

## Survival following pulmonary endarterectomy compared to a matched reference population

Janica Kallonen<sup>1,2</sup>, Natalie Glaser<sup>2,3</sup>, Fredrik Bredin<sup>1,2</sup>, Matthias Corbascio<sup>1,2</sup>, Ulrik Sartipy<sup>1,2</sup>

<sup>1</sup> Karolinska University Hospital

<sup>2</sup> Karolinska Institutet

<sup>3</sup> Södersjukhuset

### Background

Pulmonary endarterectomy (PEA) is the guideline recommended treatment for chronic thromboembolic pulmonary hypertension (CTEPH), in addition to life-long anticoagulation therapy. The aim was to analyze long-term relative survival after PEA for CTEPH.

### Methods

We included all patients who underwent PEA for CTEPH at Karolinska University Hospital between 1997-2018 (n=100). We obtained baseline characteristics and vital status from patient charts and national health-data registers. The expected survival from the general Swedish population matched by age, sex and year of surgery was obtained from the Human Mortality Database. The relative survival was used as an estimate of cause-specific mortality.

### Results

The mean age of the patients was 62 years and 39% were women. Most patients were severely symptomatic (95% in New York Heart Association functional class III-IV), and mean systolic/diastolic pulmonary artery pressure was 78/27 mmHg. The mean follow-up time was 7.2 years. Early (30-day) mortality was 7%. The 15-year observed, expected, and relative survival (95% CI) was 55% (40%-68%), 71%, and 83% (60%-100%), respectively.

### Conclusions

Although the life expectancy following PEA was shorter compared to the general population, the difference was small. Patients with CTEPH who are surgical candidates should undergo PEA to improve prognosis.

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### **Diastolic dysfunction and elevated NT-proBNP in aortic valve surgery**

Henrik Hultkvist, Rolf Svedjeholm, Jonas Holm, Eva Tamas, Eva Nylander, Jan Engvall, Farkas Vanky

Background: Left ventricular diastolic dysfunction is common in aortic valve stenosis (AS) and often precedes systolic dysfunction. Preoperative diastolic dysfunction is claimed to be associated with greater mortality after cardiac surgery. NT-proBNP predicts poor prognosis.

Aim: To evaluate the role of preoperative diastolic function according to the latest guidelines and preoperative NT-proBNP for long term mortality after surgery for AS.

Methods: 273 patients operated for AS with or without CABG were included in this prospective, longitudinal observational study. NT-proBNP and Doppler echocardiography (n=247) were assessed preoperatively and at 6 months follow-up.

Results: Diastolic dysfunction was found in 22% (n=54/247) at the time of surgery. At six months follow-up, diastolic function improved in 50% (n=27) of these patients but deteriorated in 12% (n=24/193) of those without preoperative diastolic dysfunction. NT-proBNP was higher in patients with diastolic dysfunction preoperatively and at 6 months follow-up compared to those without diastolic dysfunction; 1100 [510-3030] vs. 320 [170-775] (ng/L),  $p<0.001$  and 760 [370-1090] vs. 270 [150-490] (ng/L),  $p<0.001$ . Overall 5-year mortality was 14%. Median follow-up was 7.1 years (range 4.1-9.1 years) with a total of 63 deaths (23%). No difference in long term mortality related to preoperative diastolic function was found, Log Rank  $p=0.27$ . Preoperative NT-proBNP ( $>960$  ng/L) was associated with increased long term mortality, Log Rank  $p<0.001$  and also emerged as a predictor for long term mortality according to multivariable Cox regression.

Conclusion: High preoperative levels of NT-proBNP were associated with long term mortality after surgery for AS but we were unable to confirm such a role for diastolic dysfunction.

## Structural valve deterioration of the St. Jude Trifecta prosthesis during mid-term follow-up

Karoline Fadnes<sup>1</sup>, Rune Haaverstad<sup>1,2</sup>, Vegard S. Ellensen<sup>1</sup>

<sup>1</sup> Section of Cardiothoracic Surgery, Dept. of Heart Disease, Haukeland University Hospital, Bergen, Norway

<sup>2</sup> Department of Clinical Science, University of Bergen, Norway

### Background

The biological aortic valve prosthesis St. Jude Trifecta has been increasingly used at our institution due to its hemodynamic properties. Several published reports have suspected a propensity of premature structural valve deterioration (SVD) of this valve. This retrospective study presents single-center mid-term results.

### Material and methods

149 patients have received a St. Jude Trifecta aortic valve prosthesis at our institution. To provide a minimum of 18 months follow-up, patients operated 2010 - primo 2018 were included. A retrospective analysis of patient- and prosthesis related factors, including echocardiography, was performed. Patients with suspected SVD were identified using the European Guidelines definition (1).

### Results

A total of 58 patients (36 females) met the inclusion criteria. Aortic stenosis was the indication in 49 patients, insufficiency in 9. 33 patients had concomitant procedures. At last follow-up, the mean (SD) gradient was 11.81 (6.18) mmHg. LVESD decreased postoperatively, while LVEDD was unchanged. Three patients (5.2%) were identified as having possible SVD due to increasing mean gradients during follow-up (18-36 months), whereas one was reoperated due to endocarditis. None had regurgitation. All three had a 23 mm prosthesis, but the serial numbers were widely separated and no predisposing factors were identified.

