Challenges and Results of Open Repair of Residual TAAAs distal to Prior TEVAR for TBAD

Manju Kalra, MBBS
Division of Vascular and Endovascular Surgery, Mayo Clinic Rochester, MN, USA
VEITH Symposium 2015, New York, November 17-21

Aortic Death
- HR = 0.55 (0.32-0.98)

Aneurysm Progression
- HR = 0.55 (0.32-0.98)

Endovascular Repair of Type B Aortic Dissection
Long-term Results of the Randomized Investigation of Stent Grafts in Aortic Dissection Trial
N Engl J Med 2013

Total repairs (%) Year
- Open Repair
- TEVAR
- OMT + TEVAR

Aortic Diameter
- Total repair rate ratio 1.2
- TEVAR rate ratio 25.0*

Medicare patients
- 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010

False Lumen Resolution
- Open Repair
- TEVAR
- OMT + TEVAR

Total repairs (%)
- 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010

Nienaber C et al. Circulation 2013

OMT TEVAR +OMT P Value
Aortic Diameter
- Total repair rate ratio 1.2
- TEVAR rate ratio 25.0*

Medicare patients
- 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010

False Lumen Resolution
- Open Repair
- TEVAR
- OMT + TEVAR

Total repairs (%)
- 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010

Nienaber C et al. Circulation 2013

Disclosure
I have no relevant financial relationships to disclose

Aneurysm Progression
- Months from randomization
- HR = 0.55 (0.32-0.98)

OMT

OMT + TEVAR

Aortic Death
- Months from randomization
- HR = 0.55 (0.32-0.98)

OMT

OMT + TEVAR

Aortic Diameter
- True Lumen
- False Lumen

OMT

OMT + TEVAR

Aortic Diameter
- True Lumen
- False Lumen

Endovascular Rx in Marfan syndrome

<table>
<thead>
<tr>
<th>Author</th>
<th>n</th>
<th>Prior proc</th>
<th>Yes</th>
<th>PTF</th>
<th>STF</th>
<th>Reinterventions</th>
<th>Mortality</th>
<th>FU (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waterman (2011)</td>
<td>16</td>
<td>1 - 5</td>
<td>6</td>
<td>7</td>
<td>2</td>
<td>8</td>
<td>4</td>
<td>13.7</td>
</tr>
<tr>
<td>Geisbuech (2008)</td>
<td>6</td>
<td>1-3 (n=4)</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>31</td>
</tr>
<tr>
<td>Marcheix (2008)</td>
<td>15</td>
<td>1 (n=11)</td>
<td>3</td>
<td>10</td>
<td>2</td>
<td>8</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td>Baril (2004)</td>
<td>6</td>
<td>1 (n=4)</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>29</td>
</tr>
<tr>
<td>Dong (2005)</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>0</td>
<td>0</td>
<td>12-16</td>
</tr>
<tr>
<td>Ince (2005)</td>
<td>6</td>
<td>1 (n=5)</td>
<td>2</td>
<td>4</td>
<td>-</td>
<td>2</td>
<td>1</td>
<td>12-74</td>
</tr>
</tbody>
</table>

Prior procs: Yes PTF STF
Reinterventions: Mortality
FU (m): Follow-up in months

Challenges to Open Repair

- Status of thoracic aortic false lumen
  - Complete resolution
  - Partial resolution
  - Enlarging
- Extent of distal aortic enlargement
  - Paravisceral segment
  - Entire abdominal aorta
- Diameter of aorta immediately distal to stent graft

Retrograde False Lumen Flow

Endovascular Treatment of Type B Dissection in Patients with Marfan Syndrome: Mid-Term Outcomes and Aortic Remodeling

- TEVAR safe
- Associated with re-interventions
- Reduced rate of positive aortic remodelling
Adopted the technique in 2002
- Deep Hypothermic Circulatory Arrest (DHCA)
- Anatomically challenging aortic arch, TAA and TAAA repairs
- Elective repairs initially only in young patients with connective tissue disorders
- Subsequently adopted as technique of choice in all good risk patients


Mayo Experience – TAAA Repair
2002-2015: 94 patients
Mean Age: 58 years
Median SVS/AAVS Score: 5

Type B: 86 (72%)
Type C: 13 (14%)
Type D: 1 (1%)

Mayo Clinic Experience

Open Thoracoabdominal Repair
DHCA

Technique

Intercostal Patch Aneurysm

Staged TAAA Repair
Prior Elephant Trunk / TEVAR

Previous Aortic Repair
Ascending aorta / arch 48*
Descending aorta 12
Open 7
TEVAR 5
Abdominal aorta 13*

*One patient with both repairs
## Results

<table>
<thead>
<tr>
<th>Variable</th>
<th>UVA</th>
<th>Mayo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of pts</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Mean age (years)</td>
<td>48</td>
<td>54</td>
</tr>
<tr>
<td>Dissection</td>
<td>8 (80)</td>
<td>5 (100)</td>
</tr>
<tr>
<td>Connective Tissue Disease</td>
<td>3 (30)</td>
<td>2 (40)</td>
</tr>
<tr>
<td>Hypertension</td>
<td>8 (80)</td>
<td>3 (60)</td>
</tr>
<tr>
<td>COPD</td>
<td>2 (20)</td>
<td>2 (40)</td>
</tr>
<tr>
<td>Current Tobacco Use</td>
<td>5 (50)</td>
<td>1 (20)</td>
</tr>
<tr>
<td>Renal insufficiency (S. Cr &gt; 1.5 mg/dL)</td>
<td>2 (20)</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

### Transabdominal Repair

<table>
<thead>
<tr>
<th>Variable</th>
<th>UVA</th>
<th>Mayo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergent TEVAR</td>
<td>3 (30)</td>
<td>5 (100)</td>
</tr>
<tr>
<td>Interval TEVAR – OR (mths)</td>
<td>4</td>
<td>32</td>
</tr>
<tr>
<td>Aortic control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LHB: 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CPB: 6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DHCA: 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mortality</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Paraplegia / paraparesis</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Acute kidney injury</td>
<td>2 (20)</td>
<td>1 (20)</td>
</tr>
<tr>
<td>Cardiac complication</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Pulmonary complication</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

### Hybrid Repair

### Summary

- The greatest challenge of open repair of residual TAAA distal to TEVAR for TBAD remains non-resolution of the false lumen distal to the stent.

- Open repair can be performed safely in young, relatively healthy patients utilizing total or partial cardiopulmonary bypass.