What’s New in Type A Aortic Dissection?

Michael A. Borger, MD PhD
Director of Cardiac Surgery
Leipzig Heart Center
Type A Dissection: Goals of Surgery

1. Excise the intimal tear
2. Decrease or obliterate blood flow into false lumen
3. Replace the ascending aorta +/- aortic arch (Dacron graft)
4. Correct malperfusion
Type A Dissection with Aortic Insufficiency
Aortic Valve Sparing (David) Operation
The outcome after aortic valve-sparing (David) operation in 179 patients: a single-centre experience†

Sergey Leontyev, Constanze Trommer, Sreekumar Subramanian, Sven Lehmann, Yaroslava Dmitrieva, Martin Misfeld, Friedrich W. Mohr and Michael A. Borger*

Department of Cardiac Surgery, Heart Center, University of Leipzig, Leipzig, Germany

* Corresponding author. Leipzig Heart Center, Struempellstrasse 39, 04289 Leipzig, Germany. Tel: +49-341-865-1422; fax: +49-341-8651452; e-mail: michael.borger@medizin.uni-leipzig.de

Received 21 September

Abstract

OBJECTIVES: The aim of the study was to evaluate long-term results in patients with aortic root aneurysmal disease and pliable aortic cusps. The objective of this study was to assess our early and medium-term outcomes with the AVr-D operation.

METHODS: Between 2003 and 2011, a total of 179 patients underwent AVr-D procedures. The mean patient age was 49.7 ± 15.1 years, and 23.5% (n = 42) were female. Marfan's syndrome was present in 15.6% (n = 28). Conventional surgery for type A dissection was performed in 15 patients (8.5%)

RESULTS: Early morbidity and mortality were low. Transthoracic echocardiography revealed mild mitral regurgitation in 14.5% of patients (n = 145) and aortic regurgitation grade 1 in 23.8% (n = 42) patients. Annular dilatation was significant in 2.2% of patients (n = 4). Elective patients: 0/151 = 0%

CONCLUSIONS: AVr-D is associated with a low mortality and morbidity rate, even in patients with Type A aortic dissection. Although a slightly higher rate of recurrent AI may be present in patients with Marfan syndrome, freedom from recurrent AI and reoperation remains excellent during medium-term follow-up. The David operation should be considered the gold standard for patients with proximal aortic root pathology (aneurysm or dissection) and pliable aortic cusps.
David Operation for Acute Type A Dissection
David Operation for Acute Type A Dissection
David Operation for Acute Type A Dissection
David Operation for Acute Type A Dissection
David Operation for Acute Type A Dissection
„Frozen Elephant“ Trunk for Type A Dissection
Simplified Hybrid-Prothesis for Type A Dissection

Ascyrus Medical Dissection Stent
What Causes Aortic Growth Post-Type A Dissection Repair?

- Friability of the dissected aorta, results in creation of a **distal anastomotic new entry (DANE)** 50-70% of the time which acts as a Primary Entry Tear (PET).
- Pressurization of the new PET leads to true lumen collapse, malperfusion and aortic growth.

Single-Stage Management of Dynamic Malperfusion Using a Novel Arch Remodeling Hybrid Graft

Sabin J. Bozso, MD, Jeevan Nagendran, MD, PhD, Michael W. A. Chu, MD, MSc, Bob Kiaii, MD, Ismail El-Hamamsy, MD, PhD, Maral Ouzounian, MD, PhD, Jörg Kempfert, MD, Christoph Starck, MD, Ali Shahriari, MD, and Michael C. Moon, MD

Division of Cardiac Surgery, University of Alberta, Edmonton, Alberta, Canada; Division of Cardiac Surgery, Western University, London, Ontario, Canada; Division of Cardiac Surgery, Montreal Heart Institute, Montreal, Quebec, Canada; Division of Cardiac Surgery, University of Toronto, Toronto, Ontario, Canada; German Heart Centre, Berlin, Germany; and Ascyrus Medical, Boca Raton, Florida

Background. Organ malperfusion remains challenging, causing complications associated with acute DeBakey I dissections. We describe the results of malperfusion management after implantation of the Ascyrus Medical Dissection Stent (AMDS; Ascyrus Medical, Boca Raton, FL), an adjunct to current surgical aortic dissection repair.

Methods. From March 2017 to January 2019, 47 consecutive patients (median age, 65 years; interquartile range, 15.8 years; 61.9% male) presented with acute DeBakey I aortic dissections and underwent emergent surgical aortic repair with AMDS implantation. Malperfusion was detected preoperatively in 55.3% (n = 26) of patients. Two patients were excluded from efficacy analysis due to lack of follow-up. Overall, 66 vessel malperfections were identified, consisting of 1.5% (n = 1) coronary, 33.3% (n = 22) supraaortic, 21.2% (n = 14) visceral, 24.2% (n = 16) renal, and 15.1% (n = 10) extremities. Three patients (11.5%) had clinical evidence of paralysis at presentation.

