cm^2 \pm 0.54$ cm^2 to 12.6 $cm^2 \pm 0.27$ cm^2) in 4 patients.

Discussionn. Our data show that the mitral ring geometry is not subject to significant change after MitraClip implantation in secondary mitral regurgitation which is in contrast to the study of Schmidt et al who found a significant change in mitral annulus area.

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P-15
Anaesthetic management for transapical off-pump implantation of artificial chordae to correct mitral regurgitation

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Introduction. Transapical implantation of NeoChord is an emergent beating heart technique for correction of mitral regurgitation through minimal invasive left mini-thoracotomy. The purpose of this study was to evaluate the peri-operative management of patients undergoing this procedure.

Methods. This was an observational bio-ethics committee approved prospective study. From December 2011 to March 2014 41 patients underwent mitral valve repair with the NeoChord system in our institution. Balanced anaesthesia with fentanyl-propofol-sevoflurane was used in all cases. We attempted to keep the patients' core temperature above 36°C with warming blanket and warm infusion fluids. A 2D and 3D TOE was used in all patients to navigate the NeoChord deployment instrument to the posterior mitral valve leaflet. Following effective leaflet capture artificial chordae were deployed. Optimal placement of artificial chordae was evaluated by placing them under tension and observing significant contribution to MR reduction. A cell saver was used in all cases. Following surgery all patients were transferred to the ICU.

Results. Mean age of the patients was 59 ± 12 yr (range 33-84), male/female ratio 24/17. Most patients had severe mitral regurgitation (grade IV – 24%, grade III – 68%). The average pre-operative EuroSCORE II was 1.1 ± 0.6% (range 0.43-3.14). Mean duration of the procedure was 129 ± 30 min. Average reduction of mitral regurgitation was from pre-procedural grade 3.3 ± 0.4 to 0.3 ± 0.5 immediately following the procedure. One patient was converted to conventional mitral valve repair due to failure to effectively deploy NeoChords. All patients underwent an uneventful postoperative course. The average time to extubation was 4.4 ± 2.3 h and the average length of ICU stay 2 ± 4.6 days. Blood products were used in 4 patients (9.7%) (including one patient who was converted to conventional MV repair).

Discussion. Two dimensional and three dimensional TOE plays a vital role during the NeoChord implantation. Anaesthesia for transapical NeoChord implantation could be performed safely under beating-heart conditions, with short procedural time and minimal peri-operative patient morbidity.

P-16
Regional anaesthesia in patients undergoing carotid surgery: a 5-years single centre experience

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Introduction. Carotid endarterectomy is the most effective treatment for reducing the risk of stroke in patients with significant carotid stenosis. Despite several published studies, there still is no consensus about the influence of the anaesthetic technique on post-

operative outcome after carotid endarterectomy. Moreover, results of randomized trials (GALA trial) and large observational studies are controversial. We therefore decide to report our experience as a major centre of vascular surgery.

Methods. Data of all patients undergoing carotid endarterectomy between January 2009 and December 2013 in our centre were retrospectively reviewed. Anaesthetic and surgical techniques, intra-operative neurological complications and mortality were analysed. Combined deep and superficial cervical plexus block or superficial cervical plexus block were performed according to anaesthesiologist's choice and patients characteristics (e.g. anticoagulation or dual antiplatelet therapy). Intra-operative remifentanil (0.025-0.05 μg/kg/min) was administered as needed in order to maintain an adequate level of comfort, responsiveness, and cooperation.

Results. A total of 2271 procedures on 2085 patients were performed (eversion technique 75.2%, patch closure 24.8%). A Javid shunt was selectively used in 282 (12.4%) cases because of the presence of clinical signs of cerebral ischaemia at clamp test. Regional anaesthesia was practiced in 2,245 (98.9%) interventions, while 26 (1.1%) patients received general anaesthesia. In 7 (0.3%) cases regional anaesthesia was converted to general anaesthesia because of severe agitation (6 patients) and persistence of neurological deterioration after shunt insertion (one patient). No intra-operative deaths were observed.

Discussion. Carotid endarterectomy under regional anaesthesia is safe and associated with a very low rate of conversion to general anaesthesia and intra-operative complications.

Poster Session – Intensive Care

P-17
Cardiac surgery ICU vs general ICU in cardiac surgery patients: influence on early postoperative outcomes

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Introduction. The early postoperative period after cardiac surgery requires high quality critical care to minimize complications, morbitity and mortality [1]. The aim of our study was to evaluate the early postoperative outcomes of cardiac surgery patients' recovery in a new designed cardiac surgery ICU (CICU) compared to a general ICU.

Methods. Between May 2012 and December 2013, a total of 684 consecutive cardiac surgery patients were admitted to ICU. From May to December 2012 (period 1) 224 patients received postoperative care in a general ICU staffed by intensivists and from January to December 2013 (period 2) 460 patients were admitted postoperatively in a newly opened specialized cardiac surgery ICU, staffed by intensivists, cardiac anaesthetists and cardiac surgeons. The following parameters were compared between the 2 groups retrospectively: Fast track extubation (less than 8 h), re-intubation, respiratory complications necessitating non-invasive ventilation (NIV), pneumonia, septicaemia, acute kidney injury (AKI) and re-exploration for bleeding. Statistical analysis was performed using the chi-squared test ($p < 0.05$).

Results. Although period 2 included double the number of patients, the postoperative care of cardiac surgery patients in a specialized cardiac surgery ICU resulted

Table 1

	Period 1	Period 2	*p* value
No pts	224	460	
EuroScore II	2.07	2.4	
Mortality	3.3%	2.8%	
Fast track	83 (36.7%)	291 (63.3%)	< 0.01
NIV	55 (24.3%)	50 (10.9%)	< 0.01
Pneumonia	6 (2.65%)	9 (2%)	0.557
Septicaemia	13 (5.8%)	11 (2.4%)	0.024
AKI	38 (16.8%)	71 (15.4)	0.642
Bleeding	18 (8%)	21 (4.6%)	0.07
Re-intubation	5 (2.2%)	13 (2.8%)	0.636

in more fast track extubations, less respiratory complications necessitated NIV and less septicaemia incidence while there was no statistical difference in the incidence of AKI, pneumonia, re-exploration for bleeding and re-intubation rate (s. Table 1).

Discussion. The number of complex cardiac surgery procedures is increasing. Highly trained medical and nursing staff, a multidisciplinary approach and implementation of specialized intensive care unit protocols undoubted contribute to better early postoperative outcomes [2].

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P-18
Repatriation of patients from a specialist cardiothoracic intensive care unit (CICU) to a general intensive care unit (GICU)

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Introduction. CICU beds are a scarce resource. Their availability in specialist referral centres facilitates necessary care for patients in need. After initial recovery from cardiothoracic surgery patients sometimes need prolonged intensive care but they do not necessarily need specialist input and their care can be managed in a GICU. We sought to audit morbidity and mortality of patients who were repatriated to a GICU.

Methods. This was a retrospective study over 18 months. CICU data was obtained from the electronic records of Computer Information system. GICU's data regarding discharge destination, length of stay and survival was obtained from Intensive care National Audit and Research centre (ICNARC) database. Data was verified by two operators.

Results. The total number of patients repatriated to GICU was 136 over 18 months out of total admissions of 3605. Mean age was 60.77 yr (SD 18.19). Average stay in CICU was 16.59 days (SD 16.36). Over 75% of patients were transferred to level 3 care. 69% survived to hospital discharge. 78% of survivors went home and 16% went into care. 4% of repatriated patients were readmitted to CICU. Mean duration of stay in GICU prior to discharge was 14.25 days.

Discussion. Repatriation of patients from CICU is potentially favourable for patients as it allows better integration with rehabilitation, domiciliary support and primary care. It causes less disruption to visiting family members. It also helps CICU capacity in specialist centres. With appropriate knowledge skills framework of receiving hospitals, these patients do receive excellent care with intermittent telephonic advice if needed as shown by mortality, bed occupancy and re-admission rates. It is difficult to compare the mortality figures of repatriated patients in a GICU to CICU long stay patients as the patient profiles are arguably different. GICU care is probably more cost effective but this will require further analysis. Finally the true burden to the community will be ascertained by QALYs post discharge and we needs further study.

P-19
Right ventricle contractility in the early postoperative period after coronary artery bypass grafting with cardiopulmonary bypass

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Introduction. The aim of our research work was to study the contractility of the right ventricle (RV) with regard to its relationship with systemic haemodynamics in patients undergoing coronary artery bypass grafting (CABG) with cardiopulmonary bypass (CPB).

Methods. The study included 25 patients (14 male, 11 female, mean age 58 ± 7 yr) admitted to ICU after CABG with CPB. All patients required inotropic therapy. Patients with previous pathology of the right ventricle or right coronary artery were excluded from the study. Haemodynamic parameters and RV functions were estimated by PiCCO plus-VoLEF system. The obtained data were processed using the classical methods of variation statistics and correlation analysis, as well as non-parametric methods Mann-Whitney and Fisher's exact test.

Results. In 10 patients (40%) the need for inotropic agents was associated with the fall in RV contractility (RV ejection fraction (RVEF) < 40%, dP_{max} > 1,200 mmHg/sec), in 8 patients (32%) with isolated left ventricle (LV) dysfunction (RVEF > 40%, dP_{max} < 1,200 mmHg/sec), in 7 patients (28%) with biventricular dysfunction (RVEF < 40%, dP_{max} < 1,200 mmHg/sec). Patients with isolated RV dysfunction required a longer period of inotropic therapy (22.5 [21-23]) h compared with patients with isolated LV failure (10.5 [10-11.5]) h, $p < 0.001$ and ICU stay (28 [27-29] h vs. 15.5 (15-16.5) h respectively, $p < 0.001$). It was found that the reduced contractility of RV may cause the reduction in stroke volume of LV with normal contractility (dP_{max} > 1,200 mm Hg/sec). The increase of preload in patients with RVEF less than 30% does not improve its function, but leads to an increase in its end-diastolic volume. We found a negative correlation between RVEF and mean pulmonary artery pressure ($r = -0.73$, $p < 0.05$). Also we discovered a negative correlation between RVEF and pulmonary vascular resistance ($r = -0.95$, $p < 0.05$).

Discussion. RV dysfunction is common after CABG. The clinical course of isolated RV failure is longer than isolated LV dysfunction. After CABG, a fall in RVEF is associated with increase pulmonary vascular resistance.

P-20
Prediction of fluid responsiveness in patients with atrial fibrillation: PEEP-induced increase in central venous pressure vs. passive leg raising

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Introduction. Dynamic indices of preload depending on the heart-lung interaction require sinus rhythm and cannot be applied to patients with atrial fibrillation. PEEP-induced increase in central venous pressure (CVP) was shown to be a valid predictor of fluid responsiveness after cardiac surgery in patients with sinus rhythm, and was speculated to be of value in patients with rhythm other than sinus. The aim of this study is to assess the predictability of PEEP-induced increase in CVP and passive leg raising (PLR)-induced changes in stroke volume index (SVI) on fluid responsiveness in patients with atrial fibrillation following valvular heart surgery.

Methods. In 33 patients with atrial fibrillation after valvular heart surgery baseline, PEEP was increased to 10 cmH_2O for 5 min and increase in CVP was assessed. After returning the PEEP to 0 cmH_2O, PLR was performed for 5 min and changes in SVI obtained from the pulmonary artery catheter connected to continuous cardiac output monitor device were recorded. After that, 300 ml of hydroxyethyl starch 130/0.4 was infused in the supine position for 10-20 min and haemodynamic variables including SVI were assessed 5 min after completion of fluid challenge. Fluid responders were defined as SVI increase ≥12% derived from the pulmonary artery catheter. To analyse the relationship between the increase in CVP and SVI, Pearson's correlation analysis was used. To evaluate the predictability of the PEEP-induced increase in CVP and fluid challenge-induced increase in SVI on fluid responsiveness, the area under the receiver operating characteristic curve (AUROC) was used.

Results. Overall, 9 (27%) patients were fluid responders. PEEP-induced increase in CVP did not show any correlation with the changes in SVI after fluid challenge (beta coefficient; –0.05, $p = 0.968$), whereas changes in SVI after PLR showed significant correlation with the changes in SVI after fluid challenge (beta coefficient; 0.713, $p < 0.001$). The AUROC of PEEP-induced increase in CVP for fluid responsiveness was 0.649 (95% confidence interval; 0.385-0.913, $p = 0.199$). The AUROC of changes in SVI after PLR was 0.808 (95% confidence interval; 0.631-0.985, $p = 0.008$).

Discussion. In contrast to the previous report performed in patients with sinus rhythm, PEEP-induced increase in CVP was not able to predict fluid responsiveness after cardiac surgery in patients with atrial fibrillation. Increase in SVI after PLR seems to be a valid predictor of fluid responsiveness in patients with rhythm other than sinus following cardiac surgery.

P-21
Impact of immediate versus delayed tracheal extubation on length of ICU stay of cardiac surgical patients

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Introduction. Ultra-fast track anaesthesia (UFTA) aims at immediate extubation of cardiac surgical patients at the end of the operation. This study compares the effect of UFTA versus continued postoperative mechanical ventilation on the ICU length of stay (LOS).

Methods. Fifty two elective adult patients were randomly allocated into UFTA and conventional groups by computer-generated random numbers. Redo operations, pre-

Table 1

Variables	UFTA	conventional	*p* value
Extubation time (h)	0.2 ± 1.2	12.9 ± 5.0	< 0.001
ICU stay (h)	57.4 ± 18.6	95.0 ± 33.6	< 0.001
VAS (numeric scale)	3.9 ± 0.7	3.8 ± 0.4	0.832
ICU morphine (mg)	4.2 ± 1.9	5.1 ± 0.7	0.035
Vomiting	6 (23.1%)	0	0.023
Ischaemia	2 (7.7%)	13 (50%)	0.002

Values as mean ± SD or n(%)

operative intubation, uncontrolled diabetes, shock/LVEF < 45%, PASP > 55 mmHg, creatinine clearance < 50 ml/min, haemodynamic instability, or those with concerns of postoperative bleeding were excluded. Pre- and intra-operative management was similar and Logistic EuroSCORE II was calculated for all. Intra-operatively, haemodynamic parameters, urine output, SPO_2, arterial blood gas analysis (ABG), 5-lead ECG, operative-, bypass-, and cross clamp time, and opioid consumption were collected. Postoperatively, patients were compared during their ICU stay (Table 1). Data were analysed by χ^2/Fischer exact, unpaired student's t-test, univariate two-group repeated measures ANOVA with post hoc Dunnett's test, and Mann-Whitney U tests as appropriate. $p < 0.05$ was considered significant.

Results. Patients were comparable regarding their peri-operative characteristics and EuroSCORE. The ICU LOS was shorter in the UFTA group (57.4 [18.6] vs. 95 [33.6] h, $p < 0.001$), without increasing postoperative renal, respiratory complications rate or reopening rate.

Discussion. UFTA seems to decrease ICU LOS without increasing the rate of postoperative complications.

P-22
Glucose management during on-pump elective coronary artery bypass graft surgery (CABG) in non-diabetic patients

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Introduction. Hyperglycaemia following cardiac surgery is a common reaction caused by peri-operative stress, cardiopulmonary bypass (CPB), the use of glucose-containing solutions, inotropes and steroids. Maintenance of an appropriate blood glucose (BG) level has been associated with better outcomes, including lower mortality. Interpatient insulin resistance (IR) variability makes management difficult. The most reasonable approach is based on continuous intravenous (iv) infusion, with the use of dynamic computer-assisted predictive algorithms (CAPA). The aim of the study was to compare safety and efficacy of CAPA versus conventional therapy (iv bolus or infusion).

Methods. Ninety non-diabetic on-pump CABG patients were randomized in two groups. Group 1 (n = 45) "empiric therapy", insulin was given as iv boluses or continuous infusion. Group 2 (n = 45) "SGC", insulin was

Table 1

STAGES	I	II	III	IV	V	VI	VII	HYPO- (cases)	TOTAL Insulin dose (ED)
Group 1	0	36	56	64	72	87	80	2	6 ± 1
Group 2	0	30	0*	10*	10*	0*	0*	0*	15 ± 3*

*$p < 0.05$.

given according to dynamic CAPA (Space Glucose Control, BBraun, Germany). BG levels were measured in arterial blood with "ABL – 800 Flex" ("Radiometer", Denmark) at the following points: surgery start (I); heparin introduction (II); start, middle and end of CPB (III, IV, V); protamine introduction (VI), surgery end (VII). Hyperglycaemia was considered as BG level over 8.3 mmol/l, hypoless than 4.4 mmol/l. Statistical analysis was performed with SPSS 17.0 for Windows.

Results. The incidence of hyper- and hypoglycaemia (% of patients) is presented in Table 1.

Discussion. CADA provides better glucose control, than empiric control. Despite higher insulin doses, there were no hypoglycaemia episodes, which make this therapy safer for the patient.

P-23
Changing glucose control target and risk of surgical site infection in a South-East Asian population

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Introduction. Hyperglycaemia is associated with increased morbidity, such as surgical site infection (SSI) and mortality in cardiac surgical patients [1]. There is overriding evidence that glycaemic control improves morbidity and mortality [2]. However, the optimal glucose range in these patients remains controversial. Intensive glucose control can lead to mortality among critically ill adults, due to hypoglycaemia. Therefore, we examined the effect of different glucose target control on the incidence of SSI in our population of diabetics and non-diabetics undergoing coronary artery bypass grafting (CABG).

Methods. Data from 1442 patients who underwent elective CABG at a tertiary heart institution from 2009 to 2011 was obtained. The first glucose upon arrival in the cardiothoracic intensive care unit was set at 4-8 mmol/l in 2009 and 2010 and 4-10 mmol/l in 2011 as part of a quality improvement initiative. Glucose control was achieved with intravenous insulin infusion with a strict glucose monitoring protocol. Population demographics, medical history, pre-operative risk assessment, intra-operative variables and postoperative outcomes were analysed. SSI was the primary outcome.

Results. The majority of patients presenting for CABG were males, Chinese and diabetics. Diabetic patients had significantly higher levels of glucose upon arrival in the intensive care unit. The change in target glucose control did not result in a significant increase in the SSI incidence of non-diabetic patients ($p = 0.615$). However, for diabetic patients, there was a significant increase in SSI incidence from 2.2% to 6.9% with a less stringent target glucose control ($p = 0.003$).

Discussion. Target blood glucose of < 8 mmol/l was associated with a lower incidence of SSI in diabetic patients presenting for elective CABG in the local South-East Asian population.

