Aortic Arch Aneurysm:
Management and Treatment Options

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Disclosures

• EVERYTHING is OFF-Label...

• Investigator
  • Gore
  • Medtronic
  • Cook
  • Edwards
  • Abbott

• Speaking Honoraria:
  • Abbott
  • Gore
  • Medtronic
  • Terumo Aorta
  • Edwards
Who does NOT need Ascending /Arch TEVAR: Congenital Aortic Syndromes – Ascending only pathology

<2% Mortality/Stroke for straight forward Ascending/Hemiarch +/- Root in experienced centers
Who is Eligible for Branched Graft Therapies in the Aortic Arch?

- Residual Dissection after Type A repair
- Saccular Arch Aneurysm
- Distal Arch Aneurysm
- Mega aorta – intact ascending LZ
- Zone 0/1

Zone 2 Landing
Extending TEVAR to Zone 2: Coverage of the Left Subclavian Artery

- Extension of the proximal landing zone
  - Proximal aneurysm extent
  - Angulated arch
  - Traumatic aortic injuries
  - Type B dissection

- Options
  - LCC-LSCA bypass
  - Parallel Grafts
  - In situ Fenestration
Gore TBE EARLY FEASIBILITY: Summary of Early Results

- 31 Zone 2, 9 Zone 0
- 100% Technical success
- 100% Survival at 1 month

- Peri-Procedural Stroke
  - 3.3% (1/31) Zone 2
  - 22.2% (2/9) Zone 0/1

- Side Branch Patency
  - 1/31 Zone 2 patency loss
  - No loss of patency in Zone 0

- NOW in PIVOTAL
  - >200pts enrolled
Zone 2 Branched TEVAR
Gore TBE – Residual Type A

Residual Dissection After Zone 2 Arch
Medtronic Valiant Mona LSA
Early Feasibility

Delivery System
• Two wire system
  • Main/primary aortic tracking wire
  • LSA cannulation wire
• Pre-cannulated LSA cuff
• Tip capture for precise MSG delivery
Zone 0/1 Landing

Saccular Mid Arch
Residual Type A s/p repair

“Classic” Debranching
Type I
Type II
Type III
Zone 0 Landing: The problem of TEVAR in the proximal Aorta

Systolic-diastolic motion

- at the root base 4-7mm
- at the brachiocephalic trunk 3-4 mm
- Systolic-diastolic twist of 6°

Robicsek et al. 2004
Gore TBE – Single Branch in Zone 0
Proximal Arch Saccular Aneurysm
Arch Aneurysm Zone 0 Treatment

Pre-Op

30 Days Post Op

2 Years Post Op
Bolton Relay Dual Branch – Internal Branch

“Large single window for ease of cannulation of 2 internal tunnel(s)
Cook TX2 Arch Graft (2-3 branch): Internal Branch

Table 3. Comparative analysis (median [Q1−Q3] or n [%]).

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Group 1 (n = 38)</th>
<th>Group 2 (n = 27)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length (min)</td>
<td>250 (210−330)</td>
<td>295 (232−360)</td>
<td>.35</td>
</tr>
<tr>
<td>X-ray time (min)</td>
<td>46 (32−84)</td>
<td>39.3 (34−61)</td>
<td>.07</td>
</tr>
<tr>
<td>Volume of contrast (mL)</td>
<td>150 (95−207)</td>
<td>183 (120−290)</td>
<td>.03</td>
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<tr>
<td>Early post-operative</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endoleaks</td>
<td>11 (28.9%)</td>
<td>3 (11.1%)</td>
<td>.08</td>
</tr>
<tr>
<td>Secondary procedures</td>
<td>4 (10.5%)</td>
<td>4 (14.8%)</td>
<td>.61</td>
</tr>
<tr>
<td>Cerebrovascular events</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Systemic complications</td>
<td>17 (44.7%)</td>
<td>13 (43.3%)</td>
<td>.79</td>
</tr>
<tr>
<td>Mortality</td>
<td>5 (13.2%)</td>
<td>0 (0%)</td>
<td>.05</td>
</tr>
<tr>
<td>Follow up (n = 33)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endoleaks</td>
<td>3 (9.1%)</td>
<td>2 (7.4%)</td>
<td>.82</td>
</tr>
<tr>
<td>Secondary procedures</td>
<td>3 (9.1%)</td>
<td>2 (7.4%)</td>
<td>.82</td>
</tr>
<tr>
<td>Mortality</td>
<td>4 (12.1%)</td>
<td>1 (3.7%)</td>
<td>.24</td>
</tr>
<tr>
<td>Overall mortality</td>
<td>9 (23.6%)</td>
<td>1 (3.7%)</td>
<td>.02</td>
</tr>
</tbody>
</table>

Group 1: early experience study.
Group 2: current study.

Spear, R., et al. (2016). Editor’s Choice - Subsequent Results for Arch Aneurysm Repair with Inner Branched Endografts. EJVES, 51(3), 380–385
Additional Method for Aortic Arch Aneurysm

Device 1: Φ 30mm

Device 2: Φ 34-30mm
TEVAR for Aortic Arch Aneurysm with Fenestrated Endograft
Current treatment outcomes for Complex aortic arch

- Open surgical repair
  - Longer hospital stays
  - Younger, healthier patients

- Endovascular Repair (parallel, branched, and fenestrated)
  - High risk for open repair

- Hybrid Repair
  - High risk for open repair
  - Not intended use of devices

- Perioperative mortality
  - Open = 8.6% (Leshnower, 2011)
  - Endovascular= 4-15% (Moulakakis, 2013)
  - Hybrid = 10.8% (Cao, 2012)

- Stroke/neurological events
  - Open = 8.2% (Hiraoka, 2014)
  - Endovascular= 8-15% (Moulakakis, Cook)
  - Hybrid = 6.8% (Cao, 2012)

- Reinterventions
  - Open = 9% (Sundt III, 2008)
  - Endovascular= 30.8% (Mangialardi, 2014)
Conclusions

• Branched graft solutions for Zone 0-2 Arch pathology are rapidly evolving

• Rigorously controlled studies must be done to appropriately study these procedures, particularly related to stroke

• Strong Collaboration between multidisciplinary teams is needed for optimal results:
  • Imaging, CT surgery, Vascular Surgery, Interventional Cardiology, Neurology, Anesthesia, Critical care