Valve Sparing Root Reimplantation in Emergent Situations: Acute Aortic Dissection

Edward P. Chen MD

Director Thoracic Aortic Surgery
Division of Cardiothoracic Surgery
Emory University School of Medicine
Atlanta, Georgia

No disclosures
Salient Points of Valve-Sparing in Type A Dissection

- Cusps should have minimal degeneration and sclerosis
- AI is due to acute prolapse so the nature of the regurgitant jet less of a concern with normal cusps
- Coronary buttons can be friable
- Not indicated in the setting of shock, organ malperfusion or surgeon inexperience
- ? role for extensive cusp repair
- In high volume centers and experienced hands, not associated with worse outcome
Case Presentation

- 25 yo male
- No past medical history
- Marfanoid phenotype
- Acute onset of chest pain
- Local ED
- CT revealed Acute Type A Dissection
- Hemodynamically stable on presentation
- Asymptomatic
- No signs of malperfusion
Baseline TEE Images
Valve sparing root replacement in Type A Dissection

*Initial surgical maneuvers*

- Excision of abnormal sinus tissue (leaving 4-5 mm rim of aortic tissue)
- Creation of coronary buttons
Assessment of Feasibility

- Upward traction on commissural posts
- Creation vacuum in LV to induce valve coaptation (LV vent and cell saver)-”suction test”
- Examine valve cusps for competency:
  - Degeneration
  - Coaptation zone
  - Presence of prolapse
  - Cusp restriction
  - Fenestrations
  - Free margin length
Examine Valve for Competency

- Cusp coaptation
  - Presence of prolapse
    - Okay if free margin elongated
    - Abort if free margin shortened

- Critical underlying principle: Recognition of the anatomy the aortic valve must display in order to be competent after CPB
Graft Sizing/Tailoring

• Choose appropriate sized dacron graft and plicate annular end

• Graft Sizing:
  – Original David-Feindel Formula\textsuperscript{1}:
    • \(2 \times [(\text{Average Cusp Height}) \times \frac{2}{3}] + 6\)

• Annular Plication
  – “Technical Art”

\textsuperscript{1}J Thorac Cardiovasc Surg 1992;103:617-22
Anchoring Graft

- Anchor graft to base of heart
Tacking Commissural Posts

- Tack the commissural posts
- Post heights and angles: not necessarily equal!
- *Key step for valve competency*
Final Steps

- Reimplant valve inside graft along the 4-5 rim of aortic tissue
- Assessment for valve competency
- Valve/cusp repair then performed if needed
- Coronary reimplantation
TEE Images after Repair
## Early Experience of Valve-Sparing in Acute Dissection

<table>
<thead>
<tr>
<th>First Author</th>
<th>Year (Journal)</th>
<th>No. pts</th>
<th>Op Mortality</th>
<th>Mean F/U (months)</th>
<th>Freedom from &gt;2+ AI</th>
<th>Freedom from AVR</th>
</tr>
</thead>
<tbody>
<tr>
<td>RG Leyh</td>
<td>2000 (ATS)</td>
<td>20</td>
<td>10%</td>
<td>26</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>RG Leyh</td>
<td>2002 (Circ)</td>
<td>30</td>
<td>17%</td>
<td>22.6</td>
<td>Unknown</td>
<td>95%-David</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>63%-Yacoub</td>
</tr>
<tr>
<td>AW Erasmi</td>
<td>2003 (ATS)</td>
<td>36</td>
<td>19.4%</td>
<td>11.3-David</td>
<td>100%</td>
<td>100%-David</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>29.6-Yacoub</td>
<td></td>
<td>82%-Yacoub</td>
</tr>
<tr>
<td>K Kallenbach</td>
<td>2002 (EJCTS)</td>
<td>22</td>
<td>14%</td>
<td>18.4</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>F Farhat</td>
<td>2007 (EJCTS)</td>
<td>15</td>
<td>6.7%</td>
<td>11</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>TP Graeter</td>
<td>2000 (ATS)</td>
<td>22/52 Type A</td>
<td>9.1%</td>
<td>24</td>
<td>93.2%</td>
<td>100%</td>
</tr>
<tr>
<td>K Kallenbach</td>
<td>2004 (EJCTS)</td>
<td>44/232 VSRR</td>
<td>11.4%</td>
<td>19</td>
<td>100%</td>
<td>97%</td>
</tr>
<tr>
<td>K Kallenbach</td>
<td>2004 (Circ)</td>
<td>48/295 Type A</td>
<td>10.4%</td>
<td>19</td>
<td>100%</td>
<td>65%@5 yrs</td>
</tr>
<tr>
<td>S Leontyev</td>
<td>2012 (EJCTS)</td>
<td>28/179 VSRR</td>
<td>7.1%</td>
<td>Unknown</td>
<td>93.6% overall</td>
<td>95.9% overall</td>
</tr>
<tr>
<td>F Kerendi</td>
<td>2010 (ATS)</td>
<td>16/37 VSRR</td>
<td>6.3%</td>
<td>8.8 overall</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>B Leshnower</td>
<td>2012 (JTCVS)</td>
<td>29/150 VSRR</td>
<td>6.8%</td>
<td>19 overall</td>
<td>93%</td>
<td>100%</td>
</tr>
</tbody>
</table>
Valve-Sparing Root Reconstruction Does Not Compromise Survival in Acute Type A Aortic Dissection