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Poster Session – Haemostasis

P-24
Antifibrinolytics are not indicated in the pre-bypass period for first time sternotomy in cardiac patients

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Introduction. Antifibrinolytics have been shown to be effective in minimizing fibrinolysis during cardiopulmonary bypass (CPB). Antifibrinolytics are related to serious complications. The intra-operative timing and dosing differs among cardiac surgery centres with a majority starting before surgical incision. We aimed to clarify whether antifibrinolytics are indicated before CPB in first time sternotomy cardiac surgery patients.

Methods. In a prospective, randomized, double-blind study of two groups of 20 pts, group A received epsilon-amino caproic acid (EACA) 10 g iv bolus dose after anaesthesia induction, followed by 1 g/h continuous infusion before CPB, and group B received placebo. In group B EACA was started after heparinization just before CPB. In both groups EACA was continued until the end of surgery. Before anaesthesia induction (baseline) and just before heparinization blood samples for D-dimers and thromboelastography (TEG) measurements were collected.

Results. The mean (± SD) incision to CPB time was 140 ± 63 min in group A, and 165 ± 63 min in group B. From induction to heparinization pre-CPB D-dimers did not change in group A. D-dimers increased (median) from 266 to 291 ng/ml in group B. MA and EPL median values did not change in either group. There was no statistical difference between the groups in incision to CPB time. D-dimers increased significantly more in Group B ($p < 0.05$)

Discussion. This prospective, randomized study showed that in first-time sternotomy cardiac surgery patients D-dimers increased significantly in the group where EACA was administered only after heparinization. However, according to the TEG values, the D-dimer increase was not associated with increased fibrinolysis in either group. This implies that there is no clinical indication to start antifibrinolytics in the pre-CPB period in this patient population.

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P-25
Assessment of the impact of the administration of pre-operative low molecular weight heparin on postoperative bleeding in adult cardiac surgery

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Introduction. Following the publication of the NICE guidance CG92 (Jan 2010) on reducing the risk of venous thromboembolism, our institution included low molecular weight heparin given on the evening before cardiac surgery in all adult patients. We investigated the impact of this in elective adult cardiac surgery, on postop bleeding.

Methods. A total of 410 patients were included over a period of 7 months. 174 received pre-operative enoxaparin before March 2013 and 236 patients after March 2013 did not. Results were analysed by medians and interquartile range. *p* values were calculated on all parameters.

Results. See Table 1.

Discussion. Our results show that the group that received enoxaparin before surgery bled more postoperatively than the group that did not. They also had higher postoperative heparin concentrations. A higher percentage had to be re-operated on to control post op bleeding. Our study is limited by its small size but our results indicate that pre-operative enoxaparin may be associated with increased postoperative bleeding in cardiac surgical patients and warrants further investigation.

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Table 1

Variable	Preop enoxaparine administered n = 174	Preop enoxaparine not administered N = 236	*p*
Blood loss ICU admission	825 (550, 1,375)	800 (500, 1,312.5)	0.41
Blood loss at 6 h	325 (200, 475)	275 (175, 475)	0.09
Blood loss at 12 h	500 (330, 800)	450 (275, 700)	0.032
Plasma, units	4 (3, 8)	4 (3, 7)	0.36
Red blood cells, units	6 (4, 8)	4 (4, 8)	0.43
Platelets, units	2 (2, 3)	1 (1, 2)	0.06
PT	14.2 (13.1, 15.3)	14.7 (13.35, 16.05)	0.014
APTT	32.9 (30.2, 37.1)	32.9 (30.1, 37.4)	0.78
Fibrinogen	1.8 (1.5, 2.25)	1.9 (1.6, 2.2)	0.16
Heparin	0.11 (0.08, 0.14)	0.10 (0.06, 0.14)	0.013
PLT	111 (94, 138)	111.5 (92.5, 142)	0.66
By pass time (min)	102	107	
Cross clamp (min)	64	68	
Re-operation for bleeding (%)	7.5	5.9	

P-26
An assessment of the clinical utility of the PlateletWorks platelet aggregation system in cardiac surgery involving cardiopulmonary bypass

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Introduction. Impairment of platelet function is a major factor in bleeding after cardiac surgery. This study explored the ability of the PlateletWorks® point of care test, at a

single point, after protamine administration, to predict mediastinal chest tube drainage and platelet transfusion requirement in cardiac surgery involving cardiopulmonary bypass. This point represents the commonest time when clinical decisions about platelet transfusions are made.

Methods. Seventy three elective adult cardiac surgical patients were enrolled. Patients with a documented haemostatic abnormality, heparin allergy or heparin induced thrombocytopenia, and/or patients on clopidogrel within 10 days of surgery were excluded. Surgery, anaesthesia and cardiopulmonary bypass perfusion management were as per current practice at the institution. Anticoagulation management consisted of heparin and protamine for its reversal. In addition to our usual haemostatic tests, 5 minutes following the administration of protamine, assessment of platelet function was performed using the PlateletWorks system, i.e. a baseline platelet count, adenosine diphosphate (ADP) agonist count and collagen agonist count. The functional count was derived by subtraction from baseline. Comparison was also made with the PlateletWorks assessment performed immediately after induction of anaesthesia. Physicians were blinded to the results from the PlateletWorks assessments.

Results. There was no relationship with the duration of cardiopulmonary bypass and the level of platelet dysfunction measured by the PlateletWorks agonists (ADP or Collagen) using Pearson's correlation coefficient. ROC Curve analysis of parameters at the primary study point post protamine revealed the functional platelet count by ADP agonism was the best discriminator of the requirement for platelet transfusion (AUC 0.801; sensitivity 71.4% and specificity 93.3%). All post protamine variables consistently had greater specificity than sensitivity. No univariate correlation was found between the PlateletWorks or thromboelastography variables and mediastinal blood loss at 6 or 24 h.

Discussion. Bleeding in cardiac surgery relates to many factors such as surgical technique, the patients' premorbid haemostatic profile and coagulation management. The results support the hypothesis that platelet function assessment by ADP agonism but not collagen agonism during cardiac surgery predicts platelet transfusion; however there was no relationship found between univariable haemostatic parameters and postoperative mediastinal blood loss.

P-27
Efficacy of fibrinogen concentrate compared with cryoprecipitate for reversal of the antiplatelet effect of clopidogrel in an in vitro model

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Introduction. The management of dual antiplatelet therapy when patients present for surgical revascularization is a clinical challenge. Approaches include allowing the drug to wear off, platelet transfusion, cryoprecipitate transfusion or desmopressin infusion. Fibrinogen concentrate may have a role to restore altered adenosine diphosphate (ADP) dependent platelet activation, increase glycoprotein fibrinogen binding or increase formation of soluble fibrin as a component of whole blood clot. Our hypothesis was that fibrinogen concentrate would normalize in vitro haemostatic parameters after clopidogrel loading. The effect was compared to two doses of cryoprecipitate.

Methods. Platelet aggregation was assessed using Multiplate impedence aggregometry. Rotational thromboelastometry ExTEM and FibTEM assays; and modified thromboelastography ADP-Platelet Mapping assessed viscoelastic properties. Twenty patients presenting for cardiac catheterization, loaded with dual antiplatelet therapy, with a documented ADPtest < 40 U were studied. Whole blood was titrated with the equivalent of five and ten units of cryoprecipitate and the equivalent of 50 mg/kg and 100 mg/kg of fibrinogen concentrate. Samples were

then diluted 40% with normal saline and titrated with the equivalent of ten units of cryoprecipitate and 100 mg/kg of fibrinogen concentrate. The Mann-Whitney U test was used to test the significance of difference between samples.

Results. The principal finding of the study was that fibrinogen supplementation primarily improved assays of fibrin formation. Platelet aggregation response to ADP and TRAP was not improved. Fibrinogen supplementation resulted in supranormal fibrin polymerisation in whole blood and restoration of fibrin polymerisation between 50mg/kg and 100 mg/kg in diluted blood as demonstrated by the ExTEM and FibTEM assays. It also significantly improved the rate of clot formation, represented by the angle in the modified TEG, ADP assay. In contrast, neither cryoprecipitate nor fibrinogen concentrate, at the concentrations used improved the amplitude at 30 minutes in the TEG-ADP assay, the threshold value used in the Target-CABG trial [1] to delineate bleeding risk with clopidogrel. They also produced comparable amplitudes at 30 minutes on the modified TEG assay, despite a two fold difference in fibrinogen supplementation.

Discussion. Further research is required to delineate the role of fibrinogen in the management of patients presenting for surgery on clopidogrel.

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P-28
High activated clotting time level after cardiopulmonary bypass in paediatric heart surgery does not indicate residual heparin

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Introduction. 300-400 IU/kg heparin is given before cardiopulmonary bypass (CPB) and its effect is measured with the active clotting time (ACT). However, the ACT during CPB poorly reflects the anticoagulant status in paediatric patients [1]. 1:1-1.5 protamine is given after CPB and heparin neutralization is also evaluated with the ACT. However, the precise dose of protamine required to neutralize heparin after CPB in paediatric heart surgery is still controversial.

Methods. Twenty seven children (< 10 kg) were included in this study. 400 IU/kg heparin was administered before CPB. No further heparin apart from 2000 IU in the pump priming volume was administered until neutralization by 1:1 protamine. Neither blood products nor other coagulation factors were administered. The ACT levels and the levels of coagulation factors, thrombin-antithrombin complex (TAT) and prothrombin fragment 1+2 (F1+2) in the blood were compared with one another prior to, during, after CPB and after 1:1 protamine following modified ultrafiltration (MUF). Heparin concentration in the blood was measured by anti-Xa assay. Statistical significance was determined as $p < 0.01$ using the studen's paired t-test.

Results. The ACT levels seemed to alter parallel with the heparin concentration in the blood after heparin administration. However, correlation coefficients showed little correlation between them. The mean duration of CPB was 68.3 ± 6.8 min. The ACT levels after 1:1 protamine still remained significantly higher (177.14 ± 5.43 s) compared to those before heparin administration (128.89

± 3.09 s), although there was no residual heparin in the blood after 1:1 protamine. The levels of coagulation factors in the blood were significantly lower. On the other hand, those of TAT and F1+2 were significantly higher after 1:1 protamine.

Discussion. Many anaesthesiologists and surgeons believe the cause of the higher ACT after protamine administration following CPB to be due to residual heparin and requires additional protamine, although its negative effects on the coagulation system have been well-known for a long time. However, a high ACT level after CPB is due to the low levels of the coagulation factors in the blood, which are caused by their consumption as well as haemodilution during CPB.

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P-29
Analysis of transfusion requirements in cardiac surgery patients using a method of recursive partitioning

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Introduction. The recursive partitioning analysis (RPA) is a statistical methodology that allows definition of risk factors related to a dependent variable. The aim of this study was to analyse the variables that allow us to forecast transfusion requirements in patient candidates for heart surgery using this new statistical **Method.**

Methods. We made a prospective study of 2122 adult patients treated with cardiac surgery consecutively at a tertiary hospital during the period 2009-2013. Age and sex of patients were evaluated, as well as body mass index, haemoglobin (Hb) and pre-operative creatinine clearance, NYHA grade, EuroSCORE, type of surgery performed, priority of surgery and history of previous surgery. Transfusion frequency (FT), defined as the administration of at least one blood product during the peri-operative period (from 2 days prior to 10 days after surgery) was evaluated.

Results. The percentage of patients receiving transfusions was: red blood cells 69.5%; plasma 11.1% and platelets 11.6%. All measured variables were significantly associated with performing transfusions during the peri-operative period in both univariate and multivariate analysis. The results obtained using the RPA method allowed us to define four categories of patients according to frequency of transfusions depending on Hb levels, creatinine clearance and the age of patients: group I patients Hb > 135 g/l and age ≤ 66 yr, 39.5% FT; group II, patients with Hb > 135 g/l, and age > 66 yr or patients with Hb 120-135 g/l and creatinine clearance > 76.13 ml/min/m^2, 58.4% FT; group III, patients with Hb 120-135 g/l and creatinine clearance ≤ 76.13 l/min/m^2, 83.4% FT; group IV, patients with Hb ≤ 120 g/l, 93.1% FT. The predictive ability of the classification was 73.9%.

Discussion. Regarding other more complex classification methods, the determination of Hb, pre-operative creatinine clearance and age of patients enabled a categorization of patients who underwent cardiac surgery with relation to their transfusion needs [1, 2].

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P-30
Cold agglutinins and cardiac surgery: a national survey of cardiac anaesthetic practice in the UK

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Introduction. The risk of cold agglutinins (CAs) for cardiac surgical patients is of haemolysis. Due to variation in advice and absence of any guidelines, we conducted a UK-wide survey regarding anaesthesia practice in patients with cold autoantibodies presenting for cardiac surgery [1].

Methods. Our electronic survey was approved by the Committee of the Association of Cardiothoracic Anaesthetists (ACTA) and sent to all ACTA members. The questions related to CA were: Awareness of cold agglutination syndrome; Existence of any protocol in the institute; Incidence of the problem in the practice; General action taken; Investigations ordered; Pre-operative management with high titre CAs; Alteration of cardiopulmonary bypass (CPB); Surgery requiring deep hypothermic cardiac arrest (DHCA).

Results. We received 40 responses out of approximately 200 (response rate of 20%). 35 were aware of the cold agglutination syndrome. 37 did not have any hospital policy. 60% have less than 5 cases/year. 85% would refer to haematologists. 35% and 27% preferred antibody titre and thermal amplitude testing. Referring to haematologist's for pre-operative management, 70% advised using warm cardioplegia. On the last question with DHCA, 42% would proceed with caution.

Discussion. Our national survey shows there is confusion over appropriate management of these patients. Most cardiac anaesthetists seeing between 1 and 5 cases per year, have no hospital policy, and the most popular option is to contact a haematologist. Some anaesthetists are willing to cancel surgery and others happy to go ahead with deep hypothermia even in the face of high antibody titres. A literature review does not show any consensus on the best plan of action. Our results prompted the development of local guidance (Royal Victoria Hospital, Belfast, UK).

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Posters Session – Cardiac Anaesthesia & Cerebral Monitoring

P-31
Can pre-operative cognitive impairment predict delirium in patients undergoing cardiac surgery?

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Introduction. Delirium is a common and serious complication of cardiac surgery and numerous studies have confirmed this with incidences of delirium varying from 3% to 47% [1]. It results in higher levels of patient morbidity and mortality, functional and cognitive decline as well as increased health care expenditure [2]. The aim of this study was to determine the incidence and prospective risk factors (e.g. age and pre-operative cognitive function) for postoperative delirium.

Methods. A single-centre cohort of 40 patients undergoing elective cardiac surgery, were prospectively studied. Participants' pre-operative cognitive function was assessed using the Mini Mental State Examination. Other demographic and clinical variables were obtained from medical notes. Patients were followed up for 5 consecutive days post-operatively and delirium incidence and duration was documented using the Confusion Assessment Method.

Results. The incidence of postoperative delirium was 45%. Delirium lasted on average 2.05 days (measuring only those patients who developed delirium, S.D = 1.468) and 1.05 days for all patients (median: 1, first quartile 0.5, third interquartile: 3) and was most common on post-operative day 1. Average age of delirious patients was significantly higher than non-delirious patients (71.3 vs. 63.7 yr). Average MMSE score was significantly lower in the delirious patients vs. non-delirious (27.3/30 vs. 28.6/30). Pearson's chi squared test revealed a significant association between MMSE scores and incidence of delirium (Pearson-chi score = 4.639, $df = 1$, $p < 0.05$), suggesting cognitive functioning correlates not only with incidence but duration or severity of delirium. A Receiver Operator Characteristics curve demonstrated use of MMSE in delirium as moderately effective as a diagnostic utility (area under the curve 0.693).

Discussion. Our current analysis suggests advancing age and MMSE score are predictive factors for delirium after cardiac surgery. Our study and other examples in the literature suggest a link between pre-operative cognitive functioning and delirium [3]. Because of the limitations of this study, some ground must be covered before we will fully understand the role of pre-operative cognitive impairment in the development of delirium. However, cognitive function can be assessed easily in the hospital setting and it may be advisable to implement cognitive function screening in future practice. Regular screening will allow clinicians to identify, observe and target at risk patients more closely and in some cases permit the prophylactic use of anti-delirium medication to reduce the potentially hazardous complications of delirium.

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P-32
Jugular bulb fibreoptic oxygenation: is it necessary in cardiac anaesthesia?

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Introduction. Measurement of oxygen saturation in jugular bulb (SjbO2) allows estimation of brain oxygen delivery/consumption ratio. The fibreoptic monitoring of $SjbO_2$ provides continuous measurement «in vivo». The aim of the study was to estimate efficiency and safety of fibreoptic monitoring of $SjbO_2$ in pts undergoing cardiac and aortic arch surgery with cardiopulmonary bypass (CPB).

Methods. After the local Ethic Committee approval and informed consent 48 pts underwent cardiac and aortic arch surgery with CPB. We studied safety and efficiency of fibreoptic $SjbO_2$ measurement during anaesthesia and surgery. The fibreoptic catheter was placed by retrograde manner into the jugular bulb through a 5F introducer. We used "Explorer" or "Vigilance" oximeters and fibreoptic catheter 4F (Edslab Dual-Lumen Oximetry Catheter, 94-015H-4F) 25 cm (Baxter). We used simple linear regression analysis to compare data of the applied methods of brain oxygenation measurement.

Results. There were no complications of this Method. We have found high accuracy of the method; correlation coefficient was 0.82 in comparison with standard "in vitro" method of oximetry performed on ABL 800 Flex (Radiometer). We have found most significant changes of $SjbO_2$ during the start of

CPB, cooling, rewarming and CPB weaning. During CPB start and cooling, $SjbO_2$ increased and stayed high through this period. In case of deep hypothermia (T nasoph 13.5 ± 0.5 °C) $SjbO_2$ increased and was similar to arterial SO_2, indicating decrease in brain metabolism. Rewarming was always accompanied by a decreasing $SjbO_2$, and in some cases was critically low. We have not found a correlation between jugular bulb fibreoptic oxygenation and transcranial oximetry ($r = 0.249$).

Discussion. Fibreoptic monitoring of $SjbO_2$ is safe and accurate method, continuously showing changes of oxygen delivery/consumption ratio in the brain. It allows early recognition of mismatch between brain O_2 delivery and consumption which may prompt some changes in anaesthesia management. Also blood samples from the jugular bulb allow detailed estimation of brain metabolism in cardiac pts during anaesthesia and surgery. Use of fibreoptic brain oxygenation continuous monitoring allowed us to avoid critical events and prevent brain injury during cardiac surgery and CPB.

