

# **Aortic valve surgery**

## **Clinical studies**

### **after autograft, homograft and prosthetic valve replacement**

Akademisk avhandling

Som för avläggande av medicine doktorsexamen  
Vid Sahlgrenska akademien vid Göteborgs universitet  
Kommer att offentligen försvaras i sal Förmaket, Blå stråket 5,  
Sahlgrenska Universitetssjukhus/ Göteborg,  
Torsdagen den 25 November 2010 klockan 09.00

av

**Obaid Aljassim, MD**

Fakultetsopponent: Dan Lindblom  
Thoraxkliniken, Karolinska universitetssjukhuset Solna, Stockholm

Avhandlingen baseras på följande delarbeten:

- I. G. Svensson, O. Aljassim, S.-E. Svensson, O. Bech-Hanssen, U. Kjellman.  
**Anatomical Mismatch of the Pulmonary Autograft in the Aortic Root May Be the Cause of Early Aortic Insufficiency After the Ross Procedure**  
Eur J Cardiothorac Surg. 2002 Jun; 21(6):1049-54.
- II. Obaid Aljassim, MD, Gunnar Svensson, MD, PhD, Sossio Perrotta, MD, Anders Jeppsson, MD, PhD and Odd Bech-Hanssen, MD, PhD.  
**Dilatation of the Pulmonary Autograft and Native Aorta after the Ross Procedure: A Comprehensive Echocardiography Study.**  
(Submitted)
- III. Sossio Perrotta MD, Obaid Aljassim MD, Anders Jeppsson MD, PhD, Odd Bech-Hanssen MD, PhD, and Gunnar Svensson MD, PhD.  
**Survival and Quality of Life After Aortic Root Replacement With Cryopreserved Homograft in Acute Endocarditis.**  
(Accepted for publication June 22, 2010 in Ann Thorac Surg).
- IV. Obaid Aljassim, MD, Gunnar Svensson, MD, PhD, Erik Houltz MD, PhD, and Odd Bech-Hanssen, MD, PhD.  
**Doppler-Catheter Discrepancies in Patients With Bileaflet Mechanical Prostheses or Bioprostheses in the Aortic Valve Position.**  
Am J Cardiol. 2008 Nov 15;102(10):1383-9. Epub 2008 Sep 11.

UNIVERSITY OF GOTHENBURG

Gothenburg November, 2010

## **Aortic Valve Surgery**

### **Clinical studies after autograft, homograft and prosthetic valve replacement**

Obaid Aljassim, MD

**Introduction and Aims:** Aortic valve disease in symptomatic adult patients often requires surgery. Several alternatives are available: repair, mechanical and biological prostheses, homograft and the Ross procedure. In the process of choosing valve substitute, the individual patient's characteristics are matched against the characteristics of the different valve alternatives. This thesis includes clinical studies addressing outcome after the Ross procedure, after homograft replacement in endocarditis and Doppler versus catheter findings in patients with prosthetic valves.

**Methods:** In *Study I*, surgical correction of autograft mismatch in the Ross operation (n=77) was investigated. In *Study II* we established the normal aortic dimensions using echocardiography in normal controls (n=38) and compared these findings with Ross operated patients (n=71) in a long-term follow up (101±31 mo). In *Study III*, patients with prosthetic (n=31) or native valve endocarditis with abscess (n=31) were operated with a homograft replacement, and followed for 37±11 months. In *Study IV* we investigated the flow resistance of mechanical and biological aortic valves using simultaneous Doppler and left ventricular and aortic pressure measurements (high-fidelity catheters).

**Results:** *Study I:* Among the 24 patients without surgical correction an early moderate aortic regurgitation was present in eight patients (33%) compared with two of the following surgically corrected 53 patients (4%, p=0.001). *Study II:* A large proportion of the patients showed dilatation of the autograft (43%) and native aorta (32%) at late follow-up, and 5 were re-operated due to dilatation. There was a progression in both autograft and native aortic dimensions from the baseline to the follow-up. Only baseline autograft size did predict late dilatation (>4 cm). *Study III:* Nine patients (15%) died within 30 days. Variables associated with early mortality were higher Cleveland Clinic Risk Score (p=0.014), ECC-time (p=0.003), inotropic support (p=0.03), bleeding (p=0.01) and myocardial infarction (p<0.001). Cumulative survival was 82%, 78%, 75% and 67% at one, three, five and ten years, respectively. Quality of life (SF36) was not significantly different to a matched healthy control group. *Study IV:* There was a strong linear relation between catheter and Doppler gradients (r = 0.85 to 0.92). Doppler overestimated catheter gradients in both the mechanical and stented biological valve.

**Conclusions:** Aortic regurgitation immediately after the Ross procedure can be minimized with surgical correction of anatomical mismatch in the aortic root. The autograft as well as the native aorta continues to dilate and this may lead to reoperation. Severe acute aortic endocarditis treated with homograft replacement is still associated with a substantial early complication rate and mortality. Long-term survival, quality of life and homograft function is satisfactory in patients surviving the immediate postoperative period. In the first in vivo study of the relation between Doppler and catheter gradients in prosthetic valves, we found a significant Doppler-catheter discrepancy in bioprostheses. Doppler overestimates the net gradients in both mechanical and biological prostheses.

*Key words:* Aortic valve surgery, Ross operation, Homograft, Doppler-Catheter gradients.