Background

- One third of acute kidney injury (AKI) cases in the hospital occur perioperatively.  
- Renal impairment before many types of surgery is associated with increased short-term and long-term postoperative mortality, as well as an increased incidence of perioperative acute kidney injury (AKI) and adverse cardiovascular events.  
- AKI is a common complication after vascular surgery and is associated with worse outcomes. Renal failure is reported in 6% of patients after elective open abdominal aortic aneurysm repair, and is associated with increased mortality (35% vs. 4.3% 30-day mortality).  
- Acute kidney injury occurs in 54% of patients undergoing thoracic aortic surgery for acute dissection, and 11% of all patients require renal replacement therapy.  

Study Aim

Development of a risk prediction model for AKI in patients undergoing vascular surgery.

Methods

- We examined risk factors for AKI in vascular surgery.  
- AKI was defined according to the AKIN classification (Acute Kidney Injury Network).  
- Sample: 845 patients who underwent vascular surgery from January 2003 to May 2008 at our tertiary referral center.  
- Descriptive data: medians, interquartile ranges and counts (percentages).  
- We developed univariate models to predict AKI, in order to identify the most significant variables to be included in the multivariate models.  
- We developed a multivariate model to predict AKI using logistic regression models. We used receiver concordance statistics to evaluate the model's performance.  
- All tests were two-sided, and P values less than 0.05 were considered statistically significant.

Results

- Preoperative use of diuretics or beta blockers may be associated with increased short-term mortality.  
- During the perioperative period, 12.8% of patients developed AKI, with 3.9% of patients requiring dialysis.  
- We developed a risk prediction model for AKI in patients undergoing vascular surgery. The model included 20 independent variables (variables that were associated with AKI in a univariate model were included in the multivariate model).  
- The number of patients with AKI was 258 (58% preoperative use of diuretics or beta blockers).  
- The model showed a high degree of discriminative ability (AUC=0.671) and clinical utility: the model had a strong predictive value and correctly classified 82% of the patients.  
- The risk factor score can be used in clinical practice to identify patients at risk for perioperative AKI and to facilitate risk stratification prior to surgery.  
- Preoperative use of diuretics or beta blockers may be modifiable risk factors.  
- Further derivation validation studies with and without surgical procedure characteristics are warranted prior to clinical utilization of these models.

Conclusions

Preoperative risk factors for acute kidney injury in vascular surgery include preexisting CKD, older age, emergency surgery, preexisting hypertension, previous vascular intervention and perioperative use of diuretics or beta blockers.  

A multivariate model including these risk factors can estimate the likelihood of perioperative AKI and may help facilitate risk stratification prior to surgery.  

Preoperative use of diuretics or beta blockers may be modifiable risk factors.  

Further derivation validation studies with and without surgical procedure characteristics are warranted prior to clinical utilization of these models.

References

2. Model 1: AUC = 0.669. Model 2: AUC = 0.671. CI: confidence interval.  
3. OR and parameter estimates for GFR are calculated per 10 unit increase.  