P-33
Novel dynamic near-infrared spectroscopy parameter monitoring during on-pump cardiac surgery

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Introduction. The commercially available cerebral oximeters might have some limitations in accurate judgement of sufficient cerebral oxygen supply. Continuous monitoring of oxyhaemoglobin (HbO_2) and deoxyhaemoglobin (HbR) concentrations and their cross-correlation can better indicate perturbations in regional oxygen saturation (rSAT) of the cerebral cortex. A prospective observational study was designed to investigate its dynamics during on-pump cardiac surgery and to reveal its association with rSAT and S100B protein levels.

Methods. Subjects aged ≥ 45 yr undergoing elective surgery with cardio-pulmonary bypass (CPB) were eligible for inclusion. Twenty adult patients with a mean age of 67 ± 9 yr were enrolled in the trial. Based on quality control of data, 14 patients (7 female and 7 male, 66 ± 9 yr) were included into this study. Anaesthesia was performed with a standardized technique and monitoring. We used cwNIRS-LEDi imager, a 3 wavelength, 16 channel device. Near-infrared spectroscopy (NIRS) signals were registered at a sampling rate of 3 Hz during the operation. The raw NIRS data were resampled and screened with continuous wavelet transform algorithm for excluding channels with poor optical coupling. The HbO_2/HbR compartmental cross correlation coefficient (rHb) was calculated by Pearson's correlation within a running window of 6 sec. rHb values were averaged in 15 minutes blocks of 'steady-state' in pre-CPB, CPB and post-CPB periods, respectively. The percent change in the SD of rHb on CPB relative to its pre-CPB value (ΔSDrHb) was also determined. Plasma level of S100B protein, indicative of glial damage, was measured prior to induction of anaesthesia and 6 h, 24 h and 48 h postoperatively.

Results. The mean value of rHb changed significantly during CPB when pre- and post-CPB periods were compared (rHb: 0.19 ± 0.38, -0.44 ± 0.30, -0.36 ± 0.22, $p < 0.001$, respectively) with a positive linear correlation between mean arterial blood pressure and rHb during CPB ($r^2 = 0.30$, $p = 0.044$). rHb did not correlate with changes in haemoglobin levels, core temperature, metabolic factors (pH, PO_2, PCO_2) and rSAT during the operation. There was no correlation between on-CPB value of rSAT, rHb and S100B, however, ΔSDrHb correlated with S100B levels at 24 h, 48 h ($r^2 = 0.53$, $p = 0.017$, and r^2

= 0.44, p = 0.036 respectively) and the area under the curve (AUC) of S100B (r^2 = 0.46, p = 0.036) in patients with S100B concentration ≥ 0.2 μg/l at 48 h (n = 10).

Discussion. We confirmed that rHb can dynamically follow the alterations in regional cerebrocortical tissue oxygenation and its derivative, ΔSDrHb, appeared to be linked to postoperative elevated S100B levels.

P-34
Effects of near-infrared spectroscopy on cognitive dysfunction for patients undergoing elective coronary surgery

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Introduction. Postoperative cognitive dysfunction (POCD) is a common phenomenon after cardiac surgery. Near-InfraRed Spectroscopy is often used in cardiac surgery to monitor adequacy of cerebral perfusion. There are conflicting results for incidence of POCD and decrements in cerebral saturation [1, 2]. The aim of the study was to compare the incidence of POCD for patients under conventional monitoring or under NIRS during elective coronary artery bypass graft (CABG) surgery.

Methods. After Ethical Committee approval patients older than 60 yr undergoing CABG surgery were included in this randomized study. They were randomly assigned into two groups, the first (GI) was treated under conventional monitoring modalities (blood pressures, SpO_2, etc) whereas the second (GII) was handled according to NIRS values [3]. Neurocognitive function was assessed pre-operatively, at first week and third month postoperatively with a psychometric test battery. POCD is defined as a decline for more than 1 SD in more than two tests. Statistical analysis was performed with chi-squared test or Fisher's exact test for categoric variables and unpaired t-test or Mann-Whitney U test for continuous variables.

Results. Thirty-eight patients were assessed for the study (GI n = 21, GII n = 17). Demographic and operative data were similar between groups. Psychometric tests results showed no significance at any time of the study. Nine patients (43%) in GI and 7 (41%) in GII developed early POCD (p > 0.05). At the third month 10 patients (47%) in GI and 4 patients in GII (24%) showed late POCD (p > 0.05). The 4 patients in the latter group had a significant decrement in the peri-operative course despite adequate treatment.

Discussion. Early POCD is common after coronary surgery. Although the incidence of early POCD was similar between conventional and NIRS guided therapy, persistent cerebral desaturation seems to be accompanied with late POCD. NIRS may be a promising modality of monitoring for this topic.

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P-35
A goal-oriented therapy protocol based on cerebral regional oxygen saturation may improve neurologic outcome in high-risk cardiac surgery patients

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Introduction. NIRS (Near InfraRed Spectroscopy) is a neuro-monitoring tool that provides cerebral regional oxygen saturation (rSO2) [1]. We hypothesized that a goal-directed therapy (GDT) protocol based on cerebral rSO_2 changes would be associated with reduced incidence of postoperative neurologic complications (PNC) in high-risk cardiac surgery (CS) patients.

Methods. Eighty-five high-risk CS patients (mean age 71 ± 9) were prospectively monitored with NIRS (cNIRS group) during CS. The primary endpoint (i.e., PNC) was defined as the occurrence of at least one of the following: stroke, stupor, coma, cognitive function deterioration, memory deficit, and seizures. The GDT protocol was based on specific interventions aimed at improving peri-operative cerebral blood flow and rSO_2, such as 1) increasing the arterial oxygen content either with red blood cell transfusions (when appropriate) or high inspired oxygen fraction; 2) raising arterial blood pressure and cardiac output by administering fluids, inotropic drugs and vasoconstrictors; 3) optimizing roller or centrifugal pump flow rates during cardiopulmonary bypass. cNIRS group was compared with 100 patients (mean age 73 ± 6 yr) who were not monitored with cerebral NIRS (N-cNIRS group) and who were selected from our electronic patient data management system using a propensity score-matched analysis. In the cNIRS group, neuron-specific enolase (NSE) and S-100B protein were collected at different times before, during and after CS.

Results. PNC were 21% and 35% for cNIRS and N-cNIRS group, respectively ($p < 0.05$). Compared to cNIRS group, N-cNIRS group had longer times of mechanical ventilation (MV) (150.3 ± 274.9 vs. 29.9 ± 65 h, $p = 0.02$) and length of stay in the intensive care unit (ICU) (13.3 ± 14.7 vs. 3.4 ± 3.9 days, $p = 0.01$). Pre-operative cerebral rSO_2 values were lower in patients who had PNC than in those with good neurologic outcome (59.6 ± 7.6 vs. 63.4 ± 7.8%, $p = 0.04$). Inverse correlations were found between the nadir cerebral rSO_2 and the duration of MV ($r = -0.31$, $p = 0.04$) and length of stay in the ICU ($r = -0.43$, $p = 0.003$). NSE peaked significantly later in time (i.e., only at 6 h after CS) in patients with PNC ($p = 0.02$). S-100B protein did not show significant changes after CS in both the groups.

Discussion. Serum levels of NSE and S-100B protein were not predictors of PNC. Conversely, the higher the pre-operative cerebral rSO_2 the better the neurologic outcome. In our cohort of CS patients, interventions aimed at improving peri-operative cerebral rSO_2 had a positive impact on the incidence of PNC. A GDT protocol guided by cerebral rSO_2 changes may decrease PNC in high-risk CS patients.

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P-36
Cardiovascular instability following phenytoin administration in cardiac intensive care

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Introduction. Seizures following cardiac surgery and cardiac arrest are linked to significant morbidity and mortality. Phenytoin is regularly used in management, however its side effect profile means there are concerns regarding safe use in the cardiac intensive care unit (CICU) [1].

Methods. We retrospectively reviewed minute by minute haemodynamic and inotrope data of patients loaded with phenytoin in a mixed CICU from Jan 2012 to Mar 2014. Unit protocol for infusion rate was < 50 mg/min. Comparison was made using paired t-test or Wilcoxon rank sum test.

Results. Thirty-seven patients, age 62 yr (57.4-66.7) were loaded with phenytoin 17.47 mg/kg (16.44-18.49) (mean, 95% CI). Following commencement of phenytoin there was a 12.6 mmHg (8.3-16.8) drop in MAP by 50 mins. In this time; one (2.7%) patient had a cardiac arrest. In the 6 h following phenytoin, mean infusion rates of adrenaline (p = 0.042), noradrenaline (p = 0.009) and dobutamine (p = 0.038) all increased. Eleven (29.7%) patients required new inotropes to be started (Table 1).

Discussion. This data suggests that instability following phenytoin administration is common with patients requiring more cardiovascular support. Phenytoin should be administered cautiously in CICU with alternative agents considered and a slower infusion rate used.

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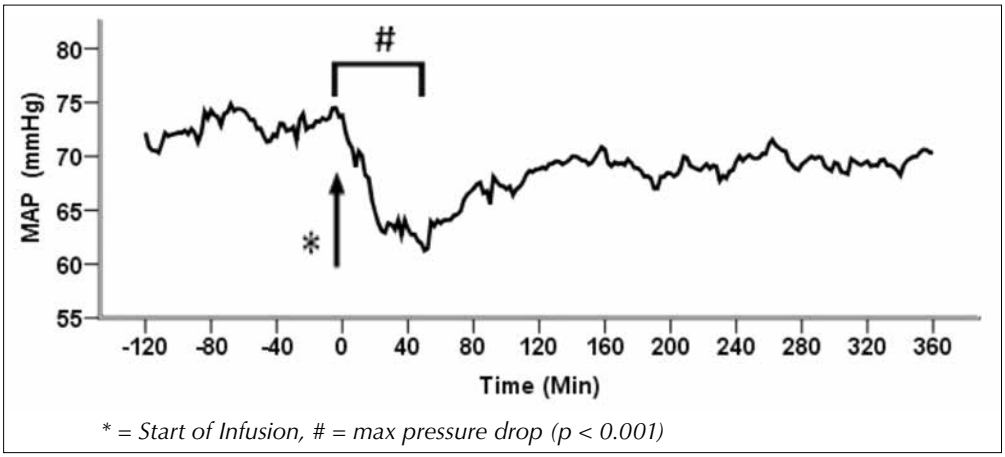
Table 1: Mean arterial pressure (MAP) during phenytoin administration (mmHg), n = 37



** = Start of Infusion, # = max pressure drop (p < 0.001)*

P-37
Adherence to the local guidelines for the management of delirium in a cardiothoracic intensive care unit: a clinical audit

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Introduction. Postoperative delirium is still poorly recognized in clinical practice. Prevention and proper recognition of this condition could improve patients' outcome and reduce the hospital stay [1].

Methods. We performed a prospective observational clinical audit over a 12 weeks period. The audit was aimed at evaluating the adherence to the local guidelines on delirium management. The incidence of delirium was also assessed. 207 eligible patients were admitted to the ICU following cardiac surgery. 150 of these, who stayed in the ICU at least 24 h, were included in the analysis. Compliance by the nursing staff with undertaking the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU) was audited. The same assessment was also undertaken daily by the auditors.

Results. Delirium developed in 17% (25/150) of these patients admitted to the ICU after cardiac surgery. 15 patients (60%) had signs of hyperactive delirium, 4 (16%) of hypoactive delirium and 6 (24%) had signs of both hypo- and hyperactivity. According to the local guidelines, the CAM-ICU screening should be performed and documented daily by the nursing staff. However, this was observed in only 15% of patients (22/150). Only hyperactive delirium and the hyperactive phase of mixed delirium were treated pharmacologically. Haloperidol was used as the first-line drug in 80% of patients. Patients who developed delirium were significantly more likely to be older (> 65 yr) and rather more were female. Delirious patients had a significantly longer length of stay in the ICU. The mean duration of delirium was 2.5 days. The most frequently performed surgical procedure in patients who developed delirium was CABG plus valve surgery (48%).

Discussion. High adherence to the local guidelines was noticed regarding the pharmacological treatment of delirium. However, compliance by nursing staff for undertaking the CAM-ICU assessment was low. Periodic re-training of the nursing and medical staff may be of benefit to raise awareness of the condition and to develop novel strategies for its prevention and management.

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Poster Session – Cardiac Anaesthesia & Aortic Valve

P-38
Pre-operative screening for aortic atherosclerosis with modified transoesophageal echocardiography in transcatheter aortic valve implantation

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Introduction. Transcatheter aortic valve replacement (TAVR) has emerged as a treatment for severe aortic stenosis in selected patients. In the PARTNER trial however, TAVR was associated with an increased risk of peri-operative cerebral embolic events, believed to be caused by the dislodgement of aortic atherosclerosis. The distal ascending aorta, aortic arch and its branches can be accurately visualized with modified tran-

soesophageal echocardiography (A-view) through the placement of a fluid-filled balloon in the trachea (area under curve: 0.89; 95% CI: 0.86-0.92). We aimed to study the prevalence of aortic atherosclerosis visualized with A-view in patients who underwent TAVR.

Methods. A single-centre prospective cohort study was made, which included consecutive TAVR patients operated between 02-2011 and 09-2012 A-view was included in a pre-operative diagnostic protocol. Presence of atherosclerosis was recorded for seven segments of the thoracic aorta. Severity of atherosclerosis was defined according to the Katz-criteria. We also differentiated soft from calcified plaques.

Results. Included were 58 patients with a mean age of 80.7 ± 5.9 yr and a mean EuroSCORE of 17.9. The approach was transfemoral (TF) in 65.5%, direct aortic (DA) in 22.4% and transapical (TA) in 12.1%. Prevalence of severe (grade 3) atherosclerosis was the lowest in TF with 83.3%, 63.9%, 86.1%, 69.4, 51.4%, 94.4% and 75% in respectively the proximal ascending aorta (PAA), distal ascending aorta (DAA), aortic arch, innominate artery, the left carotid, the descending aorta and the left subclavian artery. In DA the prevalence was 91.7% in the DAA, PAA and the left subclavian artery, 90.9% in the innominate artery, 63.6% in the left carotid and 100% in all other segments. The prevalence of severe atherosclerosis in TA was 60.0% in the left carotid, 71.4% in the DAA, 85.7% in the left subclavian artery and 100% in all other segments.

Discussion. Severe atherosclerosis of one or more segments of the thoracic aorta was diagnosed in 100% of the patients. Visualization and awareness about the exact segment location of severe atherosclerosis of the thoracic aorta may help us choose the optimal access route for TAVR patients in order to reduce cerebral complications.

P-39
Procedural sedation with dexmedetomidine for transfemoral aortic valve implantation

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Introduction. Transfemoral Aortic Valve Implantation (TF-AVI) can be performed under local anaesthesia (LA) and sedation using different sedatives and opioids [1]. Dexmedetomidine (DEX) is a centrally acting alpha-2 adrenergic agonist used for intensive care and procedural sedation. We report our initial experience with DEX sedation in TF-AVI.

Methods. With IRB approval, patients undergoing TF-AVI received local anaesthesia and sedation as per clinical routine. Starting from July 2011, patients were sedated with DEX (loading dose, 0.5 µg/kg in 20 min., followed by infusion of 0.3-0.7 µg/kg/h) to achieve a sedation level of Ramsay Scale 3 or 4. DEX group was compared to the LA group from our registry without DEX treatment. Data are mean ± SD. Alpha was 5%.

Results. The first consecutive 120 patients undergoing procedural sedation with DEX for TF-AVI were compared to 226 LA cases of the registry without DEX treatment. No patient was excluded. No differences in baseline characteristics were found. Mean DEX induction and cumulative dose was 53 ± 42 and 122 ± 66 µg, respective. Anaesthetic management and outcomes are summarised in Table 1.

Discussion. Procedural sedation with DEX for TF-AVI is feasible and safe. Procedural outcomes do not differ between DEX sedation regimes and alternatives. After TF-AVI with DEX-sedation, 95% of patients are

Table 1

	% (n)	Vasopressor	Convers LA →G A	Mortality intraop.	Spontan. breathing postop.	ICU postop.
DEX	35% (120)	63% (75)	5% (6)	1% (1)	95% (114)	8% (10)
No DEX	65% (226)	65% (146)	7% (16)	1.3% (3)	96% (217)	8.4% (19)
p value	–	n.s.	n.s.	n.s.	n.s.	n.s.

fit for a step-down unit immediately at the end of the procedure.

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P-40
Comparison of three anaesthetic techniques for endovascular aortic repair: retrospective analysis

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Introduction. Endovascular aortic repair is widely used for high risk patients for whom open surgery constitutes serious morbidity, even mortality. Peri-operative management is still a challenge for anaesthesiologists for this population according to procedural risk factors [1]. General anaesthesia (GA) or neuroaxial blocks (NAB) are safely used as well as local techniques. We herein present the results of endovascular repair from 2000 to 2014 in one centre.

Methods. After Ethical Committee approval, the records of all patients enrolled for elective endovascular aortic repair from 2000 to 2014 were examined. Demographic data, ASA scores, comorbidities, anaesthetic technique and complications are all recorded. Duration of operation, ICU stay and length of stay are similarly noted. Statistical analyses were performed with chi squared test or Fisher's exact test for categoric variables and unpaired t-test or Mann-Whitney U test for continuous variables.

Results. Eighty-six patients were registered with 25 under GA, 37 NAB and 24 with local anaesthesia (LA). The mean age of LA group was significantly different from GA and NAB groups (74 ± 8; 67 ± 9; 68 ± 11 yr old respectively with $p < 0.05$). Comorbidities such as ischaemic heart disease, diabetes or renal failure were similar between groups. Duration of operation was significantly longer for the GA group compared to NAB or LA (160 ± 35, 120 ± 47, 120 ± 32 min respectively with $p < 0.001$). Systemic complications were comparable between groups. Length of stay was similar between the three groups. However ICU stay was found to be longer in GA patients than NAB and LA groups (3 ± 0.8; 1 ± 0.4; 1 ± 0.4 day; $p < 0.01$).

Discussion. Endovascular aortic repair increased over last decade due to technological opportunities for high risk patients. GA was mostly associated with complex long procedures, or during a learning period. LA is the preferred alternative for high risk elderly patients. None of the anaesthetic

approaches showed superiority in hospital length of stay.

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P-41
Effectiveness of intra-operative detection of persistent endoleak by spontaneous echocardiographic contrast after thoracic endovascular aortic repair

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Introduction. Transoesophageal echocardiography (TOE) with colour flow Doppler, unlike angiography, can frequently detect endoleaks after thoracic endovascular aortic repair (TEVAR). Some of these endoleaks are so minor they may not affect short- or long-term outcomes. It has been reported that a change in the character of spontaneous echocardiographic contrast (SEC) within the aneurysmal sac can indicate endoleak closure. The aim of our study was to determine if this effectiveness held true for persistent endoleaks after TEVAR.

