Aortic Valve Repair
Why & When?

I. Karliova

Department of Thoracic and Cardiovascular Surgery
Saarland University Medical Center, Homburg/Saar
Germany
Aortic Valve Replacement

• Anticoagulation
  ➢ Thromboembolism
  ➢ Bleeding

• Valve degeneration

• Prosthetic valve endocarditis

Hammermeister et al JACC 2000; 36:1152-8
Reoperation after Valve Replacement

ALL REOPERATIONS %

YEARS AFTER VALVE REPLACEMENT

Hammermeister et al JACC 2000; 36:1152-8
Mortality after Valve Replacement

Hammermeister et al JACC 2000; 36:1152-8
Long-term outcomes after elective isolated mechanical aortic valve replacement in young adults

Ismail Bouhout, MSc,1 Louis-Mathieu Stevens, MD, PhD,2 Amine Mazine, MSc,3 Nancy Poirier, MD,4 Raymond Cartier, MD,5 Philippe Demers, MD,6 and Ismail El-Hamamsy, MD, PhD

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AV Replacement: Excess Mortality

Observed and Relative Survival After Aortic Valve Replacement

Per Kvidal, MD,* Prof. Reinhold Bergström, PhD,‡ Lars-Gunnar Hörte, PM, BA,§ Elisabeth Stählc, MD, PhD†

↑↑ Mortality
Lesion-dependent Survival after AVR

### Table 4. Basic Data Concerning Observed and Expected Deaths Based on Data From Follow-Up Years 1 through 15*

<table>
<thead>
<tr>
<th></th>
<th>Patient-Years at Risk</th>
<th>Observed Number of Deaths</th>
<th>Expected Number of Deaths</th>
<th>O/E Deaths</th>
<th>O/E Deaths Relative to Baseline Category</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NYHA functional class</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>1,954.5</td>
<td>36</td>
<td>32.9</td>
<td>1.1</td>
<td>1.0</td>
</tr>
<tr>
<td>IIIA</td>
<td>6,134.5</td>
<td>240</td>
<td>163.2</td>
<td>1.5</td>
<td>1.3</td>
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<tr>
<td>IIIB/IV</td>
<td>6,206</td>
<td>339</td>
<td>208.0</td>
<td>1.6</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Type of valve lesion</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AVS/combination†</td>
<td>11,079</td>
<td>472</td>
<td>349.9</td>
<td>1.4</td>
<td>1.0</td>
</tr>
<tr>
<td>Regurgitation</td>
<td>3,216</td>
<td>143</td>
<td>54.1</td>
<td>2.6</td>
<td>2.0</td>
</tr>
<tr>
<td><strong>Concomitant CABG</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>9,452</td>
<td>353</td>
<td>230.3</td>
<td>1.5</td>
<td>1.0</td>
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<tr>
<td>Yes</td>
<td>4,843</td>
<td>262</td>
<td>173.8</td>
<td>1.5</td>
<td>1.0</td>
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<tr>
<td><strong>AF</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>13,158</td>
<td>517</td>
<td>364.0</td>
<td>1.4</td>
<td>1.0</td>
</tr>
<tr>
<td>Yes</td>
<td>1,137</td>
<td>98</td>
<td>40.1</td>
<td>2.4</td>
<td>1.7</td>
</tr>
<tr>
<td><strong>Age (yrs)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤50</td>
<td>2,182</td>
<td>31</td>
<td>6.8</td>
<td>4.5</td>
<td>1.0</td>
</tr>
<tr>
<td>51–60</td>
<td>2,954.5</td>
<td>98</td>
<td>36.9</td>
<td>2.7</td>
<td>0.6</td>
</tr>
<tr>
<td>61–70</td>
<td>5,578.5</td>
<td>274</td>
<td>152.1</td>
<td>1.8</td>
<td>0.4</td>
</tr>
<tr>
<td>≥71</td>
<td>3,579</td>
<td>212</td>
<td>208.2</td>
<td>1.0</td>
<td>0.2</td>
</tr>
</tbody>
</table>

*Deaths within 30 days of the operation are excluded. †Aortic valve stenosis or combined stenotic and regurgitant lesion. O/E = observed deaths/expected deaths; other abbreviations as in Table 2.
Are allografts the biologic valve of choice for aortic valve replacement in nonelderly patients? Comparison of explantation for structural valve deterioration of allograft and pericardial prostheses

Nicholas G. Smedira, MD, Eugene H. Blackstone, MD, Eric E. Roselli, MD, Colleen C. Laffey, RN, and Delos M. Cosgrove, MD

The Journal of Thoracic and Cardiovascular Surgery • March 2006
Inspiris Resilia: An Alternative?

