

Preoperative atrial fibrillation and low haemoglobin level predict increased 30-day mortality in cardiac surgery patients

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Background: Atrial fibrillation is the most common arrhythmia occurring after cardiac surgery. Less attention has been paid to preoperative atrial fibrillation and anaemia as risk factors for postoperative mortality after cardiac surgery.

Aims: The aim of this study was to determine preoperative risk factors for 30-day mortality after open heart surgery.

Material and Methods: The study population consisted of 2015 patients (73.4% men; mean age 68 years) undergoing first coronary artery bypass grafting (CABG) surgery (52.0%), aortic valve replacement (18.6%), aortic valve replacement and CABG (10.0%), mitral valve replacement (14.0%), and AVR and aortic root reconstruction (5.5%) Kuopio University Hospital from January 2013 to December 2016. For statistical analysis, we used a multivariate Cox proportional hazards regression models and receiver operating characteristics curve (ROC) analysis.

Results: The main results of our study were that preoperative atrial fibrillation and low haemoglobin level are risk factors for 30-day mortality after cardiac surgery. Total 30-day mortality was 1.8%. By multivariate regression analysis, predictors of 30-day mortality (hazard ratio [95% confidence limits]) included preoperative atrial fibrillation (2.49[1.18-5.23]) low haemoglobin level (2.76[1.40-5.45]) and pulmonary congestion (3.25[1.54-6.83]). Estimated glomerular filtration rate did not appear as an independent predictor of 30-day mortality.

Conclusions: Identification of high-risk patients pre-operatively could help to make optimal clinical decisions for timing of operation, surgery technique and perioperative treatment.

Keywords: preoperative atrial fibrillation, low haemoglobin level, cardiac surgery, 30-day mortality

Uniportal versus multiportal video-assisted thoracic surgery for lung cancer

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Background

Video-assisted thoracic surgery (VATS) lobectomy is the recommended surgical approach for patients with stage I lung cancer. Whether a multiportal or a uniportal approach is preferable remains unclear. The aim of this study was to evaluate the safety of implementing uniportal VATS lobectomy into the treatment program of lung cancer patients.

Methods

We used the national quality register for general thoracic surgery in Sweden and included all patients who underwent VATS lobectomy for lung cancer at the Karolinska University Hospital between 2016-2018. Early postoperative complications were compared in patients undergoing uniportal (n=122) and multiportal (n=211) VATS lobectomy for lung cancer. Inverse probability of treatment weighting and standardized mean differences were used to limit differences in baseline characteristics and to assess balance after weighting.

Results

The proportion of uniportal VATS lobectomies increased during the study period and the conversion rates declined significantly. Baseline characteristics were similar in the two groups with the exception of a higher percentage of patients without any comorbidity in the uniportal group (60% vs. 45%, $P=0.010$). After inverse probability of treatment weighting the groups were well balanced. Postoperative complications were rare regardless of surgical approach, 94% in both groups had no complications. The 30-day mortality and overall survival at 1 year was 0% and 97% in the uniportal group, and 0.5% and 98% in the multiportal group ($P=0.71$). Patients undergoing uniportal VATS lobectomy were discharged directly to home to a higher extent than multiportal VATS patients (76% vs. 62%, $P=0.008$).

Conclusions

We found that uniportal VATS lobectomy is feasible and safe, and might entail advantages in terms of a faster recovery after surgery as compared to multiportal VATS lobectomy in patients with lung cancer.

Pleural effusions after cardiac surgery

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Background: Pleural effusion is common after cardiac surgery and limits functional ability. Thoracentesis of large effusions improves lung function and walking distance as we have shown previously. However, little is known about treatment strategy, risk factors and outcome.

Objective: To study if Focused Assessed Transthoracic Echocardiography (FATE) scans per protocol can identify asymptomatic pleural effusions that may limit recovery after cardiac surgery.

Methods: We included 110 elective heart operated patients from September 9th 2018 to June 2nd 2019 (intervention) for three extra FATE scans at day 3, 14 and 30 after surgery.

The control group (n=123) were included from January 3rd to July 1st 2018 and went through normal follow-up. One-year follow-up was based on hospital records.

Results are reported as medians with 25th and 75th percentiles.

Results:

In the intervention group 80 patients were seen for additional follow-up visits after discharge (30 patients were lost to follow-up). Eleven (14%) patients were admitted for thoracentesis 9 (7;11) days after discharge. Three patients underwent one additional thoracentesis (1 year follow-up pending). The drained volume was 1025 (766 ; 1737.5) mL.

In the control group 8 (7%) patients underwent thoracentesis 6 (4;17.5) days after discharge. Three patients underwent 1-3 additional thoracenteses. The drained volume was 1200 (900;1650) mL.

Conclusion: Standard post-operative follow-up may not identify all pleural effusions requiring thoracentesis.

Renal resistivity index (RRI) association with hemodynamics and AKI in cardiac surgery under cardiopulmonary bypass.

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Introduction: Acute kidney injury (AKI) is a common complication after cardiac surgery (CS) 2. Doppler-renal resistivity index (RRI) superior to 0.70 has been suggested to predict AKI, it has been associated to cardiac function¹ and to systemic vascular resistance (SVR) 4. The aim of this observational study was to investigate the interest of RRI in CS under cardiopulmonary bypass (CPB), in relation with the haemodynamic conditions and AKI.

Methods: Nine patients were prospectively included. RRI was obtained through 4 TOE measurements and the following haemodynamic parameters, cardiac index (CI), indexed stroke volume (SVI), and indexed systemic vascular resistance (SVRI), were measured by PiCCO. All parameters were assessed at: T0 after anesthesia induction, T1 before CPB, T2 15 min after CPB and T3 at the end of surgery. AKI staging was based on KDIGO criteria. Statistical analysis used Spearman correlation and ANOVA.