Methods. Consecutive adult patients (July 2010 to January 2013) undergoing TEVAR of descending thoracic aortic aneurysms (caused by atherosclerosis, type B dissection, trauma) were included in this study. After completing the endovascular procedure, we explored the aneurysmal sac with TOE to look for residual SEC or thrombus. Thrombus was defined as no SEC within the sac regardless of high echodensity. In type B dissection patients, we also looked for a false lumen around the intimal tear. The primary outcome was detection of persistent endoleak by contrast-enhanced spiral computed tomography 6 months later. Need for additional intervention within 6 months also was considered because of persistent endoleak. We examined the association between intra-operative residual SEC and persistent endoleak. Comparisons were made with the Mann–Whitney U test or Fisher's exact test when appropriate, and $p < 0.05$ was considered significant.

Results. A total of 57 patients underwent TEVAR for descending thoracic aortic aneurysms during the 31-month study. Patients with peri-operative death, incomplete follow-up, or inadequate TOE records were excluded, leaving 53 participants (41 men, 12 women; mean age 71.3 ± 12.5 yr). SEC and thrombus were observed in 14 and 33 patients, respectively. In six patients the aneurysmal sac was unobservable because of acoustic shadowing from the endograft. Persistent endoleak was detected in 10 patients (18.9%). Intra-operative angiography detected persistent endoleak in only two patients. Later, persistent endoleak was observed in eight patients (57.1%) with SEC and one patient (3.0%) with thrombus. The presence of SEC had high sensitivity (80.0%) and specificity (86.0%) for detection of persistent endoleak, indicating that SEC was significantly associated with persistent endoleak ($p = 0.0001$).

Discussion. Intra-operative TOE assessment of SEC and thrombus within the aneurysmal sac is highly effective for detecting persistent endoleak after TEVAR. Persistent endoleak was rare in patients with thrombus. Although we are sometimes unable to see inside the aneurysmal sac with TOE after endovascular graft insertion, the intra-operative goal following TEVAR may be to achieve the disappearance of SEC.

P-42
Cerebral microembolism in transapical TAVI: comparison of Symetis Acurate Aortic Valve Prosthesis with the Edwards Sapien Valve

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Introduction. The Symetis Acurate TA™ (SA) is a new self-expanding transcatheter aortic valve (TAVI) prosthesis, characterized by a specific two-step transapical (TA) implantation technique. TA-TAVI is associated with cerebral microembolism, which is detectable as high intensity transient signals (HITS) on transcranial Doppler (TCD) ultrasound [1]. The aim of this study was to quantify differences in HITS count, frequency and pattern during TA-TAVI, when comparing the SA with the balloon-expandable Edwards SapienTM (ES) valve.

Methods. TCD recordings of 31 consecutive patients undergoing TA-TAVI using SA or ES were analysed for HITS during instrumentation (IN) prior to valvuloplasty, balloon aortic valvuloplasty, prosthesis deployment (PD), and post-implantation (PI). HITS were compared between different procedural steps using Friedman Repeated Measures ANOVA on ranks; for comparison between the two prosthesis types, Mann-Whitney rank sum test was used. Data are presented as number or median with interquartile ranges.

Results. Twenty-two patients (n = 11 in each arm) displayed TCD signals of good quality throughout the entire procedure (in the remaining cases TCD was not performed due to logistic reasons (4) or to absence of the temporal bone window (3), or data acquisition was stopped because of premature loss of the MCA signal (2). No differences were detected in total procedural or interval-related HITS load (SA: 303 [200;594], ES: 499 [285; 941]; $p = 0.16$). With both devices, HITS peaked during PD, whereas fewer HITS occurred during IN ($p < 0.005$) or PI ($p < 0.01$). PD generated almost half of the total HITS load. One patient (ES) suffered a new stroke. Thirty-day mortality was 3/22.

Discussion. Despite its unique deployment technique, which results in more interaction with the calcified native aortic annulus, the SA device did not generate more HITS than the balloon-expandable ES valve. The similarity in HITS count, frequency and pattern of the two systems points to a common mechanism for the release of cerebral microemboli.

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P-43
Freedom SOLO Stentless Aortic Valve Prosthesis: no freedom of late dysfunction and failure

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Introduction. The 3rd generation Freedom SOLO (FS) stentless aortic valve prosthesis consists of bovine pericardial tissue and uses homocysteic acid in a unique anticalcification treatment. FS is implanted in the

supra-annular subcoronary position without rinsing, using a single continuous suture line. This study reports a case series of failures and explantations of the FS.

Methods. N = 149 patients (mean age 73 ± 8 yr., 68 females) underwent isolated or combined aortic valve replacement using FS. Clinical and echocardiographic follow-up findings were recorded at discharge, 6 months and yearly thereafter. Following intra-operative documentation, all explanted valve prostheses underwent histological examination. Follow-up was 100% complete with an average observation time of 5.5 ± 2.3 yr and a total of 821 patient years.

Results. Freedom from structural valve deterioration (SVD) at 5, 6, 7, 8 and 9 yr were 92%, 89%, 82%, 72% and 63%. Thirteen prostheses required explantation due to valve-independent dysfunction (thrombus formation, oversizing, aortic dilatation, endocarditis, suture dehiscence) or valve-dependent failure (acute leaflet tears or severe stenosis). Thus, freedom from explantation at 5, 6, 7, 8 and 9 yr were 95%, 95%, 92%, 82% and 73%. Vertical tear along the non-coronary/right-coronary commissure to the base became manifest at a mean of 6 yr post-implantation [range, 4.6-7.3 yr.], and affected size 27 prostheses exclusively. Four FS required explantation after a mean of 7.6 yr. [range, 7.0-8.3 yr.] due to severe functional stenosis and gross calcification that included the entire aortic root.

Discussion. The FS is safe to implant and shows satisfactory haemodynamic performance, early- and mid-term Results. However, freedom from SVD and explantation decreased markedly after only 6-7 years. Patients with FS require close clinical and echocardiographic observation and follow-up.

P-44
First-in-Man use of a novel pacing sheath for transapical transcatheter aortic valve implantation: case report

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Introduction. We describe, first-in-man, feasibility of in-situ transapical (TA) access site pacing for TA balloon aortic valvuloplasty (BAV) in TAVI, using a novel pacing device (PacingSheath™). After initial animal experiments, this PacingSheath has been used successfully in a TAVI patient unsuited for other, less invasive pacing options.

The device consists of a 24F introducer with two integrated electrodes alongside the delivery sheath to stimulate the myocardium at the transapical access site. With Federal Veterinary Office approval in a prior animal experimentation (6 pigs, 61 ± 1 kg), three electrode widths (2, 4, and 6 mm) had been compared for LV stimulation and sensing thresholds, at 5 sets of pacing rates ranging from 120 to 200 stimulations per minute. The surgical setup included full percutaneous TA access. Thereafter, a similar device was used in a patient without other pacing means for TA-TAVI with a Sapien XT balloon-expandable valve.

Animal experimentation had demonstrated successful capture for all three electrode sizes, with arterial pressure nadir at a stimulation rate of 200 bpm (baseline, 95 ± 16 systolic/56 ± 15 mmHg diastolic; nadir, 58 ± 15/35 ± 13 mmHg; $p < 0.05$). Pacing thresholds varied significantly with electrode width (2.7 ± 0.2 mV for 2 mm, 4.2 ± 0.4 mV for 4 mm, 5.4 ± 0.4 mV for 6 mm; $p < 0.01$).

Case report. First-in-man TA access site pacing with the PacingSheath provided reliable capture and systolic blood pressure reduction below 50 mmHg during BAV and valve deployment. Backup pacing was also reliably possible, at stimulation thresholds below 2 mV throughout.

Discussion. First-in-man use of the novel PacingSheath for BAV and TAVI is feasible. A dedicated introducer with integrated pacing electrodes combines access with LV pacing for TA-TAVI. Obviating a separate pacer access, fluoroscopy guidance and lead placement (e.g., transvenous, surgical), PacingSheath allows reliable procedural rapid and backup LV pacing, with potentially better synchronization, and supports a full percutaneous TA-TAVI approach.

P-45
Heart failure associated variables and one-year mortality after transcatheter aortic valve replacement in elderly patients

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Introduction. Transcatheter aortic valve replacement (TAVR) is an accepted procedure in elderly patients with aortic valve stenosis. However, postoperative cardiac failure is still an issue that may impact on long-term mortality. The aim of this study was to establish the relationship between postoperative heart failure (PHF) and patient pre and post TAVR conditions, and whether PHF affects one-year mortality.

Methods. A retrospective study was performed in 112 consecutive patients with aortic stenosis treated with TAVR from March 2009 to April 2014. Mean age was 79.8 ± 7.3 yr and 54% were men. General anaesthesia was performed in 106 patients and sedation/analgesia in 6 patients. Arterial pressure, vasopressors and preload were optimized to obtain mean arterial pressure > 75 mmHg before and during the implant. Angiography/fluoroscopy was used for valve implantation guidance, and transoesophageal echocardiography. Corevalve (Medtronic) implantation was done by a retrograde approach (110 transfemoral and 2 subclavian), 100 of which were primary TAVR (without predilation). Chi-squared test was used to compare categorical variables.

Results. Pre-operative logistic EuroSCORE was 19.5 ± 14.8, ejection fraction (EF) was 54.8 ± 11.3 (16% with EF ≤ 40) and 94 patients (84%) were in functional class III-IV. Overall mortality during the observation period (5 yr) was 13.4% (15 patients). Kaplan-Meier survival probability curve showed 6-month survival of 91% and 1-year survival of 86.6%. Postoperative heart failure was associated with echocardiographic postoperative transvalvular regurgitation ≥ 2 ($p < 0.05$) considering 108 patients, as 4 patients died during the day of the procedure (2 perforations, 1 valve dislocation and 1 electro-mechanical dissociation). However, only 6 patients (5.6%) presented with grade 3 regurgitation. A definitive pacemaker was significantly associated with PHF ($p < 0.05$); 62.5% of these patients had a pacemaker prior to TAVR. Postoperative heart failure had a significant effect on one-year mortality, taking into account 79 patients ($p < 0.001$) due to exclusion of patients with less than one year survival.

Discussion. Pre-operative variables were not related to PHF. Post-intervention factors showed that although prevalence of severe regurgitation was low, further reduction of postoperative paravalvular regurgitation would decrease PHF, and hence lower mortality in this critically ill elderly population.

Poster Session – Monitoring

P-46
Comparison of a non-invasive with two minimally invasive cardiac output monitors during off-pump coronary artery bypass surgery.

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Introduction. Cardiac index (CI) can be measured using arterial pressure curve analysis, which can be derived either minimally invasively from the radial artery (e.g. FloTrac/Vigileo™ [CIFTV] or ProAQT-Pulsioflex™ [CIPA]) or completely non-invasively with a finger cuff (e.g. ccNexfin™ [CINF]). Assuming that CIFTV and CIPA are clinically interchangeable, we compared CIFTV and CIPA with each other and the average of the minimally invasive CIFTV and CIPA (CIAVR) with non-invasive CINF.

Methods. In 70 patients undergoing off-pump coronary artery bypass surgery, CI was compared at predefined events during anaesthesia (before and after induction of anaesthesia, before and after sternotomy). Values were compared by Bland-Altman analysis for repeated measures. Four-quadrant plots and polar plot methodology were used to evaluate CI trending ability.

Results. Agreement analysis of CIFTV versus CIPA showed a bias of –0.2 l/min/m^2, limits of agreement (LOA) of ± 1.5 l/min/m^2 and percentage error (PE) of 103%. CINF slightly underestimated CI compared to CIAVR with a bias of 0.6 l/min/m^2, LOA of ± 1.6 l/min/m^2 ($p < 0.001$), PE of 102%. Polar plot analysis revealed moderate concordance to track CI changes comparing CIFTV to CIPA and CIAVR to CINF (83% and 90% within 30° limits of agreement).

Discussion. The arterial pressure curve derived CIFTV and CIPA reveal a similar agreement and trending ability with each other as with non-invasive CINF. Therefore, non-invasive CINF can be considered as interchangeable with the minimally invasive arterial pressure curve based CI monitors.

P-47
Does LiDCO rapid® reliably track relative changes in cardiac output in cardiac surgery patients with a low ejection fraction?

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Introduction. Bolus thermodilution CO measurement with a Swan-Ganz catheter has been the clinical standard for decades. Nowadays, devices that determine CO using the pulse contour technique are employed more and more frequently. One of them, the LiDCOTM plus system, has already been validated for patients with low cardiac ejection fraction [1]. This device, however, necessitates occasionally cumbersome calibration with lithium chloride prior to its use. A novel uncalibrated system, the LiDCO rapid®, has recently been introduced. Uncalibrated it gives relative CO changes, only. We hypothesized that the LiDCO rapid® system will adequately track relative changes of thermodilution CO in patients with low left ventricular ejection fraction after cardiac surgery.

Methods. After having obtained informed consent, seven cardiac surgery patients have been included until now. All patients were managed with a pulmonary artery catheter. After admission to the ICU, parallel measurements with both devices, were carried out to evaluate the haemodynamic impact of interventions, which became necessary during ICU treatment. Thermodilution CO was averaged from five consecutive measurements. Relative changes from pre-intervention CO for both techniques were subsequently used for analysis. Regression analysis was calculated employing SPSS 19.0. Furthermore,

agreement between the two monitoring techniques was also evaluated. $p < 0.05$ was considered statistically significant.

Results. We report data from 54 simultaneous CO measurements. Thermodilution CO ranged from 3.3 to 8.6 l/min. Median left ventricular ejection fraction was 35% (range: 21 to 38%). Relative changes determined by both techniques (–22 to +35% for the LiDCO rapid® system vs. –23 to +34% for thermodilution CO) correlated modestly ($r^2 = 0.761$, $Y = 0.867 * X - 0.25$, $p < 0.05$). There was no statistically significant difference in the direction of relative changes of CO.

Discussion. These preliminary data indicate that the uncalibrated LiDCO rapid® system appears to adequately track relative CO changes in patients with low left ventricular ejection fraction after cardiac surgery.

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P-48
The effect of Trendelenburg, reverse Trendelenburg positions and Vasalva manoeuvre on internal juguler vein diameter and location in children

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Introduction. The aim of this ultrasound (US) study was to compare the effects of supine (S), supine+Valsalva (SV), Trendelenburg (T), Trendelenburg+Valsalva (TV), the reverse Trendelenburg (RT) and the reverse Trendelenburg + Valsalva (RTV) manoeuvres on the diameter and location of the right internal jugular vein (RIJV) in patients between 2 and 12 yr.

Methods. After Ethics Committee approval, 100 ASA I patients aged between 2-12 who have normal cardiac function and scheduled for elective surgery (repair of hypospadias, inguinal hernia, cystoscopy) were enrolled. Demographic data were recorded. Routine monitoring was applied. Following induction with propofol and fentanyl, 2% sevoflurane was used for maintenance. The RIJV diameter of the subjects was measured with guidance of US by applying the manoeuvres of S, SV, T, TV, RT and RTV. 15° angle was given to the table for T and the RT positions. Airway pressure of 20 cmH_2O

Table 1

Position and manoeuvres	Diameter (cm)	Variation (%)	*p* value	min-max
S	1.66 ± 0.21			1.26-2.34
SV	1.86 ± 0.26	10.33	< 0.001	1.36-2.74
T	1.76 ± 0.25	6.19	< 0.001	1.28-2.66
TV	1.95 ± 0.26	20.19	< 0.001	1.43-2.77
RT	1.68 ± 0.21	1.33	0.111	1.24-2.41
RTV	1.91 ± 0.22	16.94	< 0.001	1.38-2.80

was applied to the patient for the Valsalva manoeuvre. During measurements, the patient's head was turned 20° to the contralateral side. The location of RIJV relating to the carotid artery (CA) was recorded. Statistical analyses were carried using SPSS ver. 20.0®. Data were analysed using Wilcoxon's signed rank test.

Results. The mean age of 78 male and 22 female patients was 5.95 ± 2.81 yr. RIJV diameters regarding position and manoeuvres (s. Table 1). In 15%, RIJV was in front of the CA. In 5% it was lateral to CA, in 80% it anterolateral to CA.

Discussion. While the T position and V manoeuvre increase RIJV diameter significantly, the RT position does not have a significant effect on the change of RJIV diameter. The most significant increase in the RIJV diameter was the T position together with the V manoeuvre.

P-49
Pre-operative fasting and postoperative metabolic response after coronary artery bypass grafting

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Introduction. A prolonged period of preoperative fasting may worsen the postoperative metabolic response [1]. A meta-analysis showed that it is safe to shorten pre-operative fasting before elective surgery [2]. We studied the impact of pre-operative fasting on postoperative levels of arterial lactate (AL), pH and base excess (BE) since ICU admission in patients undergoing coronary artery bypass grafting (CABG).

Methods. This was a single centre retrospective study with one year data collection (Aug 2012 to Jul 2013) from electronic medical records. Two groups were analysed: M = morning (1st case); A = afternoon (2nd case). Patients were nil-by-mouth from the midnight before surgery, regardless the list order. Demographics, comorbidities, logistic EuroSCORE, n° of grafts performed and pre-operative AL, pH and BE were screened. Data on AL, pH and BE at ICU admission and at 1, 3, 6, 12, 18, 24 h after ICU admission were collected. Patients with pre-operative haemodynamic support and/or dialysis were excluded. Normal distribution of data was assessed. Continuous variables are presented as mean ± standard deviation and compared with student's t test for independent samples. Categorical variables are presented as percentage (%) and analysed with chi-squared test with Yates's correction.

Results. We found 339 patients (M = 173, 52%; A = 163, 48%). There were no difference in rate of on- vs off-pump CABG (M = 64.8%, A = 62.0%, $p = 0.67$). Demographics, comorbidities and logistic EuroSCORE were not different. Number of grafts performed was higher in the M group (2.9 ± 0.7 vs 2.7 ± 0.8; $p = 0.03$). There were no differences in the values of pH and BE between the groups at any time. We found a trend towards higher AL in the M group until the 12th postoperative h: differences were significant at admission (M = 1.75 ± 0.9 vs A = 1.43 ± 0.6; $p < 0.001$) and at 3 h (M = 1.70 ± 1.1 vs A = 1.46 ± 0.8; $p = 0.02$).