- RESILIA tissue
- Perimount valve design
- VFit technology
- Dry storage
- Durability?
A randomized assessment of an advanced tissue preservation technology in the juvenile sheep model

Willem Flameng, MD, PhD, Hadewich Hermans, MD, Erik Verheken, MD, PhD, and Bart Meuris, MD, PhD

The Journal of Thoracic and Cardiovascular Surgery • January 2015

include detergents or surfactants, such as polysorbate 80 (Tween-80). Polysorbate 80 is the major component of the anticalcification technology used in the construction of the Carpentier-Edwards Perimount valve, which, in

Clinical data – durability?
Aortic Valve Replacement and the Ross Operation in Children and Young Adults

Mansour T.A. Sharabiani, PhD,1 Dan M. Dorobantu, MD,1,2 Alireza S. Mahani, PhD,3,4 Mark Turner, PhD,5 Andrew J. Peter Tometzki, MBChB,1 Gianni D. Angelini, MD,1,2 Andrew J. Parry, MBChB,1,5 Massimo Caputo, Serban C. Stoica, MD6

METHODS AVR procedures were compared after advanced matching, both in pairs and in a 3-way manner, using a Bayesian dynamic survival model.

RESULTS A total of 1,501 patients who underwent AVR in the United Kingdom between 2000 and 2012 were included. Of these, 47.8% had a Ross procedure, 37.8% a mechanical AVR, 10.9% a bioprosthesis AVR, and 3.5% a
ROSS Procedure

- Single valve disease turns to double valve disease
- Higher complexity = operative morbidity & mortality
- Reoperation
- Availability of pulmonary homografts
Aortic valve repair leads to a low incidence of valve-related complications

Diana Aicher, Roland Fries, Svetlana Rodionycheva, Kathrin Schmidt, Frank Langer, Hans-Joachim Schäfers

Fig. 3. Freedom from all valve-related complications in all patients versus those with bicuspid or tricuspid AV morphology.

Reoperations were by far the most frequent valve-related complications.
Quality of life after aortic valve surgery: Replacement versus reconstruction

Diana Aicher, MD, Annika Holz, Susanne Feldner, MD, Volker Köllner, MD, and Hans-Joachim Schäfers, MD
(J Thorac Cardiovasc Surg 2011;142:e19-24)

Methods: In a cross-sectional study, 166 patients (age, 18–45 years) were studied after isolated elective aortic valve surgery. They had undergone aortic valve repair (group I, n = 86), replacement with mechanical prosthesis (group II, n = 41), or pulmonary autograft (group III, n = 39). Assessment was performed by Short Form Health Survey, Hospital Anxiety and Depression Scale, Cardiac Anxiety Questionnaire, and valve-specific questions.

![Graph showing mean physical sum scores at follow-up in patients with valve repair (group I), patients after mechanical aortic valve replacement (group II), and patients after the Ross procedure (group III).]
Valve repair improves the outcome of surgery for chronic severe aortic regurgitation: A propensity score analysis

Christophe de Meester, MS, a,b Agnès Pasquet, MD, PhD, a,b Bernhard L. Gerber, MD, PhD, a,b David Vanraes, MD, PhD, a,b Philippe Noirhomme, MD, a,c Gébrine El Khoury, MD, a,c and Jean-Louis J. Vanoverschelde, MD, PhD a,b

(J Thorac Cardiovasc Surg 2014;148:1913-20)

Methods: We performed a propensity score analysis to compare the outcomes of patients with severe AR by either AVR or AV repair between 2006 and 2011.

<table>
<thead>
<tr>
<th>TABLE 1. Baseline demographic and clinical characteristics of patients undergoing Valve repair (n = 44) or AVR (n = 44)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristic</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Age (mean y ± SD)</td>
</tr>
<tr>
<td>Male gender</td>
</tr>
<tr>
<td>Smoking habits</td>
</tr>
<tr>
<td>Hypertension</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
</tr>
</tbody>
</table>

FIGURE 2. Kaplan-Meier survival curves comparing overall postoperative survival among patients undergoing aortic valve (AV) repair (solid line) or aortic valve replacement (AVR) (dashed line). Numbers at bottom indicate patients at risk. The dotted line shows the survival of the age- and gender-matched Belgian population.
Should all valves be repaired?

