Open surgical conversion after Tevar: incidence and treatment options

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Disclosure of Interest

Speaker name: DOMENICO BACCELLIERI

- I do not have any potential conflict of interest for this presentation
TEVAR vs OR: meta-analysis on 5.888 pts.

TEVAR Versus Open Repair for Descending Thoracic Aortic Disease: A Systematic Review and Meta-Analysis

(© 2010 by the American College of Cardiology Foundation)

Cheng et al, JACC 2010
Mortality at 1 year Reduced for TEVAR versus open surgery

OR: 0.73 (95% CI: 0.53 to 1.02)

Cheng et al, JACC 2010
TEVAR: long-term results

The “big” trials

**Trial** | **N** | **FU** | **Reintervention** | **Conversion**
--- | --- | --- | --- | ---
Starz-TX2 (Cook) | 1 | 158 yrs | 5.7% | 1 conversion
Valor (Medtronic) | 2 | 195 yrs | 16.4% | 3 conversions
TAG (Gore) | 3 | 140 yrs | 18.6% | 2 conversions

Melissano G, Kahlberg A, Chiesa R J Endovasc Ther 2011
Makaroun MS, Dillavou ED, Cambria RP J Vasc Surg 2008
“Off-Label” indications for TEVAR

Number of procedures vs. Time following approval

Approved indications

Off-label indications

Russell et al. J Interven Cardiol 2006
The “domino” effect

Experience with endovascular devices has evolved

↓

Application expanded to more complicated cases

↓

Reports of complication has increased

↓

Increased secondary endo procedure and open conversion
<table>
<thead>
<tr>
<th>Authors</th>
<th>Year</th>
<th>N° TEVAR</th>
<th>Open Conversions</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geisbüsch P.</td>
<td>2011</td>
<td>264</td>
<td>11</td>
<td>4.1 %</td>
</tr>
<tr>
<td>Dumfarth J.</td>
<td>2011</td>
<td>421</td>
<td>21</td>
<td>5.0 %</td>
</tr>
<tr>
<td>Miyahara S.</td>
<td>2013</td>
<td>147</td>
<td>16</td>
<td>10.8 %</td>
</tr>
<tr>
<td>Canaud L.</td>
<td>2013</td>
<td>236</td>
<td>14</td>
<td>5.9 %</td>
</tr>
<tr>
<td>Scali S.T.</td>
<td>2014</td>
<td>585</td>
<td>46</td>
<td>7.9 %</td>
</tr>
<tr>
<td>Roselli E.</td>
<td>2014</td>
<td>_</td>
<td>50</td>
<td>_</td>
</tr>
<tr>
<td>Nozdrzykowski M.</td>
<td>2015</td>
<td>371</td>
<td>25</td>
<td>6.7 %</td>
</tr>
</tbody>
</table>
Thoracic aortic experience 1993-2016  
San Raffaele Hospital, Milan, Italy  
Prof. R. Chiesa, Prof. G. Melissano

<table>
<thead>
<tr>
<th></th>
<th>Arch</th>
<th>DTA</th>
<th>TAAA</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPEN (1993 - 2016)</td>
<td>75</td>
<td>381</td>
<td>827</td>
</tr>
<tr>
<td>1283 pts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TEVAR (1999 - 2016)</td>
<td>208</td>
<td>304</td>
<td>55</td>
</tr>
<tr>
<td>567 pts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total:</td>
<td>283</td>
<td>685</td>
<td>882</td>
</tr>
<tr>
<td>1850</td>
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</tbody>
</table>
Thoracic reinterventions

OSR experience 1999-2016

Our series = 79 (48%)    Other Institutions = 86 (52%)
Indications to reintervention

- Endoleak (or distal progression) 93
- Stent-graft migration 36
- Stent-graft failure 18
- Infection / fistulization 12
- Retrograde dissection 6
“Redo” treatment strategies

- Endo-Procedures: N = 91 (55%)
- Open conversion: N = 62 (37%)
- Hybrid approach: N = 12 (8%)
Proximal Endoleak