Discussion. The length of pre-operative fasting before cardiac surgery did not affect the level of pH and BE. Lactate level seemed worse in the CABG patients scheduled 1st on the list. These results still await confirmation by multi-regression analysis.

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P-50
The effect of induced hypotension on motor neuron protection in experimental spinal cord ischaemic/reperfusion injury in rats

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Introduction. Spinal cord ischaemia remains a devastating neurologic complication of thoraco-abdominal aortic surgery. The incidence of paraplegia after thoraco-abdominal aortic aneurysm repair has been reported to be 16%. The aim of this study was to evaluate the effect of induced hypotension before aorta cross clamping on motor neuron protection in experimental spinal cord ischaemia-reperfusion injury.

Methods. Male Sprague-Dawley rats (300-350 g; n = 6) were assigned randomly to two groups: (1) the control group (n = 3) was maintained at normal blood pressure for 30 minutes before ischaemia; and (2) the hypotension group (n = 3) had induced hypotension for 30 minutes before ischaemia. Spinal cord ischaemia was induced for 10 minutes using a balloon-tipped catheter placed in the proximal descending aorta in both group. Neurologic function was assessed daily until 2 days after reperfusion. To assess the degree of ischaemic neuronal injury, the number of normal motor neurons in the anterior horn of the spinal cord (anterior to a line drawn through the central canal perpendicular to the vertebral axis) was counted in 3 sections for each animal and then averaged. Data were expressed as mean ± SD. The number of motor neurons was compared using a one-way analysis of variance followed by the Dunnett post hoc test.

Results. At day 1 after reperfusion, the hypotension group showed a significantly higher motor deficit index compared with the control group group (7.14 vs 0; $p < 0.001$). This trend was sustained at day 2 (9.71 vs 0.33; $p < 0.001$). The control group displayed a significantly larger number of normal motor neurons compared with the hypotension group.

Discussion. The induced hypotension before aorta cross clamping significantly damaged the neuronal cell after a spinal cord ischaemia-reperfusion injury in a rat model. The effect of the induced hypotension must be taken into consideration for ischaemia-reperfusion injury in patients undergoing thoracoabdominal aortic surgery.

Poster Session – Myocardial Protection

P-51
Comparison of the haemodynamic effects of nitric oxide and inhaled iloprost in patients with severe left ventricle systolic dysfunction

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Introduction. The aim was to evaluate the haemodynamic effects of nitric oxide (NO) and inhaled iloprost in patients with pulmonary hypertension (PH) associated with left ventricular (LV) systolic dysfunction.

Methods. 72 right heart catheterizations and vasoreactivity tests (VRT) were performed in 58 candidates for heart transplantation. All the patients had heart failure III-IV

NYHA and PH associated with LV systolic dysfunction. NO, 80 ppm for 20 min (43 cases, NO gr.), or inhaled iloprost, 20 micrograms (29 cases, iloprost gr.) consistently were used for vasoreactivity test. Haemodynamic effects were estimated at baseline, then after a 15 minutes period of NO inhalation, or 15 minutes later the end of iloprost inhalation. Statistical analysis was performed using the t-test for dependent samples and Fisher's exact test; results are presented as mean ± SD.

Results. Both vasodilators decreased pulmonary vascular resistance (PVR): in the NO gr. PVR dropped from 4.8 ± 2 WU to 3.6 ± 1.3 WU ($p < 0.0001$), in the iloprost gr. PVR decreased from 4.5 ± 1.6 WU to 2.9 ± 1 WU ($p < 0.0001$). More than 30% decrease in PVR was observed in 14 cases (32.6%) in NO gr. and in 20 cases (69%) in iloprost gr. ($p < 0.001$). PCWP increased in 20 cases (46.5%) in NO gr. and in 7 cases (24.1%) in iloprost gr. ($p < 0.05$). There were no changes in systemic vascular resistance (SVR) in NO gr. In contrast, inhaled iloprost significantly decreased SVR from 1,905 ± 477 dyn/s/cm^5 to 1,505 ± 460 dyn/s/cm^5 ($p < 0.0001$). The observed fall of the afterload only after iloprost inhalation resulted in considerable enhancement in LV performance: at baseline stroke volume index (SV) was 24.9 ± 7.9 ml/m^2; after iloprost inhalation SVI increased to 30.1 ± 10.2 ml/m^2 ($p < 0.001$).

Discussion. Inhaled iloprost decreased PVR more effectively compared with NO. Inhaled iloprost causes favourable changes in preload and afterload of the impaired left ventricle and increases its performance. We found that inhaled iloprost was preferable for VRT in patients with PH associated with LV systolic dysfunction that NO.

P-52
The effects of conventional vs. high-dose rocuronium on the QTc interval during anaesthesia induction in patients for coronary artery surgery

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Introduction. Myocardial ischaemia may lower the cardiac depolarization threshold and cause QT prolongation [1]. The mild vagolytic effect of rocuronium is an advantage in cardiac surgery [2]. We studied the effects of high-dose initial bolus rocuronium on the duration of QTc and incidence of arrhythmias following anaesthesia induction.

Methods. In this prospective randomized trial, patients received either conventional dose (0.6 mg/kg, Group C, n = 25) or high-dose (1.2 mg/kg, Group H) rocuronium for muscle relaxation after induction with etomidate and fentanyl. Heart rate, MAP, and QTc were recorded before induction (T0), after induction (T1), after muscle relaxation (T2), and 2 minutes (T3) and 5 minutes (T4) after intubation. Data were analysed with Friedman ANOVA, Wilcoxon and Bonferroni tests.

Results. In Group C and Group H, QTc was significantly longer after intubation (T3) than at baseline (475 vs. 429 msec in Group C [$p < 0.001$], and 459 vs. 434 msec in Group H [$p < 0.01$]). On inter-group comparisons, mean QTc values in both groups were similar at all time points ($p > 0.05$) throughout the study. The incidence of arrhythmias in Group C (28%, n = 7) and in Group H (24%, n = 6) was similar ($p = 0.5$). Arrhythmias (non-sustained ventricular tachycardia), ventricular extrasystoles, and ST depression)

in both groups occurred at similar rates 2 minutes after intubation (T3).

Discussion. QTc interval prolongation after high-dose rocuronium was not significantly longer than after conventional-dose rocuronium in patients induced with etomidate and fentanyl about to undergo coronary artery surgery. The incidence of cardiac arrhythmias was similar in both groups and none needed treatment.

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P-53
The role of ethnicity in post coronary artery bypass graft atrial fibrillation in an Asian population

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Introduction. Post-operative atrial fibrillation (AF) is associated with increased morbidity, mortality and resource use [1]. African Americans have a lower risk of post coronary artery bypass graft (CABG) AF than Caucasians, but the role of ethnicity in Asian populations has not been studied [2]. We tested the hypothesis that ethnicity is an independent risk factor for AF after CABG in an Asian population.

Methods. 3010 patients undergoing cardiac surgery between August 2008 and July 2012 at two tertiary heart centres were prospectively recruited. Exclusion criteria were non-AF post CABG cardiac arrhythmia, missing post CABG arrhythmia data, and ethnicity other than the three major local groups. 2199 patients, which consisted of Chinese (n = 1,552), Malays (n = 357) and Indians (n = 290), were eligible for analysis. Univariate analysis was carried out using the 2-tailed unpaired T test for continuous variables and chi-squared test for categorical variables. Factors from the univariate analysis with $p < 0.1$ were included into the multivariate Poisson regression model with robust estimator to estimate the relative risk of developing post CABG AF.

Results. Post CABG AF rate was 15.7% in our cohort. It was more common in Chinese (16.5%) and Malays (18.5%) than Indians (7.9%) ($p < 0.001$). Patients who developed post CABG AF were likely to be older, had previous AF, pulmonary hypertension, and a more complicated peri-operative course. Ethnicity was an independent risk factor for post CABG AF, with Chinese and Malays having a higher risk than Indians (RR: Chinese vs Indian 1.95 [95% C.I. = 1.31-2.88, $p < 0.001$]); Malay vs Indian 2.22 (95% C.I. = 1.44-3.42, $p < 0.001$).

Discussion. Chinese and Malays have a higher risk of developing post CABG AF than Indians in an Asian population. This is the first study conducted in an Asian population validating ethnicity as an independent risk factor for post CABG AF.

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P-54
Extracorporeal cardiopulmonary resuscitation (E-CPR) in refractory cardiac arrest after an acute coronary syndrome: a case report

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Introduction. Current guidelines state that extracorporeal membrane oxygenation (ECMO) may improve outcomes in refractory cardiac arrest (CA) when the cause lends itself to an immediate curative intervention. Examples are hypothermia, drowning and drug overdose. Though expensive and invasive, the outcome can be gratifying. We report a successful E-CPR in a patient with refractory CA following an acute coronary syndrome, who subsequently underwent a coronary artery bypass grafting (CABG) but succumbed to sepsis.

Case Report. A 58 year old diabetic and hypertensive man who had suffered an inferior wall myocardial infarction 3 days prior to admission presented with left ventricular failure. He had not been thrombolysed due to late presentation. A day after admission, he developed hypotension with desaturation requiring non-invasive ventilation and inotropes. Twelve hours later, he had an episode of pulseless electrical activity (PEA) which initially responded to CPR with return of spontaneous circulation (ROSC) in 15 minutes. Within 30 minutes, he again developed refractory PEA not responding to conventional CPR which was continued for nearly 2 hours with brief periods of ROSC. Hence, peripheral veno-arterial ECMO was established through the right femoral vessels. Supportive treatment with ventilation, inotropes, continuous renal replacement therapy (CRRT) and blood transfusions was continued. The following day, he was awake, with improved haemodynamic and metabolic parameters. The need for an intervention for definitive treatment was discussed. While on ECMO, he underwent a coronary angiogram which revealed total occlusion of the left anterior descending artery (LAD) and mid right coronary artery with distal filling by collaterals. Angioplasty had to be abandoned after multiple, futile attempts. CABG using saphenous vein grafts to LAD and posterior descending artery was done the same day. CRRT, ECMO, inotropes and ventilation were continued. With improving haemodynamic parameters, ECMO was successfully weaned and discontinued on the 4th postoperative day after placement of an intra-aortic balloon pump (IABP). The IABP was removed after 3 days with minimal inotropic support. An endotracheal tube aspirate culture revealed Acinetobacter and appropriate antibiotics were started. Four days later he deteriorated and blood cultures showed growths of Klebsiella and Enterococcus. He eventually succumbed to multi-organ failure as a consequence of the sepsis syndrome on the 14th postoperative day.

Discussion. In witnessed, refractory CA not responding to conventional CPR, when infrastructure and skilled personnel are available, ECMO is not only viable but may be the only option for a subset of patients.

Poster Session – Thoracic Anaesthesia

P-55
Comparison of bupivacaine and levobupivacaine for thoracic paravertebral block for post-thoracotomy pain

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Introduction. Post-thoracotomy pain is very severe and is exacerbated by ventilation [1].

This study compared post-operative pain and respiratory function of two groups of thoracotomy patients.who were given bupivacaine or levobupivacaine with fentanyl through a paravertebral catheter.

Methods. After ethics committee approval, 40 patients (ASA I-III) (18-65 years old), scheduled for thoracotomy, were randomized into two groups as Group B or Group L according to the local anaesthetics they received. An epidural catheter was placed by the surgeon into the paravertebral space. All patients received 20 ml bolus local anaesthetic according to their groups (Group B received bupivacaine, Group L received levobupivacaine) after the closure of the pleura. The solution for patient controlled analgesia contained 170 ml 25% bupivacaine or levobupivacaine and 7 ml (350 µg) fentanyl. In Group B, 0.25% bupivacaine and in Group L, 0.25% levobupivacaine combined with fentanyl were infused at a rate of 0.1 ml/kg via paravertebral catheter by patient controlled analgesia system for 48 h after the operation. The pain scores measured by VAS were assessed at rest, coughing and movement. Arterial blood gases were evaluated and respiratory function tests were made one day before the operation and 1, 6, 24 and 48 h after the operation. Side effects were recorded. The patients with VAS above 4 received 1 mg/kg pethidine. Time and doses of administration were recorded.

Results. Demographics and duration of surgery were not different ($p > 0.05$). VAS scores recorded at 1st h were higher in both groups compared to next h ($p < 0.001$) at rest, coughing and movement but there was no difference between groups ($p > 0.05$). Dosage and number of administration of rescue analgesic, were similar (Group B: 155 ± 117.9 mg pethidine 1.6 ± 1.2 times, Group L: 142.5 ± 144.4 mg pethidine 1.4 ± 1.4 times) ($p > 0.05$). FEV1 and FVC measured at postoperative days 1 and 2 were significantly lower than pre-operative measurements in both groups ($p < 0.001$), but there was no difference between groups ($p > 0.05$). Mean PaO_2, $PaCO_2$ and SpO_2 values were not different between the groups ($p > 0.05$) and these values were within normal ranges in all measurement time points. Two patients in Group B and Group L had nausea, 2 patients in Group B and 1 patient in Group L had hypotension.

Discussion. In the treatment of post-thoracotomy pain with paravertebral block, bupivacaine and levobupivacaine had equivalent efficacy and could be safely used.

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P-56
Melatonin on acute pain

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Introduction. Melatonin has anxiolytic and potential analgesic effects. The aim of this study was to investigate whether melatonin had any impact on postoperative pain after video assisted thoracoscopic surgery (VATS).

Methods. Forty patients undergoing VATS were randomly allocated into either (n = 20 each) M group or P group. Patients were premedicated with melatonin 6mg (M group) or placebo (P group). All patients were anaesthetized with sevoflurane and remifentanil. Thirty minutes before the end of surgery, patients received morphine sulphate through a patient-controlled analgesic infusion device. Pain scores and analgesic requirements were recorded 1, 12, and 24 h postoperatively. The demographic data were analysed with the t-test and the chi-squared test and the postoperative morphine consumption was analysed

with the t-test. The Mann-Whitney test was used for analysis of the categorical variables like NRS. P value of less than 0.05 was considered statistically significant.

Results. After 24 h, the NRS scores of P group were significantly higher than those of the M group (M group 1.0 ± 1.1 vs P group 2.2 ± 1.3, $p < 0.05$). The morphine consumption of P group was also greater than that of M group (M group 45.9 ± 19.2 ml vs P group 62.5 ± 29.7 ml, $p < 0.05$). There were no differences in postoperative complication.

Discussion. We concluded that oral melatonin premedication for patients undergoing VATS provided better postoperative analgesic condition.

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P-57
Effect of morphine on lung cancer in relation to opioid growth factor receptor (OGRF)

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Introduction. We evaluated the expression of opioids receptors on human lung cancer tissues and cancer cell lines and how administration of opioids influences cancer cell growth.

Method. Cancer and adjacent normal lung tissues of 16 patients were compared (3 samples of cancer and normal tissues in each patient). Human lung cancer cell lines; H1703, A549 and H1975, were used to examine OGFR and MOR expression and the effect of opioids on their growth. T test was used to compare normal and cancer tissues or control and treatment group.

Results. OGFR mRNA levels were higher in normal lung tissues than lung cancer tissue (29.7 vs. 10.4, $p < 0.01$) and higher in the adenocarcinoma than squamous carcinoma (15.5 vs. 4.5, $p < 0.05$). MOR mRNA expression was much lower than OGFR expression and there were no differences between lung cancers and adjacent normal tissues. H1975 (adenocarcinoma), which has the highest OGFR level showed increased cell growth when treated with opioids.

Discussion. Lung cancer mainly showed OGFR but not MOR. OGFR has inverse correlation with cancer cell growth and opioid treatment promoted cancer cell proliferation only in high OGFR cancer. Exogenous opioids may inhibit OGFR which is known to be a cancer suppressor.

P-58
Retrospective study of peri-operative anaesthesia management of myasthenia gravis patients undergoing thymectomy

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Introduction. Myasthenia Gravis (MG) is an autoimmune disease that attacks postsynaptic nicotinic acetylcholine receptors at the neuromuscular junction. The aim of the retrospective study was to analyse the perioperative anaesthetic management of MG patients who underwent thymectomy.

Methods. After ethics committee approval, the demographic data, disease-specific features and peri-operative anaesthesia management of 33 patients of ASA I-III class were recorded.

Results. 87.9% of patients were I/II type according to the Osserman classification. Leventhal score were calculated as ≥10 in 3 patients. Combined balanced anaesthesia and thoracic epidural analgesia (TEA) was used in 26 patients (78.8%). Total intravenous anaesthesia with TEA was used in 4 patients (12.1%). The balanced anaesthesia was performed in 3 patients (9.1%). Neuromuscular blocker (NMB) was given in only 2 patients. Intra-operatively, hypotension occurred in 5 patients and bradycardia in only one patient. All patients were extubated in the operating room. Generalized tonic-clonic seizure, hypertension and respiratory distress were observed in 3 patients, respectively. Re-intubation or ventilation support was not required. Additional analgesic was needed in 4 cases.

Discussion. Optimal peri-operative management of MG patients undergoing thymectomy requires careful pre-operative assessment and preparation [1]. Furthermore, the use of balanced anaesthesia with TEA reduces or eliminates the need for NMB and provides adequate analgesia, therefore providing early recovery in this patient population.

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P-59
Lung transplantation in critically ill patients with cystic fibrosis

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Introduction. Lung transplantation is the ultimate therapeutic option for patients with end-stage cystic fibrosis (CF), and accounts for 16-35% of all lung transplantations performed in different centres. In these patients, pre-operative clinical status and operative conditions may influence primary graft dysfunction (PGD) and survival [1]. The aim of this single centre study was to analyse patient transplant factors determining the incidence of PGD and survival.

Methods. Forty-one CF patients (34 with complete haemodynamic data) undergoing lung transplantation at the Hospital Universitario Fundación Favaloro between 1996 and 2014 were retrospectively analysed. Mean age was 25.3 ± 6.2 yr (12-37) and 41% were women. Sixty five percent of patients (22/34) had secondary pulmonary hypertension (SPH), > 25 mmHg); 63.4% hospitalized for emergency transplantation were receiving mechanical or non-invasive ventilation (HOSP) and 36.6% were ambulatory patients for elective transplantation with non-invasive ventilation (AMB). Primary graft dysfunction dependence on cardiopulmonary bypass (CPB), total ischaemic time (TIT), patient clinical status (HOSP or AMB) and SPH was assessed. Overall, PGD and clinical status survival Kaplan-Meier curves were analysed. The chi-squared test was used to establish significant differences.