Results: ANOVA analysis indicated abnormal RRI values > 0.70 from CPB and until the end of surgery (0.73±0.12 to 0.76±0.08). RRI at T2 and T3 was correlated with SVI at T0-T1, and T1 respectively. There was also a correlation between RRI at T3 and SVRI at T0. One of the two patients with AKI stage 1 had RRI > 0,79 at T0-T3. Creatinine was linked to RRI at T1, and AKI on day 1 was negatively related to RVSI at T1-T3.

Conclusion: High RRI values are related to early loading hemodynamic conditions. Whereas, we could not show an association between RRI and AKI, our results showed that both AKI and RRI are related to systemic resistance conditions.

The Use of Intra Aortic Balloon Pump (IABP) in Coronary Artery Bypass Graft Surgery

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Introduction: Intra-aortic balloon pump (IABP) is a mechanical device that enhances cardiac output by increasing diastolic blood flow to the coronary arteries and by lowering the afterload of the left ventricle. The usage of IABP in cardiac surgery has been declining with ongoing controversy regarding its benefits. The aim of this study was to assess the use and indications for IABP related to coronary artery bypass graft (CABG) surgery, as well as studying the outcome of the treatment.

Material and Methods: The study was retrospective and included 2177 patients that underwent CABG at Landspítali during 2001-2018. We compared those who received an IABP with controls, using uni- and multivariate analysis. Long term survival was estimated with Kaplan-Meier method.

Results: A total of 99 patients received an IABP. The incidence was highest in 2006 (8.9%) and lowest in 2001 (1.7%), but the incidence did not change significantly ($p > 0.1$). Most patients received the pump before (58.6%) or during (34.3%) CABG, but only 6.1% after surgery. Complications rate was 14.1%, with bleeding from the insertion site in the groin being the most common complication. Thirty day mortality was higher in the IABP group compared with controls (22.2% vs 1.3%, $p < 0.001$) and both 5-year survival (56.4% vs 91.5%) and 5-year MACCE-free survival (46.9% vs 83.0%) were inferior ($p < 0.001$).

Conclusions: Less than 5% of patients received IABP in relation to CABG in Iceland and the rate hasn't changed much for the last 18 years. As expected, the complication rate and 30-day mortality was higher in patients in IABP group and both the long term and MACCE-free survival was worse.

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Incidence and predictors of prolonged ICU stay after coronary artery bypass in Iceland

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Introduction: To maximize the use of intensive care resources, it is important to estimate the prevalence and risk factors for prolonged intensive care unit (ICU) stay after CABG, but so far, no studies have been done on this topic in Iceland.

Patients and methods: This retrospective study included all patients who underwent first time isolated CABG at Landspítali between 2001 and 2018. Patient information was collected from hospital charts and death registries. Patients who stayed at the ICU <24 hours or less were compared with those who needed longer stay at the ICU. Survival rate was estimated with the Kaplan-Meier method. Predictors for prolonged ICU stay were calculated with logistic regression and the outcome used to create a calculator that estimates the probability of prolonged ICU stay.

Results: Out of 2177 patients, almost 20% required ICU stay for more than 24 hours. Patients who stayed for more than 24 hours at the ICU were on average 2 years older ($p < 0.001$), more frequently female (23% vs 16%, $p = 0.001$), and had a higher rate of cardiovascular risk factors. Their EuroSCORE II was also higher (4.7 vs. 1.9, $p < 0.001$) as was the rate of both short-term and long-term complications, and long-term survival inferior. Independent risk factors for prolonged ICU stay were advanced age, female gender, EuroSCORE II and history of heart diseases. A calculator which estimates the probability of prolonged ICU stay was made with these results.

Conclusions: Almost every fifth patient has a prolonged ICU stay after CABG. Several risk factors predict which patients need prolonged ICU stay after CABG, particularly old age and EuroSCORE II. Hopefully a better knowledge of the risk factors for prolonged ICU stay will be useful in organizing CABG surgeries at Landspítali. We plan on further testing the risk calculator.

Reoperation for bleeding following coronary artery bypass surgery: Incidence, risk factors and long-term outcomes

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Abstract

Background: Reoperation due to bleeding is a major complication of coronary artery bypass surgery (CABG). We studied the incidence and risk factors of reoperations in a whole-nation cohort of CABG-patients and evaluated the effects of reoperation on long-term complications and survival.

Methods: A retrospective study on 2,060 isolated CABG patients operated 2001-2016. Patients requiring reoperation (n=130) were compared to those who did not (n=1,930). Risk factors for reoperation were determined using multivariate logistic regression and Cox proportional-hazards model used to assess prognostic factors of long-term survival. Median follow-up was 7.6 years.

Results: A total of 130 patients (6.3%) underwent reoperation. There was an average annual decrease of 4.1% in reoperation rate (p=0.04) over the study-period. The incidence of major complications was higher in the reoperation group (18.5% vs. 9.6%, p<0.001), median hospital stay was extended by 3 days, and 30-day mortality was more than fourfold (8.5% vs. 1.9%, p<0.001). In multivariate analysis, left main stenosis, ejection fraction ≤ 35% and clopidogrel use were independent risk factors, whereas off-pump surgery and higher BMI were associated with a lower reoperation-risk. Five-year survival and freedom from major adverse cardiac and cerebrovascular events (MACCE) were significantly lower in the reoperated group (80.0% vs. 90.1%, 68.1% vs. 81.7%, respectively (p<0.001)). In multivariate analysis, reoperation for bleeding was not an independent risk factor for long-term mortality.

Conclusion: The reoperation-rate in this study was relatively high but decreased significantly. It was associated with high complication rates, fourfold 30-day mortality and a lower freedom from MACCE.