### Conclusions

In general, results at last follow-up was satisfactory. Three patients had increasing mean gradients at 18 months postoperatively, exceeding the definition criteria of SVD. One of the three had redo surgery due to endocarditis. The findings are inconclusive, but warrant careful monitoring of this patient population.

### Reference

1. Capodanno D, Petronio AS, Prendergast B, et al. Standardized definitions of structural deterioration and valve failure in assessing long-term durability of transcatheter and surgical aortic bioprosthetic valves: a consensus statement from the European Association of Percutaneous Cardiovascular Interventions (EAPCI) endorsed by the European Society of Cardiology (ESC) and the European Association for Cardio-Thoracic Surgery (EACTS). *European Heart Journal*. 2017;38(45):3382-3390.

## Acute kidney injury following acute repair of type A aortic dissection

Dadi Helgason<sup>1</sup>, Solveig Helgadóttir<sup>2</sup>, Anders Ahlsson<sup>3</sup>, Jarmo Gunn<sup>4</sup>, Vibeke Hjortdal<sup>5</sup>, Emma C. Hansson<sup>6,7</sup>, Anders Jeppsson<sup>6,7</sup>, Ari Mennander<sup>8</sup>, Shahab Nozohoor<sup>9,10</sup>, Igor Zindovic<sup>9,10</sup>, Christian Olsson<sup>3</sup>, Stefan O. Ragnarsson<sup>11</sup>, Martin I. Sigurdsson<sup>11,12</sup>, Arnar Geirsson<sup>13</sup>, Tomas Gudbjartsson<sup>11,14</sup>

<sup>1</sup> Internal Medicine Services, Landspítali – The National University Hospital of Iceland, Reykjavik, Iceland

<sup>2</sup> Department of Anesthesia and Intensive Care, Uppsala University Hospital, Uppsala, Sweden

<sup>3</sup> Department of Thoracic and Cardiovascular Surgery, Karolinska University Hospital, Stockholm, Sweden

<sup>4</sup> Heart Center, Turku University Hospital and University of Turku, Turku, Finland

<sup>5</sup> Department of Cardiothoracic and vascular Surgery, Aarhus University Hospital, Skejby, Denmark

<sup>6</sup> Department of Cardiothoracic Surgery, Sahlgrenska University Hospital, Gothenburg, Sweden

<sup>7</sup> Department of Molecular and Clinical Medicine, Institute of Medicine, Sahlgrenska Academy, University of Gothenburg, Gothenburg, Sweden

<sup>8</sup> Heart Center, Tampere University Hospital and Tampere University, Tampere, Finland

<sup>9</sup> Department of Cardiothoracic Surgery, Skane University Hospital, Lund, Sweden

<sup>10</sup> Clinical Sciences, Lund University, Lund, Sweden

<sup>11</sup> Faculty of Medicine, University of Iceland, Reykjavik, Iceland

<sup>12</sup> Division of Anesthesia and Intensive Care Medicine, Landspítali – The National University Hospital of Iceland, Reykjavik, Iceland

<sup>13</sup> Section of Cardiac Surgery, Department of Surgery, Yale School of Medicine, New Haven, CT, USA

<sup>14</sup> Division of Cardiothoracic Surgery, Landspítali – The National University Hospital of Iceland, Reykjavik, Iceland

<sup>15</sup> Faculty of Medicine, Reykjavik, Iceland

**Background:** The aim of this study was to examine the incidence, risk factors and outcomes of patients with acute kidney injury (AKI) following surgery for acute type A aortic dissection (ATAAD) using the NORCAAD registry.

**Methods:** Patients that underwent ATAAD surgery at eight Nordic centers from 2005-2014 were analyzed for AKI according to the RIFLE-criteria. Risk factors for AKI and predictors of long-term survival were analyzed with multivariable regression.

**Results:** AKI occurred in 382/941 (40.6%) patients with 138 (14.7%), 100 (10.6%) and 144 (15.3%) within Risk, Injury and Failure classes, respectively. Postoperative dialysis was required for 105 (11%) patients. Independent predictors of AKI included age (per 10 years, OR=1.3, 95% CI:1.1-1.5), BMI>30 kg/m<sup>2</sup> (OR=2.4, 95% CI:1.6-3.5), malperfusion (Penn Classes Ab, Ac or Abc) (OR:1.7, 95% CI:1.2-2.3), cardiopulmonary bypass time (per 10 minutes, OR=1.04, 95% CI:1.01-1.06) and red blood cell transfusion (OR=1.1 for each unit transfused, 95% CI:1.1-1.1). Rates of 30-day mortality were 17.0% in the AKI group compared to 6.6% in the non-AKI group (p<0.001). In 30-day survivors, AKI was an independent predictor of long-term mortality (HR=2.0, 95% CI:1.3-3.0).