Results. The overall incidence of PGD was 41%. Use of CPB affected PGD (55.6% with CPB vs. 12% without CPB, $p < 0.01$), while TIT < 380 min vs. TIT > 380 min, presence or not SPH and HOSP vs. AMB patients did not influence PGD. Kaplan-Meier overall survival probability was 70.3 ± 10.7% at 5 yr and 63.3% at 10 yr; PGD reduced 5-yr survival to 48.9% compared to 82.1% in non-PGD patients ($p < 0.05$). Conversely, pre-operative clinical status did not affect survival; with a 10-yr survival rate of 67% (HOSP) vs. 58.3% (AMB).

Discussion. PGD was shown to be an undesired effect of CPB and affected survival. The good 10-yr survival for this type of intervention independent of pre-operative clinical status indicates that in experienced centres all CF patients undergoing lung trans-

plantation have a similarly favourable chance of long-term survival.

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Poster Session – Quality Management

P-60
Quality of life of elderly patients in one year after cardiac surgery: relation to peri-operative course parameters

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Introduction. The early results of cardiac operations in elderly patients (pts) are evaluated [1]. The quality of life (QOL) in one year (yr) after surgery is the focus of our interest.

Methods. Sixty four pts (45 males, 19 females) aged 75 (80 ± 4) or more yr old were included. Cardiac procedures with cardiopulmonary bypass (CPB) were performed: coronary artery bypass grafting (CABG) – n = 46, aortic or mitral valve replacement/repair (VR) – n = 13, VR and CABG – n = 5. The telephone survey was carried out one yr after surgery. The criteria assessed were (yes or no): 1) survival, 2) absence of unplanned repeated hospitalizations, 3) ability to self-service at home, 4) walking outside the home more than once a week. The satisfactory QOL was registered if all questions are answered «yes». Student's t-test was used, $p < 0.05$ was considered significant. Data are given as mean ± standard deviation.

Results. Forty-two pts reported a satisfactory QOL (group 1). One pt died. In 21 pts the QOL was not satisfactory (group 2). There were 6 repeated hospitalizations. The pts in the 1st and 2nd groups were of similar age: 79 ± 2 and 80 ± 3 yr ($p = 0.778$). Group 1 had a lower CPB time: 62 ± 21 and 91 ± 28 min ($p = 0.0014$), post-CPB blood lactate level: 1.7 ± 0.7 and 2.5 ± 1.1 mmol/l ($p = 0.016$), amount of blood loss: 7.3 ± 2.2 and 11 ± 4.4 ml/kg ($p = 0.014$), blood transfusion rate: 2.4 ± 1.4 and 7.7 ± 3.1 ml/kg ($p = 0.021$), and a higher pre-operative haemoglobin level: 137 ± 10 and 125 ± 14 g/l ($p = 0.0061$) and post-operative platelets (PLT) count: 185 ± 53/10^9 and 135 ± 46/10^9/l ($p = 0.004$).

Discussion. The QOL of elderly pts one yr after cardiac surgery is determined by the features of the peri-operative course.

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P-61
Patient satisfaction in cardiac anaesthesia: a single centre survey

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Introduction. Assessing patient satisfaction with a validated assessment tool is becoming more and more important. The inclusion of patients' peri-operative experiences within a decision-making process is one of the priorities of the NHS in the UK. The results of validated patient satisfaction questionnaires allow comparison with other departments and they have the potential to facilitate improvement in the delivery of patient care. We used a validated patient satisfaction questionnaire in cardiac surgery in combina-

tion with the modified Brice questionnaire to assess awareness with recall [1, 2].

Methods. Patients between 18 and 80 yr scheduled for elective or urgent cardiac surgery were included in this registered survey (AP3022). Exclusion criteria were diagnosis of psychiatric disorder or severe cognitive disorders and the inability to read, write and speak English. Patients received the satisfaction questionnaire on the third or fourth postoperative day.

Results. Eighty one patients participated in the survey; 41 underwent coronary artery bypass graft (CABG) surgery, 22 single valve surgery and 11 received a valve procedure plus CABG surgery. The mean age was 66.7 ± 10.6 (SD), and 17 patients were female. Most patients (73/81) felt reassured by meeting the anaesthetist pre-operatively. None of the patients had an episode of awareness during surgery. The main postoperative complaints were pain and nausea by 59% and 50% of patients, respectively. The overall patient satisfaction levels demonstrated that 91% and 93% of patients were very satisfied or satisfied with the service offered by the anaesthetists and by the surgeons, respectively.

Discussion. Overall patient satisfaction levels in this survey were very high with none of the patients having intra-operative awareness. The results reveal however, that many patients complain about postoperative pain and postoperative nausea and vomiting after cardiac surgery.

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P-62
Does minimally invasive direct coronary artery bypass (MIDCAB) reduce hospital length of stay? A retrospective analysis

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Introduction. During the last 20 years Minimally Invasive Direct Coronary Artery Bypass (MIDCAB) has been suggested as a means of reducing costs. A shorter hospital length of stay (LOS), less postoperative pain, accelerated rehabilitation, reduction of wound infections and superior cosmetic results have been postulated as the underlying benefits of MIDCAB. However, much of the early literature on this topic is based on technical reports or small case series and a lack of agreement between studies (statistical heterogeneity between randomized controlled trials, conflicting results) produced only low grade recommendations from experts.

Methods. From January 2005 to December 2011 overall 818 elective surgical coronary revascularization cases have been performed at our institution. We retrospectively matched a mixed cohort of 59 MIDCABs with a cohort of 59 off-pump (full sternotomy) coronary artery bypass cases (OPCAB) extracted from our electronic dataset, using the propensity score based nearest neighbour matching, as described by Rosembaum et al. Multilevel stepwise regression modelling was used to indentify predictors of ICU and hospital length of stay. Differences in ICU and hospital LOS were primary endpoints.

Results. The mini-invasive approach was not a predictor of ICU-LOS, hospital LOS, duration of mechanical ventilation, perioperative blood losses or peri-operative red packed cells transfusions. The mini-invasive approach was an independent predictor of duration of surgery. Independently of the

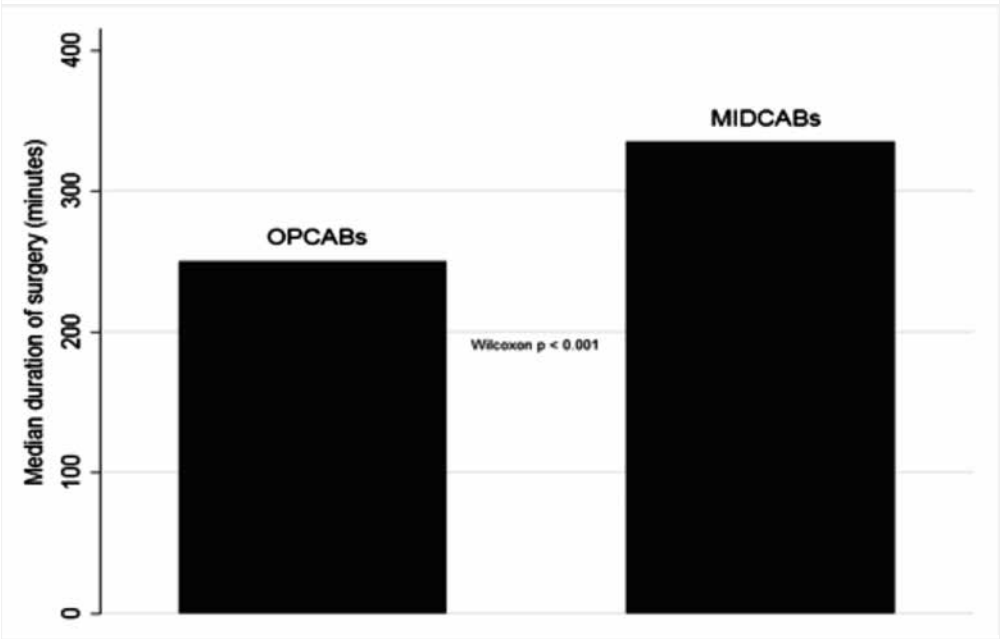

Figure 1: Median duration of surgery in study cohorts (OPCABs vs MIDCABs

number of grafts performed, MIDCAB patients underwent a longer procedure (66 min longer, $p < 0.01$, 95% CI: 47-85 min). Higgins's Cardiac Risk Score (CRS) was the only independent predictor of hospital LOS on multilevel analysis. Post hoc power analysis showed 87% power to detect a difference in hospital LOS of 2 days but only 32% for a difference of 1 day Figure 1).

Discussion. This retrospective analysis failed to show any significant difference (> 2 days) in ICU LOS and hospital LOS. MIDCAB was not a predictor of ICU and hospital LOS. This might be the result of the lack of superiority of MIDCAB against OPCAB or might be due to a lack of an ultra-fast track protocol at our institution. However, ultra-fast track hospital discharge in cardiac surgery is still debated and a fully integrated ultra-fast track protocol after MIDCAB as a standard of care requires further evaluation. Albeit some cost related benefits of MIDCAB have been suggested (cosmetic results, reduction of sternal infections, a reduced risk in redo cardiac surgery), a reduction in LOS and thus peri-operative costs attributable to MIDCAB is still debated and further research is imperative.

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P-63
Pre-hospital therapeutic hypothermia in cardiac arrest: a meta-analysis of randomized clinical trials

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Introduction. Current guidelines suggest therapeutic hypothermia to 32-34 °C in comatose patients after out of hospital resuscitation for cardiac arrest to improve neurological outcome. However, recent large randomized clinical trials (RCTs) did not confirm these beneficial effects. We therefore performed a meta-analysis of RCTs to evaluate the effects of hypothermia on mortality, neurologically intact survival, and re-arrest.

Methods. Four trained investigators searched pertinent studies on BioMedCentral, PubMed, Embase and the Cochrane Central Register. Inclusion criteria were adult patients and random allocation to treatment (pre-hospital therapeutic hypothermia versus normothermia or in-hospital therapeutic hypothermia). Computations were performed with Review Manager version 5.2. Outcomes were analysed to compute individual and pooled risk ratio (RR) with pertinent 95% confidence interval (CI), by means of Mantel-Haenszel method with a fixed- or random-effect model.

Results. Among 447 retrieved studies, five eligible studies randomizing 1993 patients (1003 to pre-hospital therapeutic hypothermia and 990 to normothermia or in-hospital therapeutic hypothermia) were identified. No difference in mortality was found at the longest follow-up available (555/1,003 [55%] in the pre-hospital therapeutic hypothermia group versus 552/990 [56%] in the control group, RR = 1.00 [95% CI 0.93 to 1.08], *p* for effect = 0.97, *p* for heterogeneity = 0.74, I^2 = 0% with 5 studies included). Moreover, no difference in neurologically intact survival was recorded (180/803 [22%] in the pre-hospital therapeutic hypothermia group versus 196/793 [25%] in the control arm, *p* for effect = 0.24 with 3 studies included). In contrast, pre-hospital therapeutic hypothermia was associated with an increased rate of re-arrest (181/921 [20%] in the pre-hospital therapeutic hypothermia group versus 143/909 [16%] in the control group, RR = 1.24 [95% CI 1.02 to 1.50], *p* for effect = 0.03, *p* for heterogeneity = 0.70, I^2 = 0% with 4 studies included).

Discussion. Pre-hospital therapeutic hypothermia does not improve outcome of patients after cardiac arrest and could be detrimental since it increases the rate of re-arrest.

P-64
Levosimendan in non-cardiac surgery: a systematic review

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Introduction. Levosimendan reduces mortality in the critically ill [1] and increases cardiac output with no increase in myocardial oxygen consumption. It is mostly used in cardiac surgery and heart failure patients. Even if more than 200 million major non-cardiac surgical interventions are performed per year worldwide, the use of this drug has been seldom reported in this context. We performed a systematic review to identify all the manuscripts ever published reporting levosimen-

dan administration in patients undergoing non-cardiac surgery.

Methods. An extensive research of the literature (PubMed, BioMedCentral and Scopus) was performed by trained investigators. Data on surgical setting, dose of levosimendan, postoperative course, and outcome were extracted.

Results. Nine studies (published in 2008-2013) reported the use of levosimendan in non-cardiac surgery, four of them in vascular surgery. A total of only 46 patients received levosimendan and 10 patients placebo (only one small randomized trial has been published so far). Four manuscripts described emergency procedures. Bolus dose was reported by five authors and continuous infusion (0.1-0.2 μg/kg/min) was continued for 12-48 hr. A significant improvement in the main cardiac function parameters (e.g. cardiac index) and no 30-day mortality were achieved in the five manuscripts reporting these data. No haemodynamic complications (e.g. hypotension) nor major arrhythmias were described, with the exception of a single case of atrial fibrillation with spontaneous reversal.

Discussion. Levosimendan may be a feasible option for the peri-operative management of high-risk patients undergoing non-cardiac surgery. The topic merits further attention since only few and small studies previously investigated the role of levosimendan in this setting.

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Poster Session – Thoracic Anaesthesia: Ventilation

P-65
Window setting of chest computed tomography to appropriately determine the left mainstem bronchial diameter

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Introduction. Measuring the left mainstem bronchial (LMB) diameter on the chest computed tomography (CT) is widely used to determine the left-sided double-lumen tube (DLT) size. However, the LMB diameter is differently measured according to the window setting of the CT, which may result in inappropriate size of DLTs. This study was performed to investigate the optimal window setting for measuring the LMB to predict the proper DLT size for patients.

Methods. Patients scheduled for thoracic surgery were randomly allocated into two groups, the soft-tissue window group (n = 110) and the bronchial window group (n = 111). We decided the DLT size according to the chest CT, in which the window settings were to width 400 Hounsfield unit (HU), level 25 HU in the soft-tissue window group and width 1000 HU, level 450 HU in the bronchial window group. The appropriateness of the tube size was determined by the presence of air-tight seal during one-lung ventilation with 25 cmH_2O of peak airway pressure. We considered the selected DLT to be oversized if there was no air-leak with the bronchial cuff totally deflated, and undersized if there was air-leak even with the bronchial cuff volume over the resting volume. The selected DLT size, the probability of selecting oversize/undersize tube and the intra-cuff volume and pressure of the bronchial cuff during air-tight seal were examined in the both groups.

Results. There was a significant difference in the selected DLT size in both groups. The incidence of oversized DLT was higher in the soft-tissue window group ($p = 0.003$). The intra-cuff volume of the bronchial cuff during air-tight seal was higher in the soft-tissue window group (0.8 ± 0.5 vs. 0.6 ± 0.4, $p = 0.024$), but the intra-cuff pressure was comparable between both groups.

Discussion. The window setting of width 1000 HU, level –450 HU in chest CT is preferable for selection of a proper size DLT.

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P-66
Gel lubrication reduces fluid leakage past the endobronchial cuff of double lumen tubes

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Introduction. To protect the healthy lung from soiling, the bronchial cuff of double- lumen tubes (DLT) must achieve a water-tight seal. Although a polyvinylchlroride (PVC) endotracheal cuff cannot achieve a water-tight seal, application of lubricating gel on the PVC cuff has been reported to improve sealing characteristics [1]. Thus, we hypothesized that lubricating gel on endobronchial cuffs can reduce the fluid leakage past the cuff. An artificial tracheobronchial tree was made and the fluid leakage past the cuff was measured.

Methods. Seven 35 Fr left sided DLTs were tested. The endobrconchial cuff of DLTs were randomly lubricated either with water (group C) or lubricating gel (group Gel), then intubated the artificial tracheobronchial tree. Five ml of coloured water put into the non-dependent side of the artificial tracheobronchial tree and fluid leaking past the endobronchial cuff was monitored for 6 h.

Results. Fluid leakage was first detected within one minute [0.5 min (0.4 – 0.7); median (interquartile)] in group C. In contrast, fluid leakage was not detected until 240 min in group Gel. At the end of the study period, all the fluid had passed over the cuff in group C, but 0 (0-0.6) ml of fluid leakage was detected in group Gel.

Discussion. Lubricant gel can increase the sealing characteristics of the DLT by filling the folds in the cuff, thereby obstructing the flow of material along the folds. Lubrication of bronchial cuff can effectively reduce the fluid leakage past the bronchial cuff.

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P-67
Protective lung ventilation with pressure control ventilation versus volume control ventilation during one lung ventilation

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Introduction. A constant threat during one lung ventilation (OLV) in patients undergoing thoracic surgery is hypoxaemia. For many years it was thought that large tidal volumes produced the highest arterial oxy-

gen tension (PaO2) during OLV, leading to the recommendation that tidal volume (TV) during OLV should be as high as in two-lung ventilation (8-12 ml/kg). Recently data have demonstrated that protective lung ventilation (TV ≤ 5ml/kg, positive end-expiratory pressure-PEEP 5-10 mmHg and limit of the plateau airway pressures up to 20 cmH_2O) prevents acute lung injury (ALI). Use of pressure control ventilation (PCV) versus volume control ventilation (VCV) during OLV is considered to improve pulmonary oxygenation, to reduce intrapulmonary shunt and to lower airway peak pressure [1]. However, benefits of PCV implementation remain controversial not only in patients with pulmonary pathology but also in otherwise healthy patients [2]. In this study we investigated whether PCV or VCV can achieve the target of PLV during OLV in non-functionally impaired patients during thoracic surgery.

Methods. Twenty patients with good pre-operative pulmonary function (FEV1 > 75%, FEV1/FVC > 75%) scheduled for thoracic surgery, were prospectively enrolled in this study. Ten patients underwent OLV with VCV and ten patients with PCV for a similar period of time with the same settings (TV: 5ml/Kg, PEEP: 5 cmH_2O). Peak, Plateau airway pressure and arterial blood gases were obtained during OLV.

Results. Arterial PO_2 did not differ between two groups before OLV establishment. There were significant differences during OLV in arterial oxygenation between VCV and PCV (PO_2: 12.9 ± 0.72 kPa vs 18.4 ± 4.78 kPa respectively, $p = 0.031$). Peak airway pressure was lower with PCV than with VCV (P_{peak}: 20 ± 0 vs 36 ± 3.28 respectively $p = 0$). Plateau pressure up to 20 cmH_2O was achieved only with PCV; even though the low $P_{inspiration}$, PCO_2 was maintained less than 50 mmHg.

Discussion. The use of PCV during OLV leads to improved oxygenation compared with VCV also for patients with good pre-operative pulmonary function. Moreover PCV reduced peak airway pressures resulting to better distribution of ventilation to the lung, better ventilation/ perfusion matching and protection from barotraumas.