- Patient preference
- Quality of life
- Comorbidity (Renal failure, Contraindication for anticoagulation)
- Durability of repair procedure
- Surgical alternatives
- Age
- Patient preference
Repairable Valve Morphology

- Bi-/tricuspid aortic valves with preservation of the natural design
- Unicuspid switched to bicuspid design (Schäfers ATS 2008)
- Quadricuspid switched to tricuspid design (Schmidt ATS 2008)
Choice of Aortic Valve Procedure
Homburg Routine

- AV repair
- Ross
- mechanical
- biological

Age (years)
Limitations of Repair

Repair versus replacement of the aortic valve in active infective endocarditis

Katharina Mayer, Diana Aicher, Susanne Feldner, Takashi Kunihara and Hans-Joachim Schäfers*

Figure 1: Survival following aortic valve repair (I) or aortic valve replacement (II) for AIE.

Survival rates and freedom from reoperation for tricuspid and bicuspid aortic valves.
Two decades of experience with root remodeling and valve repair for bicuspid aortic valves

Ulrich Schneider, MD, a Susanne K. Feldner, MD, a Christopher Hofmann, a Jakob Schöpe, MSc, b Stefan Wagenpfeil, PhD, b Christian Giebels, MD, a and Hans-Joachim Schäfers, MD b

The Journal of Thoracic and Cardiovascular Surgery • April 2017

![Graph](image)

**TABLE 2.** Competing risks regression models

<table>
<thead>
<tr>
<th></th>
<th>Crude model</th>
<th></th>
<th>Adjusted model</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Subdistribution HR</td>
<td>P value</td>
<td>95% CI</td>
<td>Subdistribution HR</td>
</tr>
<tr>
<td>Effective height measurement</td>
<td>1.62</td>
<td>.240</td>
<td>0.73-3.63</td>
<td>1.23</td>
</tr>
<tr>
<td>Aneurysm†</td>
<td>0.49</td>
<td>.083</td>
<td>0.22-1.10</td>
<td>0.53</td>
</tr>
<tr>
<td>Graft size (24 mm)</td>
<td>1.14</td>
<td>.760</td>
<td>0.49-2.65</td>
<td>1.22</td>
</tr>
<tr>
<td>Graft size (28 mm)</td>
<td>1.58</td>
<td>.480</td>
<td>0.44-5.72</td>
<td>1.34</td>
</tr>
<tr>
<td>Degree of fusion</td>
<td>0.59</td>
<td>.220</td>
<td>0.25-1.39</td>
<td>0.38</td>
</tr>
<tr>
<td>Calcification‡</td>
<td>2.31</td>
<td>.030</td>
<td>1.08-4.94</td>
<td>4.33</td>
</tr>
<tr>
<td>Percutaneous Patching</td>
<td>5.17</td>
<td>&lt;.001</td>
<td>2.28-11.7</td>
<td>4.08</td>
</tr>
<tr>
<td>Annuloplasty**</td>
<td>1.55</td>
<td>.300</td>
<td>0.68-3.52</td>
<td>1.21</td>
</tr>
</tbody>
</table>

Competing Risks Regression Models (adjusted for age, calcification* [no/yes], degree of fusion* [no/yes], sex [male/female]). *Only when not considered as investigated independent variable. Bold values indicate statistical significance. HR, Hazard ratios; CI, confidence interval. †Reference group: no effective height measurement. ‡Reference group: AR. §Reference group: graft size (26 mm). ¶Reference group: partial. ◆Reference group: no calcification. #Reference group: no pericardial patch. **Reference group: no annuloplasty.

**FIGURE 2.** Cumulative incidence for reoperation. Red lines highlight the 95% confidence interval.
Patch Cusp Repair
Homburg Results

- 2000-2017
- n = 277 (BAV = 137, TAV = 140)
- Autologous n = 236, heterologous n = 41
When to repair

Reasonable
- Root dilatation in tricuspid/bicuspid valves
- Prolapse (1-2 cusps), annular dilatation

Uncertain
- Fenestrations, prolapse 3 cusps
- UAV, limited retraction
- Retraction/calcium
- Infective endocarditis
Conclusion

• Excess mortality after AVR in young.

• Relevant valve related complications after AVR.

• Valve related complications lower in AV reconstruction vs AVR.

• Quality of life better in AV reconstruction vs AVR.

• Improved survival after AV reconstrucution vs AVR (?)