**Conclusions:** AKI is a common complication following surgery for ATAAD and independently predicts adverse long-term outcome. Most risk factors for AKI are unmodifiable and associated with patient characteristics and anatomical features. Mortality risk persists beyond the perioperative period arguing that close clinical follow-up is required in this sub-group of patients.

## Immediate and long-term need for permanent cardiac pacing following aortic valve replacement

Sindri Aron Viktorsson<sup>1,2</sup>, Andri Willberg Orrason<sup>2</sup>, Kristjan Orri Vidisson<sup>2</sup>, Anna Gudlaug Gunnarsdottir<sup>2</sup>, Dadi Helgason<sup>3</sup>, Arni Johnsen<sup>2</sup>, David O. Arnar<sup>4</sup>, Arnar Geirsson<sup>5</sup>, Tomas Gudbjartsson<sup>1,2</sup>

<sup>1</sup> Faculty of Medicine, University of Iceland, Reykjavik, Iceland

<sup>2</sup> Division of Cardiothoracic Surgery - Landspítali - The National University Hospital of Iceland

<sup>3</sup> Internal Medicine Service - Landspítali - The National University Hospital of Iceland

<sup>4</sup> Division of Cardiology - Landspítali - The National University Hospital of Iceland

<sup>5</sup> Division of Cardiac Surgery, Yale School of Medicine, New Haven, CT, USA

**Introduction:** Atrioventricular node conduction disturbances are frequent following surgical aortic valve replacement (SAVR) and in some cases the patient needs a permanent pacemaker (PPM) implantation before discharge from hospital. Less is known about the long-term need for PPM and the PPM dependency of these individuals. We report the incidence of PPM implantation both before and after discharge in a well-defined cohort of SAVR-patients, and also analysis of long term pacemaker dependency.

**Methods:** The study included 587 consequent patients who underwent SAVR for aortic stenosis in Iceland between 2002-2016, excluding 30 patients with a pacemaker already implanted prior to the surgery. All patients were followed-up in a centralized nationwide pacemaker registry. Timing and indication for PPM were registered but pacemaker dependency was defined as ventricular pacing >90% of the time. Median follow-up was 73 months. The cumulative incidence of pacemaker implantation was plotted treating death as competing risk.

**Results:** Out of 557 patients, 22 (3.9%) received PPM in the first 30 days after surgery; most commonly for complete AV-block (n=14) or symptomatic bradycardia (n=8); the median implantation-time being 8 days postoperatively (range 0-18). After 30 days postoperatively, at a median of 43 months following surgery (range 0-190), further 38 patients (6.8%) had a PPM implanted, most often for AV-block (n=13) or sick-sinus syndrome (n=10). The cumulative incidence of PPM implantation at 1, 5 and 10 years postoperatively was 5.0%, 9.2% and 12.3%, respectively. During follow-up, 45% of the 60 patients were pacemaker dependent.

**Conclusion:** The cumulative incidence of permanent pacemaker implantation following SAVR approximates 12% at 10-years, with every other patient being pacemaker dependent at follow-up. This suggests that AV node conduction disturbances do extend significantly beyond the peri-operative period.

## Is inguinal hernia associated with thoracic aortic aneurysm and dilatation?

Emelie Carlestål<sup>1</sup>, Christian Olsson<sup>1</sup>, Anders Franco-Cereceda<sup>1</sup>

<sup>1</sup> Karolinska University Hospital

### Background

Thoracic aortic aneurysm and dilatation (TAAD) is potentially lethal, but generally asymptomatic and not subject to screening programs. TAAD risk factors are poorly understood. If associated, inguinal hernia, also a connective tissue dysfunctionality, could serve as an easily detected condition prompting TAAD work-up.

### Methods

Four-hundred men (46-91 years) with previous inguinal hernia repair were invited to undergo chest CT and provide basic comorbidity data. Another 400 men (46-92 years) with previous cholecystectomy were invited as controls. A total of 448 (56%) subjects, 208 hernia repair (52%), 240 cholecystectomy (60%) finalized the study with complete data. Thoracic aortic diameters at prespecified levels (root, ascending, isthmus, and mid-descending) were measured and compared between groups. Hernia repair was assessed as independent predictor of TAAD in logistic regression analysis.

### Results

In the hernia group, mean ( $\pm$ standard deviation) aortic diameter (mm) was significantly larger in the ascending ( $38\pm 4$  vs  $37\pm 4$ ,  $p=0.026$ ) and mid-descending ( $29\pm 4$  vs  $28\pm 3$ ,  $p=0.019$ ) aorta; in the remaining aortic segments there were no statistically significant differences. Hernia repair was the only independent predictor of aortic root TAAD (40 mm diameter) in logistic regression analysis, odds ratio 1.8, 95% confidence level 1.01-3.1,  $p=0.048$

### Conclusions

Men with a history of inguinal hernia repair had slight but statistically significant larger diameter of the ascending aorta than controls. Hernia repair was an independent predictor for aortic root TAAD. The relationship between inguinal hernia and TAAD should be further examined in a population-based study.