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P-68
Protective one lung ventilation for pulmonary resections: a pilot study

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Introduction. Postoperative pulmonary complications are still major causes of morbidity and mortality after pulmonary resection. The use of low tidal volume (VT) during one lung ventilation (OLV) has been recently evaluated to decrease the incidence of Acute Lung Injury (ALI) as part of ventilation strategy [1]. No study to evaluate the best VT during OLV has been designed so far. The primary endpoint of this study was to evaluate the feasibility of 6 vs. 4 ml/kg of VT during OLV for pulmonary resection and the impact of intra- and postoperative PaO_2/FiO_2. The secondary endpoints were the postoperative length of stay (LOS), cardiac and pulmonary complications and mortality.

Table 1

	6 ml/kg^{-1} (12 pts)	4 ml/kg^{-1} (12 pts)	*p* value
PaO_2 kPa (2SD) intraoperative OLV	21.9 ± 19.8	19.5 ± 19.3	0.28
$PaCO_2$ kPa(2SD) intraoperative OLV	5.2 ± 1.1	5.7 ± 1.4	< 0.0001
pH (2SD) intraoperative OLV	7.41 ± 0.1	7.37 ± 0.09	0.0004
PaO_2/FiO_2 < 13.3 (n) Intraoperative OLV	0	1	0.3
PaO_2/FiO_2 (2 SD) 1 hour postoperative	39.4 ± 20.5	40.9 ± 24.4	0.77
PaO_2/FiO_2 in POD1 (2SD)	45.9 ± 25.1	45.1 ± 18.6	0.87
PaO_2/FiO_2 in POD3 (2SD)	44.5 ± 13.8	42.9 ± 15.3	0.66
PaO_2/FiO_2 < 40 (n) in POD1	4	3	0.5
PaO_2/FiO_2 < 40 (n) in POD3	2	1	0.3
PaO_2/FiO_2 < 26.7 (n) postoperative	0	0	–
Pneumonia (n)	3	0	0.045
Atelectasis (n)	1	0	0.3
Arrhythmias (n)	1	2	0.3
Redo (n)	1	2	0.44
LOS_{days} (2 SD)	11 ± 14	12 ± 14	0.66
Mortality	0	0	–

Methods. Twenty four patients undergoing elective thoracotomy or thoracoscopic lobectomy were enrolled and randomly assigned to two different OLV groups. During two lung ventilation (TLV) both groups were ventilated with a VT of 8 ml/kg. The comparison, as an observational intermediate step for designing a pilot study, was directed to a VT of 6 ml/kg (group 6) vs. a "more" protective VT of 4 ml/kg (group 4), during OLV. Exclusion criteria were: history of heart and/or renal disease, pulmonary hypertension, severe COPD and pts with pre-operative PaO_2 < 8 kPa and/or $PaCO_2$ > 6 kPa. During TLV both groups were ventilated with a peak pressure (P_{peak}) ≤ 25 cmH_2O and I:E = 1:2. During OLV boyh group6 and group4 were ventilated with Ppeak ≤ 35 cmH_2O, I:E = 1:2, while ZEEP was set in group6 and a PEEP of 5 cmH_2O was set in group 4. Only in group4, lung recruitment manoeuvres (LRM) were performed every hour of OLV and in case of desaturation (SpO_2 < 92%), FiO_2 was increased to maintain SpO_2 > 93%. LRM were implemented as described by Tusman G. et al [2]. After LRM ventilation parameters were switched to baseline settings. After lung re-expansion, but before chest closure, PEEP of 5 cmH_2O was set in TLV. Intra-operatively arterial blood gas analysis, haemodynamic and ventilatory data were recorded. In the postoperative period, vital signs every 12 h for 2 days, arterial blood gas analysis in the first and third postoperative day (POD), pulmonary and cardiac complications, postoperative LOS, need for re-operation and mortality were recorded.

Results. Are reported in Table 1.

Discussion. There was no statistical differences between the two groups studied in terms of PaO_2/FiO_2 and LOS. Among the postoperative complications, there was a

higher incidence of pneumonia in *group 6*. During OLV, hypercapnia was a side-effect in "more" protective ventilation *group 6* with minimal pH changes. In thoracic surgery, Yang at al [1] reported that OLV of 6 ml/kg strategy, despite the smaller VT,, was comparable to 8 ml/kg in terms of oxygenation, alveolar ventilation and postoperative outcomes. In conclusion, the design of the present "pilot" study to compare a VT during OLV of 6 vs. 4 ml/kg showed that both the protective ventilation strategies, during OLV, were safe with no difference in postoperative **Results.**

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P-69
Effect of ventilatory mode on arterial oxygenation during one-lung ventilation for thoracic surgery in patients with obstructive lung diseases

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Introduction. The effect of ventilation mode during one-lung ventilation (OLV) on arterial oxygenation in patients with obstructive lung diseases has not been clearly determined yet. The purpose of this study was to evaluate the effects of ventilation mode on arterial oxygenation, airway pressures and haemodynamic variables during one-lung ventilation.

Methods. Forty patients, who had obstructive lung diseases on pulmonary function tests, undergoing elective thoracic surgery in the lateral position, were included. They were randomly assigned to one of two groups. In group A, OLV was started by volume-controlled ventilation (VCV) and the ventilation mode was switched to pressure-controlled ventilation (PCV) after 30 min. In group B, ventilation modes were performed in the opposite order. OLV was performed with a tidal volume of 6 ml/kg based on predicted body weight, with positive end-expiratory pressure (PEEP) of 5 cmH_2O. During OLV with PCV, the inspiratory pressure was closely adjusted to obtain a tidal volume of 6 ml/kg with PEEP of 5 cmH_2O. Arterial blood gas analysis data, peak inspiratory pressures (Ppeak), mean airway pressure (Pmean), plateau inspiratory pressure (Pplateau), and haemodynamic variables were obtained at the end of each ventilatory mode during OLV. Statistical analysis was performed using paired t-test for numerical data and chi-squared test for non-numerical data between groups. Statistical significance was accepted for p-values of < 0.05.

Results. No significant difference was observed in arterial oxygenation during OLV with VCV (PaO_2 = 194.3 ± 43.7 cmH_2O) or PCV (PaO_2 = 200.8 ± 58.3 cmH_2O; p = 0.722). Compared to two-lung ventilation (18.8 ± 2.4 cmH_2O), peak airway pressure increased after the initiation of OLV with VCV (21.9 ± 2.5 cmH_2O; p = 0.002) or PCV (21.3 ± 4.1 cmH_2O; p = 0.039), but the airway pressures and haemodynamic variables were similar during OLV with each ventilation mode.

Discussion. In patients with obstructive lung disease, PCV provides no advantage over VCV in terms of respiratory and haemodynamic variables during protective OLV.

P-70
The one and a half ventilation technique with Human Silbroncho® double lumen tube for improving hypoxaemia during one-lung ventilation: a pilot study

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Introduction. Double lumen endobronchial tubes (DLT) are the most common method of achieving lung isolation and one-lung ventilation (OLV) during thoracic anaesthesia. The selective application of continuous positive-pressure ventilation (CPAP) to recruit the non-dependent lung (NL) during OLV improves arterial oxygenation, but may limit the surgical access during video-assisted thoracoscopic surgery (VATS). We hypothesized that the one and a half lung ventilation (OHLV) using Human Silbroncho® DLT during VATS may improve arterial oxygenation and providing a similar surgical access compared to the CPAP.

Methods. Sixteen patients scheduled for elective VATS were included. They were intubated with Human Silbroncho® (manufactured by INSUNG Medical.co, South Korea). After the first 15 min of OLV (TOLV), the NL was ventilated with tidal volume 5 ml/kg and CPAP of 5 cmH_2O (TCPAP). After 15 min of CPAP, patients were ventilated with the OHLV (TOHLV) (Figure 1). The OHLV means conventional OLV plus 50% ventilation of NL. PaO_2 of TOLV, TCPAP, and TOHLV was compared each other. Degree of field disturbance (DFD) was evaluated by the surgeon and described as follows. (DFD score: 0 = no disturbance, 1 = mild, 2 = moderate, 3 = severe disturbance). Statistical analysis was performed with Wilcoxon signed-rank test using SPSS 12.0 (SPSS Inc., Chicago, IL, USA). Data are mean ± SD.

Results. There was no significant difference between PaO_2 of TOHLV (17.6 ± 6.8 kPa) and TCPAP (19.2 ± 9.2 kPa). Both PaO_2 of TOHLV and TCPAP were significantly higher than PaO_2 of TOLV (14.0 ± 44.8 kPa). DFD showed no significant difference between OHLV (1.0) and CPAP (0.9).

Discussion. OHLV with Human Silbroncho® was as effective as CPAP in improvement of oxygenation during OLV, and provided satisfiable surgical fields for operation during VATS.

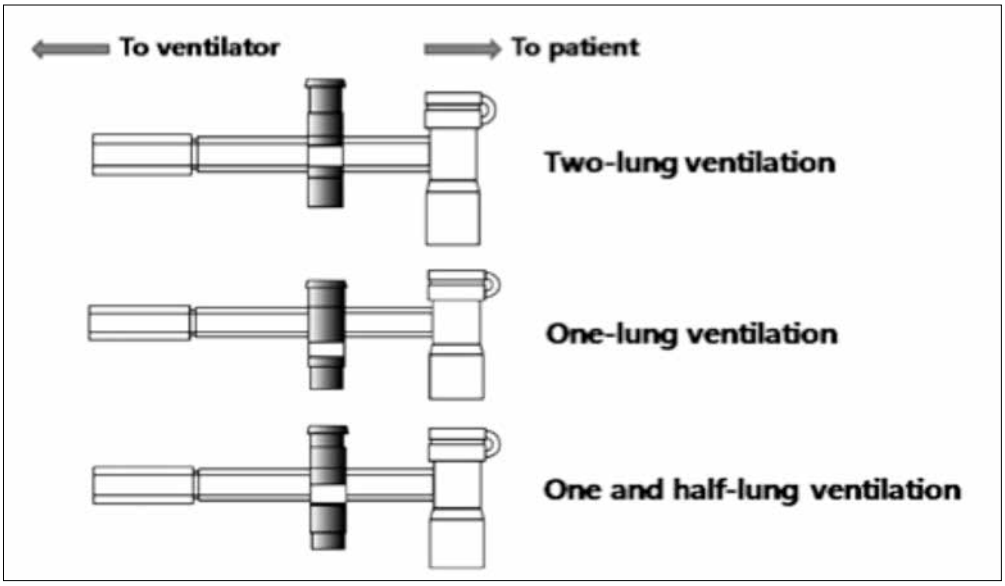

Figure 1: Human Silbroncho® DLT and OHLV

Poster Session – Cardiac Anaesthesia

P-71
Pre-operative renal function stratification and early cardiac ICU adverse events in coronary artery disease

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Introduction. Patients with chronic kidney disease (CKD) presenting for cardiac surgery, often display comorbid diseases and a varying degree of adverse events in the peri-operative setting [1]. In this group of patients, association of CKD and complications during cardiac ICU (CICU) stay are not well-defined.The objective of this investigation was to evaluate early postoperative complications in CICU among patients with normal or mild decrease of renal function versus those with CKD (moderate to severe kidney dysfunction).

Methods. We retrospectively analysed data from 598 consecutive patients admitted to cardiac ICU after elective isolated coronary artery bypass grafting procedures from June 2012 to March 2014. Patients on renal dialysis, those having undergone urgent or emergent surgery, or those who suffered from pre-existing arrhythmia were excluded prior to the study. Estimated GFR (eGFR) was calculated by the MDRD equation for each patient. An eGFR of less than 60 ml/min/1.73 m^2 was considered the threshold for CKD. Early postoperative outcomes included re-intubation, pneumonia, acute kidney injury (AKI), renal failure requiring dialysis (RD), multiple organ dysfunction syndrome (MODS), new onset atrial fibrillation (AF) and in-hospital mortality. Chi-squared test and student's t-test were used for statistical analysis.

Results. The threshold of CKD occurred in 165 patients (27.6%; Group 2) while 433 patients presented normal or mild deterioration of renal function (72.4%; Group 1). The mean age of Group 1 and Group 2 was 63.2 ± 10.6 and 69 ± 8.4 yr, respectively. Patients with CKD had higher re-intubation rate and incidence of pneumonia, AKI and RD (Table). A relative statistical significance was observed regarding MODS (4 vs. 5; $p = 0.06$). Concerning AF, there was no statistical significance between the groups. Incidence of in-hospital mortality was less in Group 1 (Table 1).

Discussion. According to our results, patients with moderate to severe renal dysfunction undergoing open-heart surgery for coronary disease show increased postoperative morbidity and mortality. Therefore, preoperative stratification according to renal

Table 1

n = 598	Group 1 (n = 433)	Group 2 (n = 165)	P value	Relative Risk
Pneumonia	2 (0.5%)	5 (3%)	< 0.01	6.545
Re-intubation	3 (0.7%)	7 (4.2%)	< 0.01	6.123
AKI	50 (11.5%)	38 (23%)	< 0.01	1.994
Renal Dialysis	5 (1.2%)	6 (3.6%)	0.04	3.149
Mortality (%)	0.9	3.7	0.02	3.951

function is required to adopt renal protection strategies in an effort to avoid postoperatively potential deleterious adverse events.

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P-72
Parameters of renal function after myocardial revascularization with the use of cardiopulmonary bypass

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Introduction. During cardiac surgical procedures with the use of CPB, kidney function is often affected, which manifests itself in changes in glomerular and tubular function. In patients with normal pre-operative renal function, there is a transitory renal dysfunction with the use of CPB. The aim of research was to establish renal function parameter values in patients, before and after myocardial revascularization, with and without the use of cardiopulmonary bypass.

Methods. Eighty patients with coronary heart disease, who were subjected to elective surgical myocardial revascularization were studied prospectively. 40 patients were subjected to myocardial revascularization with the use of CPB and 40 patients subjected to myocardial revascularization without the use of CPB. Renal function parameters were measured in all subjects before and after myocardial revascularization and postoperatively up to 48 h. Creatinine clearance, fractioned sodium excretion in urine and free water clearance were measured.

Results. Values of CrCl after myocardial revascularization in the CPB group were significantly lower compared to off-pump group, as well as ClH_2O values ($p < 0.01$). Values of FENa in urine after myocardial revascularization in the CPB group were significantly higher compared to the off-pump group values ($p < 0.01$).

Discussion. Myocardial revascularization without the use of CPB maintains better renal function and enables better renal protection.

P-73
Beneficial impact of levosimendan in critically ill patients with or at risk for acute renal failure: a meta-analysis of randomized clinical trials

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Introduction. Critically ill patients show a high incidence of Acute Kidney Injury (AKI), with few interventions that can alter its clinical course and improve outcome. Levosimendan is an inodilator agent that seems to increase renal blood flow due to its vasodilating effects. The aim of the study was to comprehensively assess all randomized controlled trials (RCTs) ever performed comparing levosimendan with any pharmacological comparator in order to evaluate the role of this drug in critically ill patients with or at risk of AKI.

Methods. A systematic review (Cochrane Central Register, Embase, Scopus and Medline) and a meta-analysis of pertinent RCTs were performed in accordance with the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) guidelines. To identify ongoing or unpublished trials, we searched the Clinical Trial Registry. We extracted data on setting, dose of levo-

simendan, type of comparator, outcome and length of follow up. The primary endpoint was the number of patients receiving Renal Replacement Therapy (RRT) after randomization. The secondary endpoint was the number of patients developing AKI.

Results. The final analysis included 33 RCTs and 3,879 patients (2,024 receiving levosimendan and 1,855 receiving control). The overall analysis showed that the use of levosimendan was associated with a significant reduction in the risk of RRT (17 of 492 [3.5%] in the levosimendan group versus 37 of 427 [8.7%] in the control group, RR = 0.52, 95% CI 0.32 to 0.86, *p* for effect = 0.01) and in the risk or worsening of AKI (114 of 1,598 [7.1%] in the levosimendan group versus 143 of 1,529 [9.4%] in the control arm, RR = 0.79, 95% CI 0.63 to 0.99, *p* for effect = 0.048).

Discussion. This meta-analysis suggests that the use of levosimendan is associated with a significant reduction in the incidence of RRT in critically ill patients and that this promising drug should be further studied in large randomized controlled trials.

P-74
Urinary catheter management in a Cardiac Intensive Care Unit: a follow up

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Introduction. During their stay in the intensive care unit, patients are subjected to various sources of infection. Urinary tract infection is one of the most frequent. Epic2 Guidelines suggest bladder washout is not useful in preventing catheter related infections and could potentially increase infection rates due to opening of the sterile closed system.

Methods. An audit on urinary catheter management was done between March and June 2011 on 207 patients admitted consecutively in our cardiothoracic intensive care unit. The aim of the investigation was to assess compliance with Epic2 guidelines on management of urinary catheters, frequency of bladder washout and compliance with Trust Policy during the procedure. After two years, a re-audit was conducted on 267 patients of the same Unit, between October and December 2013. The aim of the re-audit was to ensure no bladder washouts were performed unnecessarily, to verify utilization of bladder scan to detect presence of urine in the bladder and to ensure total adherence with Trust Policy regarding urinary catheter management.

Results. The first audit showed a low rate of bladder washout (13 on 207 pts) but only 2 of the bladder washouts performed were useful in resolving an obstruction. Compliance with ANTT (aseptic non touch technique) in performing the manoeuvre was also considered not satisfactory. The use of bladder scan to detect presence of urine in the bladder and staff retraining was recommended. The re-audit results showed 6 bladder scans performed in 267 patients, 4 of them followed by bladder washouts. Two patients had bladder washout with no bladder scan performed and without appropriate indications which resulted in being not useful. Complete accordance with policy and 100% compliance with ANTT were recorded in performing the manoeuvre.

Discussion. Re-audit showed an excellent compliance with hygiene policy and very effective staff training. Bladder scan is now an established device in our Unit. Rate of bladder washouts has decreased further. Final suggestion has been to always perform a bladder scan before bladder washout and to limit washouts to situations in which the procedure is strictly required (severe haematuria).

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P-75
Haemodialysis in ICU patients results in cerebral microembolism

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Introduction. Generation of microemboli (ME) in the dialysis circuit is a recognised event during continuous veno-venous haemodialysis (CVVH). Evidence is accumulating that ME do not trap in the pulmonary vasculature and reach the cerebral circulation. The aim of this pilot study was to quantify (as microemboli load per 30 minutes) and qualify (particulate versus gaseous) ME, detected by transcranial Doppler (TCD) as high-intensity transient signals (HITS), in the middle cerebral arteries (MCA) during haemodialysis.

Methods. With local Ethics Committee approval and informed patient consent, ICU patients undergoing CVVH were included. Patients with severe head injury, carotid artery stenosis > 80%, other extracorporeal support or agitation were excluded. In a randomized fashion, HITS were recorded for 30 minutes during and without haemodialysis in both MCAs. Statistical analysis used Wilcoxon Signed Rank Test (significance at $p < 0.05$). Data are presented as number (n), mean ± standard deviation and median with interquartile ranges.