Sreekumar Subramanian, MD,* Sergey Leontyev, MD,* Michael A. Borger, MD, PhD, Constanze Trommer, MD, Martin Misfeld, MD, PhD, and Friedrich W. Mohr, MD, PhD

Department of Cardiac Surgery, Heart Center Leipzig, Leipzig, Germany; Department of Surgery, University of Arizona Medical Center, Tucson, Arizona; and Department of Cardiothoracic Surgery, Southern Arizona Veterans Affairs Health Care System, Tucson, Arizona

- Largest single series to date, 1995-2010
- 374 pts with Type A Dissection

<table>
<thead>
<tr>
<th></th>
<th>No. pts</th>
<th>Op Mortality</th>
<th>Ave F/U (months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bentall</td>
<td>130</td>
<td>27%</td>
<td></td>
</tr>
<tr>
<td>Yacoub</td>
<td>51</td>
<td>16%</td>
<td>44</td>
</tr>
<tr>
<td>David</td>
<td>27</td>
<td>15%</td>
<td>27</td>
</tr>
</tbody>
</table>

Valve-Sparing Root Reconstruction Does Not Compromise Survival in Acute Type A Aortic Dissection

Sreekumar Subramanian, MD,* Sergey Leontyev, MD,* Michael A. Borger, MD, PhD, Constanze Trommer, MD, Martin Misfeld, MD, PhD, and Friedrich W. Mohr, MD, PhD

Department of Cardiac Surgery, Heart Center Leipzig, Leipzig, Germany; Department of Surgery, University of Arizona Medical Center, Tucson, Arizona; and Department of Cardiothoracic Surgery, Southern Arizona Veterans Affairs Health Care System, Tucson, Arizona

---

**Survival**

Fig 1. Survival by aortic root procedure for acute type A aortic dissection.

**Freedom from Reop**

Fig 2. Freedom from root reoperation by aortic root procedure for acute type A aortic dissection.

Midterm Results of David V Valve-Sparing Aortic Root Replacement in Acute Type A Aortic Dissection

Bradley G. Leshnower, MD, Richard J. Myung, MD, LaRonica McPherson, RN, and Edward P. Chen, MD

- 2005-2013
- 350 patients with Acute Type A; 98 roots
- 43 patients (14%) underwent David V
- Mean age 46 years
- Operative mortality 4.7% (2 pts)

## Echocardiographic Data

<table>
<thead>
<tr>
<th>Degree of AI</th>
<th>Preoperative</th>
<th>Postoperative</th>
<th>Latest Follow-Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero</td>
<td>7</td>
<td>35</td>
<td>23</td>
</tr>
<tr>
<td>Trace (0.5+)</td>
<td>3</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Mild (1+)</td>
<td>6</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Moderate (2+)</td>
<td>5</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Mod-Severe (3+)</td>
<td>5</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Severe (4+)</td>
<td>17</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

- **Follow-up:** 85% complete
- **Mean F/U:** 40 months (0.2-102 months)
Valve Durability and Survival: Mid Term Results

• Freedom from 2+ AI: 94%
• Freedom from AVR: 100%
• Freedom from Proximal Aortic Reintervention: 100%
• Freedom from Distal Aortic Reintervention: 80%
  – 1 Total Arch replacement
  – 7 DTA/TAAA replacements
• Survival at 9 years: 88%
Summary and Conclusions

• Despite unique technical challenges related to the disease process, valve-sparing procedures can be safely and effectively performed with acceptable operative risk in patients presenting with acute Type A aortic dissection and aortic root pathology.

• In experienced hands and the appropriate clinical setting, the indications for valve-sparing aortic root surgery should be expanded to include type A dissection.