Results. All 26 device implants were successful. In the malperfusion cohort, 30-day mortality was 7.7% (n = 2). A new neurologic deficit identified postoperatively in patients without neurologic symptoms preoperatively occurred in 7.7% (n = 2). During the follow-up period, 95.5% (n = 63) of vessel malperfections had resolved without an additional procedure, including 95.5% (n = 21) supraaortic, 92.9% (n = 13) visceral, 93.8% (n = 15) renal, and 100% (n = 10) extremity. All patients with paralysis at presentation had complete resolution.

Conclusions. The AMDS provides an effective single-stage malperfusion management strategy. In this study, dynamic malperfusion involving supraaortic, visceral, spinal cord, and lower extremities were treated concurrently with the index standard-of-care operation without delay in life-saving care.

Simplified Hybrid-Prothesis for Type A Dissection

Positive aortic arch and descending aortic remodeling
Correction of Malperfusion Post-Repair

A: Nearly Occluded Common Carotid Arteries
B: Patent Common Carotid Arteries
C: Occluded SMA
D: Patent SMA

Occluded Renal Arteries Bilaterally
Patent Renal Arteries Bilaterally

Mid-Term Mortality

Freedom from Overall and Aorta-Related Mortality

<table>
<thead>
<tr>
<th>Survival Time (t) Days</th>
<th>Number of Subjects at Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>46</td>
</tr>
<tr>
<td>30</td>
<td>40</td>
</tr>
<tr>
<td>365</td>
<td>37</td>
</tr>
<tr>
<td>545</td>
<td>26</td>
</tr>
<tr>
<td>730</td>
<td>8</td>
</tr>
<tr>
<td>1000</td>
<td>1</td>
</tr>
</tbody>
</table>
Results in Patients with Malperfusion

- 95.5% (n=63) of vessel malperfusions resolved after AMDS implantation, without a secondary procedure.

- 100% (n=3) of patients presenting with spinal cord ischemia manifesting as paralysis had complete reversal of their paralysis post-operatively.

- Cerebral malperfusion involving the supra-aortic vessels (SAVs) was anatomically resolved in 85.7% (18/21) of the vessels involved.
<table>
<thead>
<tr>
<th>Aortic Zone</th>
<th>A</th>
<th>B1</th>
<th>B2</th>
<th>B3</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Change from Baseline</strong></td>
<td>% (N=35*), (n/N)</td>
<td>% (N=35*), (n/N)</td>
<td>% (N=35*), (n/N)</td>
<td>% (N=35*), (n/N)</td>
<td>% (N=35*), (n/N)</td>
</tr>
<tr>
<td>Total Aortic Diameter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decrease</td>
<td>34.3 (12/35)</td>
<td>8.6 (3/35)</td>
<td>2.9 (1/35)</td>
<td>0.0 (0/35)</td>
<td>2.9 (1/35)</td>
</tr>
<tr>
<td>Stable</td>
<td>65.7 (23/35)</td>
<td>68.6 (24/35)</td>
<td>77.1 (27/35)</td>
<td>80.0 (28/35)</td>
<td>71.4 (25/35)</td>
</tr>
<tr>
<td>Increase</td>
<td>0.0 (0/35)</td>
<td>22.9 (8/35)</td>
<td>20.0 (7/35)</td>
<td>20.0 (7/35)</td>
<td>25.7 (9/35)</td>
</tr>
<tr>
<td>TL Diameter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decrease</td>
<td>0.0 (0/35)</td>
<td>0.0 (0/35)</td>
<td>0.0 (0/35)</td>
<td>0.0 (0/35)</td>
<td>0.0 (0/35)</td>
</tr>
<tr>
<td>Stable</td>
<td>11.4 (4/35)</td>
<td>14.3 (5/35)</td>
<td>31.4 (11/35)</td>
<td>22.9 (8/35)</td>
<td>51.4 (18/35)</td>
</tr>
<tr>
<td>Increase</td>
<td>88.6 (31/35)</td>
<td>82.9 (29/35)</td>
<td>65.7 (23/35)</td>
<td>74.3 (26/35)</td>
<td>45.7 (16/35)</td>
</tr>
<tr>
<td>FL Diameter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decrease</td>
<td>88.6 (31/35)</td>
<td>88.6 (31/35)</td>
<td>40.0 (14/35)</td>
<td>54.3 (19/35)</td>
<td>25.7 (9/35)</td>
</tr>
<tr>
<td>Stable</td>
<td>11.4 (4/35)</td>
<td>8.6 (3/35)</td>
<td>34.3 (12/35)</td>
<td>31.4 (11/35)</td>
<td>51.4 (18/35)</td>
</tr>
<tr>
<td>Increase</td>
<td>0.0 (0/35)</td>
<td>2.9 (1/35)</td>
<td>22.9 (8/35)</td>
<td>11.4 (4/35)</td>
<td>20.0 (7/35)</td>
</tr>
</tbody>
</table>

*35 patients have at least 1-year follow-up CT compared to the 1st post-operative CT scan as a baseline

**Maximum diameter measured
Thank you!

• michael.borger@helios-kliniken.de
What’s New in Type A Aortic Dissection?

Michael A. Borger, MD PhD
Director of Cardiac Surgery
Leipzig Heart Center