Results. Twenty patients (6 female, age 56 ± 11 yr.) were examined. The double-lumen dialysis catheter was positioned in the left/right internal jugular vein (n = 5/10) or left subclavian vein (n = 5). Overall HITS count increased from 77 (14; 600) without haemodialysis to 358 (62; 1,142) during haemodialysis ($p < 0.001$). Compared to the right MCA, the left MCA exhibited more overall HITS (150 [18; 902] vs. 39 [7; 356]; $p = 0.007$) and more gaseous HITS (140 [17; 821] vs. 35 [7; 351]; $p = 0.007$]) during haemodialysis.

Discussion. This study confirmes that CVVH generates a considerable number of both particulate and gaseous ME, which pass the lungs and reach the MCA. Further research is needed to investigate the association of HITS to stroke and cognitive dysfunction in patients undergoing CVVH.

P-76
Evaluation of outcomes for renal transplant recipients who undergo cardiac surgery

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Introduction. As the majority of patients requiring both cardiac surgery and renal transplantation undergo cardiac surgery prior to transplant, there is little outcome data available on renal transplant patients undergoing cardiac surgery. We aimed to evaluate outcomes for patients with a functioning renal transplant after undergoing cardiac surgery.

Methods. Thirty three patients identified (mean age 56.3 yr; 26 male, 7 female) (20 CABG only, four CABG & valve, nine valve only) between July 1997 and April 2010 were studied. Notes were retrospectively interrogated. Analysis was performed in SPSS, using lifetables survival analysis, Wilcoxon signed ranks, as well as basic descriptive analysis.

Results. Survival was: 97%, 78% and 48% at one, five and ten years respectively (Figure 1). Renal function declined initially,

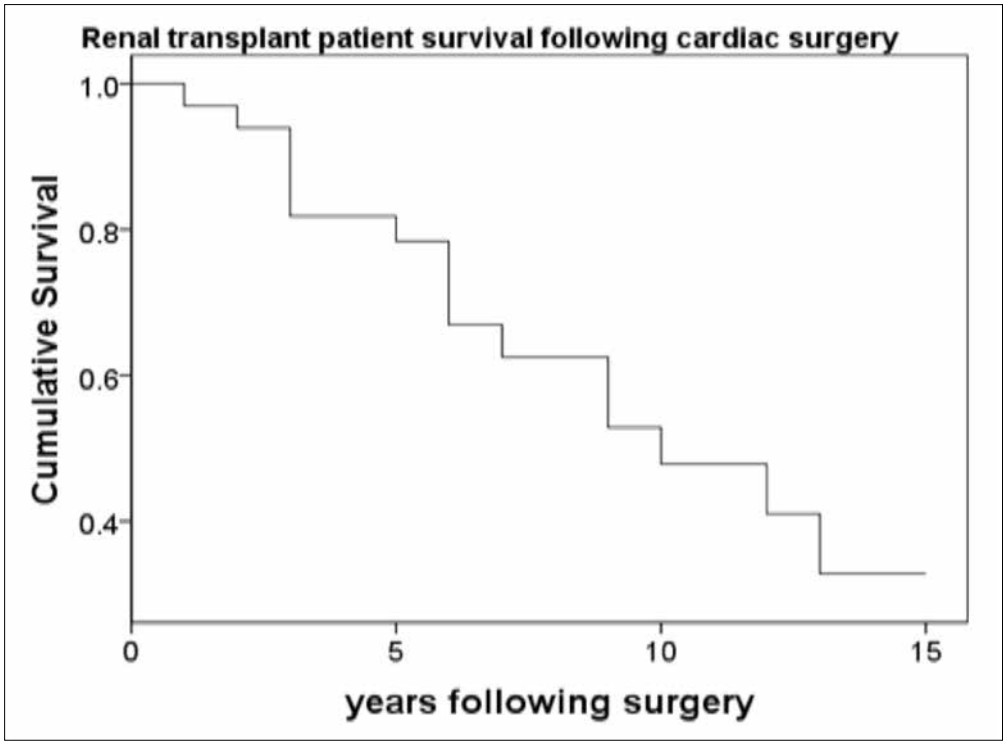

Figure 1: Survival curve for renal transplant patients following cardiac surgery

using the Acute Dialysis Quality Initiative's RIFLE acute renal failure guide, but clinically returned to baseline by discharge in 92.3% of patients. All patients were immunosuppressed, with 89.6% of patients on 2 or more agents. Infection rates observed were: leg wound infection (10%), sternal wound infection (10%) and pneumonia (9.1%).

Discussion. Cardiac surgery can be performed safely with low mortality and morbidity rates in patients with a renal transplant. Long term survival rate and allograft function were found to be in an acceptable range.

P-77
Reduction of the risk of gastroduodenal bleeding in cardiac surgery: new tactics

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Introduction. Acute erosion and ulceration of upper gastrointestinal tract mucosa occur in 0.8-35% of cardiac surgery patients and have high mortality rates (up to 70%) [1,2]. A method of forecasting gastroduodenal bleeding (GDB) was examined on the basis

of the pathological mechanisms of erosions und ulcer.

Methods. In a prospective trial 180 patients scheduled for coronary artery bypass grafting surgery were examined. The study group included 84 patients 56 ± 6 yr old. A week before the surgery these patients underwent a hypoxic test (HT) (breathing gas mixture with 10% oxygen for 40 min). During the HT, measurement of intragastric pH by acidogastrometer "AGM-03" was performed. All cases where gastric antrum pH was below 4.0 were considered to be at high risk of GDB and were administered 40 mg omeprazole per os. A low risk of GDB was assumed with a stable pH (Utility patent RU No 2404712 C2, 2010). A comparison group of 96 patients, 56 ± 5 yr received traditional prophylactic antisecretory therapy. ROC-analysis was performed to assess the prognostic power of the Method. Odds ratio was used to estimate the risk of GDB in both groups.

Results. High risk of GDB was revealed in 21 (25%) patients of the study group. Analysis of pH monitoring during cardiopulmonary bypass (CPB) results revealed that in 6 patients of the study group pH decreased down to 3.8 (p = 0.05). They received intravenous omeprazole 40-80 mg intra-operatively. Using the HT in conjunction with an intragastric pH-metering has sensitivity-76.2%, specificity-90.5%, and the critical pH is ≤ 3.8 (p = 0.001), AUC = 0.88 (95% CI 0.80-0.95). The likelihood of developing GDB in patients of the study group at pH > 3.8 is lower than in the comparison group, Odds Ratio = 5.3.

Discussion. Performance of HT in conjunction with intragastric pH-metering allows selection of patients that do not require antisecretory drugs before operation. Intragastric pH monitoring during the peri-operative period allows an estimation of risk of GDB for administration of individual *pathogenetically substantiated* antisecretory therapy.

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Poster Session – Echocardiography

P-78
Impact of intra-operative transoesophageal echocardiography on cardiac surgery decision-making: a prospective analysis

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Introduction. Previous studies demonstrated the importance of intra-operative monitoring with transoesophageal echocardiography (TOE) in cardiac surgery [1]. We assessed the impact on surgical decisions in patients undergoing cardiac surgery in our environment.

Methods. We designed a prospective observational study of patients undergoing cardiac surgery from June 2012 to October 2013. TOE was performed by the consultant anaesthesiologist in charge. The data collected was: 1) Type of surgery; 2) Preoperative echocardiographic findings ("basal ECHO"); 3) Echocardiographic findings before entering cardiopulmonary bypass (CPB) ("pre-CPB TOE"); 4) Differences between baseline ECHO and pre-CPB TOE ("new pre-CPB finding") and whether these differences modified planned surgery; 5) Echocardiographic diagnosis after disconnection of CPB ("new post-CPB finding") and whether these post-CPB echocardiographic findings were suffiently significant to re-establish CPB.

Results. 449 patients were studied. Intraoperative TOE showed "new pre-CPB find-

ings" in 49 patients (10.9%) and 32% (16 patients) of these caused a change in scheduled surgery. Of these findings, the most frequent were valvular abnormalities in patients undergoing coronary revascularization surgery which led to a replacement or repair that had not been scheduled. The incidence of "new post-CPB findings" was 8.7% (39 patients) and 64.1% (25 patients) of those required reinstating CPB and modifying the surgery performed. The main cause that led to re-entry into CPB was worsening of mitral valve dysfunction. In the remaining 14 patients who had "new post-CPB findings", there was no change in the surgical procedure.

Discussion. Differences between pre-operative and intra-operative echocardiographic diagnosis may be due to better quality TOE images compared with pre-operative transthoracic explorations or expertise of the baseline echocardiographer. This may differ from small centres to echochardiography laboratories. Also and very importantly, the differences may be related to disease worsening secondary to a large time period between the pre-operative echocardiographic exploration and the surgery. Echocardiographic study after CBP provides direct and immediate assessment of the surgical outcome which can be useful for modifying the procedure if required. As previously described, TOE examination affected decision making and should be a standard procedure for all patients undergoing cardiac surgery. Despite the limitations of our study, we consider that TOE proved to be very useful in our working area.

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P-79
Inter- and intra-observer variability of tricuspid annular plane excursion by 2 Dimentional-mode and M-mode in Transoesophageal Echocardiography

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Introduction. The aim of this study was to assess the inter- and intra-observer variability of different modes of TAPSE measurements in TOE.

Methods. Patients scheduled for elective cardiac surgery underwent TOE including modified right ventricular deep transgastric view (dTGRV) at 0° and 120°. TAPSE was measured in midoesophageal 4 chamber view (4CH) by RV free wall shortening in 2D and in dTGRV by M-mode of lateral tricuspid annulus (TA). Data were digitally stored for subsequent offline analysis. The degree of M-mode cursor alignment to lateral TA in dTGRV was characterized as good < 20°, regular 20°-45° or poor > 45°. Image quality of 4CH was described regarding endocardial definition as good, regular or poor. For intra-observer variability one examiner performed the measurements twice in a time interval of 6 weeks. For inter-observer variability a second examiner performed all the measurements blinded to the results of the first examiner. For reliability analysis we used the intraclass correlation coefficient (ICC) with the results shown as ICC and its 95% confidence interval.

Results. Thirty five patients (19 men/16 women) were included. Quality of images was good in 68.5% of dTGRV0°, 40% of dTGRV 120° and 57% of 4CH, regular in 28.5% of dTGRV0°, 54% of dTGRV120°and 34% of 4CH and poor in 3% of dTGRV0°, 6% of dTGRV 120° and 9% of 4CH views (s. Table 1).

The intra-observer reliability analysis showed a very good (> 0.91) correlation in dTGRV views and a good (0.7-0.9) one in 4CH view. The correlation for inter-observer

Table 1

	Intra-observer ICC	Inter-observer ICC
dTGRV 0°	0.96 (0.85-0.96)	0.87 (0.76-0.93)
dTGRV 120°	0.97 (0.93-0.98)	0.92 (0.84-0.96)
4CH	0.79 (0.63 -0.89)	0.45 (0.14-0.68)

values was good or very good for dTGRV views but poor (0.31-0.5) in 4CH view.

Discussion. TAPSE measurement using M-mode in modified dTGRV 0° and 120° views in TOE demonstrates a good reproducibility in comparison to TAPSE measured by 2D-mode in 4CH view.

P-80
Tricuspid annular plane excursion and peak systolic velocity in grading of right ventricular function in TOE in operative setting: is it valuable?

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Introduction. Right ventricular (RV) longitudinal shortening for assessment of RV function after cardiac surgery has been considered critical compared to fractional area change (FAC) [1]. The aim of our study was to assess the likely value of tricuspid annular plane excursion (TAPSE) and peak systolic velocity of tricuspid annulus (S') evaluation in grading of global RV function pre- and post-cardiopulmonary bypass (CPB) by transoesophageal echocardiography (TOE) in the operative setting.

Methods. Patients scheduled for elective cardiac surgery with sternotomy and CPB including aortic valve replacement (AVR), repair of ascending aorta (AA) and coronary artery bypass graft (CABG) underwent standard TOE. TAPSE by M-mode and S' by tissue Doppler in RV modified deep transgastric view (dTGRV) as well as RVFAC in mid-oesophageal four chamber (4CH) view were measured pre- and post-CPB. FAC was categorized as normal (> 35%), mildly (30-35%) or severely (< 30%) reduced.

One way ANOVA was performed for pre- and post-CPB TAPSE and S' values. Results are expressed as mean and SD and as percentage ($p < 0.05$).

Results. 37 patients (23 men/14 women) were included and scheduled for AVR ± AA (n = 30), CABG (n = 3) and AVR+CABG (n = 4).

A significant difference in TAPSE and S' values was observed not only pre- but also post-CPB between the various categories of RV function (s. Table 2).

Discussion. Despite the changes in RV contractile pattern in the operative setting, TAPSE and S' measurement may be used to categorise RV function. Larger studies are

Table 2

	n	TAPSE pre	S' pre	n	TAPSE post	S' post
FAC < 30%	4	10.5 ± 4.1	4.4 ± 1.9	9	8.0 ± 1.8	3.9 ± 1.4
FAC 30-35%	10	12.9 ± 1.4	5.9 ± 1.4	11	11.7 ± 3.1	5.2 ± 2.3
FAC > 35%	23	16.4 ± 3.3	7.7 ± 2.2	17	14.3 ± 3.9	7.4 ± 2.7
p value		0.001	0.025		0.000	0.004

necessary to define the value ranges within each category.

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P-81
Use of a novel stethoscope in a cardiac intensive care

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Introduction. Pocket sized hand-held echocardiography devices have been claimed to be stethoscopes of the future. A novel device, V scan, provides good quality images comparable to standard echocardiography [1]. We present data from our on going local service evaluations on the use of the V scan in a cardiac intensive care unit (ICU) setting.

Methods. Following the introduction of two portable V scan devices, we examined their use in 22 patients on our cardiac ICU. 16 out of the 22 focused studies were performed on patients following cardiac surgery and 6 studies on medical patients. A single operator (PRM) performed all the focused studies, as per the FATE protocol [2]. In each study, the indication, quality of images (on a scale of 0 = poor, 1 = acceptable, 2 = good), windows obtained and any change in clinical management resulting from the study, were documented.

Results. In all the focused studies, conclusions were based on at least three views. The quality of the images obtained were recorded as good in 68% (15/22) and acceptable in 32% (7/22) of the cases. In the subgroup of patients who were mechanically ventilated (13/22), the quality of the images were good in 9 (70%) and acceptable in 4 (30%) patients. In 64% (14/22) of the cases, the use of the V scan prompted a change in management. (Need for a comprehensive transthoracic echo study in 5 cases, optimization of fluid status in 3 cases, need for inotropic support in 2 cases, exclusion of cardiac tamponade in 2 cases and thoracocentesis in 2 cases).

Discussion. Despite having limited applications (2D and colour Doppler), pocket sized hand-held devices can provide valuable information on the haemodyanamic status of critically ill patients. In our case series, interpretable images were obtained in all the focused studies, including in patients who were mechanically ventilated. Our results suggest that the V scan pocket device may be a useful tool for focused echocardiography in a cardiac ICU setting.

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P-82
Simulation-based transthoracic echo teaching: a tertiary centre experience

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Introduction. Simulation-based teaching has recently been shown to be an effective approach to train echo naïve non-cardiologists in transthoracic echocardiography (TTE) [1].

We present data on our experience in simulation-based TTE teaching.

Methods. Following approval from the Intensive Care Society (UK), we developed a one-day course to teach basic transthoracic echo, for echo naïve intensive care physicians. The Heartworks® transthoracic echo simulator (HS) is a novel teaching tool that allows 3D visualization of the cardiac anatomy. The course incorporated simulation-based training using the HS, in addition to standard teaching. On our first course (August 2013), one of the four core lectures was delivered using the HS. Our second course (January 2014) included more simulation-based elements with three simulation-facilitated lectures. We evaluated candidates' feedback from both courses.

Results. The core lectures were categorized as either simulator-based or didactic. Feedback data from both courses revealed that, although scores between the simulator-facilitated lecture teaching and didactic lectures were similar, the candidates' overall impressions on the second course were significantly better than the first. This may be due to the fact that our second course had more simulation-based elements incorporated in the contents of the course (Figure 1).

Discussion. In our experience we found that the HS is an excellent teaching tool, which improves the candidates' understanding of the cardiac sonoanatomy. Our results reveal that inclusion of a simulation-based teaching approach in a basic TTE course, improves candidates' satisfaction and feedback.

References

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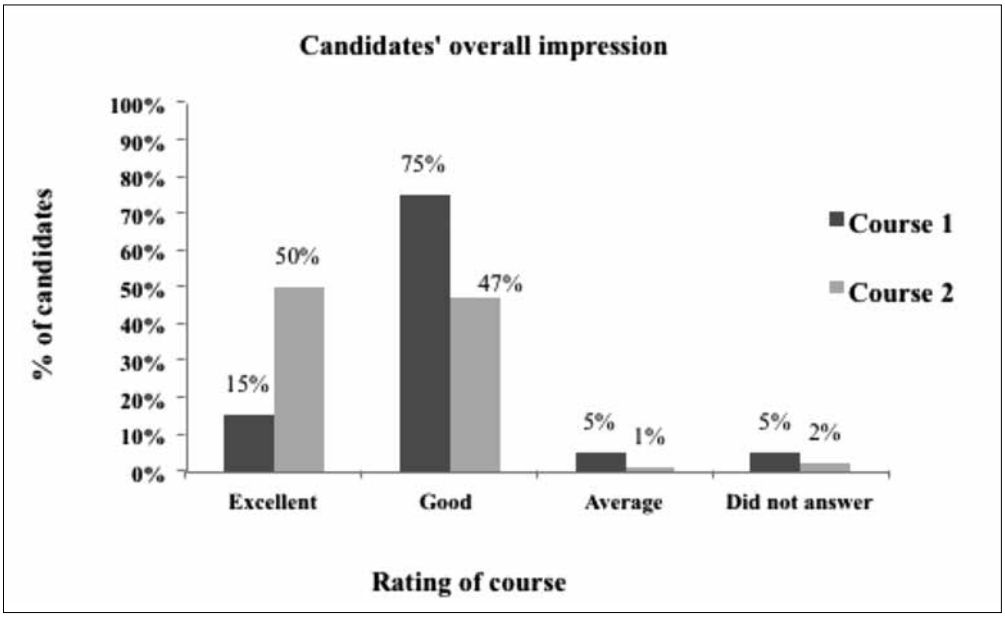

Figure 1