Debranching + Proximal Cuff
Distal Endoleak

- 1998: AAA open repair
- 2009: TEVAR for DTA

2011: Sudden back pain
CT → endoleak, sac growth
Distal Endoleak
Distal Endoleak

Previous AAA graft

Previous DTA stent-graft

Splanchnic cold perfusion
Distal Endoleak

6-cm long
(no anatomic feasibility for branched-EVAR)
Distal Endoleak

Graft-to-endograft anastomosis
“Extent IV” TAAA Repair

Carrell patch splanchnic vessels repair
StentGraft partial resection

Triple layer (Endograft; Aorta; Teflon felt)
StentGraft partial resection

Triple layer (Endograft; Aorta; Teflon felt)
Stentgraft Infection
Stentgraft Infection
Stentgraft Infection
Stentgraft Infection

“In situ” reconstruction, Silver-coated Graft
Stentgraft Infection

2-year control PET-CT: No abnormal captation
Graft failure and infection
FEVAR Failure

SMA stent fracture and fluid collection
FEVAR Failure

Cultures = negative
(sterile fluid collection)
FEVAR Failure

Thoracophrenolaparotomy, splancnic cold perfusion
FEVAR Failure
FEVAR Failure

Carrell patch
FEVAR Failure

Gore Hybrid

LRA “sutureless” bypass
FEVAR Failure
Explanted stent-graft
Stentgraft infection / AEF

Tracer captation at PET/CT

Close contact with the esophagus

2 Medtronic Valiant
Stent-graft infection / AEF

Left thoracotomy - Intercostal muscle flap preparation
Stent-graft infection / AEF

Endograft removal
Stent-graft infection / AEF

Evidence of AEF

“In situ” repair with silver-coated graft
Stent-graft infection / AEF

Esophageal repair

Intercostal muscle interposition
Distal TAAA progression

- ♀, 42 years
- **Marfan Syndrome**
- 2005: aortic dissection type A+B → aortic repair
- 2009: Frozen elephant-trunk
- 2016: progression of TAAA (> 6 cm)
Distal TAAA progression Marfan S.
Distal TAAA progression
Distal TAAA progression

- Stent-graft (E-Vita-Open)
- Multi-branched graft
- Teflon reinforced
Distal TAAA progression

Intercostal arteries inclusion

Distal Anastomosis
Distal TAAA progression

LRA  SMA  CT  RRA
Retrograde dissection

TEVAR for atherosclerotic aneurysm (zone 0)

Late retrograde dissection with syncope and acute chest pain

3-month CT scan

Tshomba, Chiesa et al, Ann Vasc Surg 2010
Retrograde dissection

Debranching graft from ascending aorta

14 days

Virtual angioscopy

4mm endograft distal migration

3 months

Aortic tear
Retrograde dissection
Ascending aortic repair and “Y” graft reimplantation
Postoperative CT-angiography

Tshomba, Chiesa et al, Ann Vasc Surg 2010
# Results

<table>
<thead>
<tr>
<th></th>
<th>Open conversion N pts (%)</th>
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<tbody>
<tr>
<td><strong>Total</strong></td>
<td>62</td>
</tr>
<tr>
<td><strong>Mortality (30-days)</strong></td>
<td>10 (16%)</td>
</tr>
<tr>
<td><strong>Major morbidity</strong></td>
<td></td>
</tr>
<tr>
<td>Respiratory failure</td>
<td>15 (24%)</td>
</tr>
<tr>
<td>Renal failure</td>
<td>8 (13%)</td>
</tr>
<tr>
<td>Paraplegia</td>
<td>2 (3%)</td>
</tr>
</tbody>
</table>
### Mortality x Etiology

**62 open conversions**

<table>
<thead>
<tr>
<th>Indication to conversion</th>
<th>30-days Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endoleak (27)</td>
<td>1 (4%)</td>
</tr>
<tr>
<td>Endograft migration + failure (17)</td>
<td>2 (12%)</td>
</tr>
<tr>
<td>Retrograde dissection (6)</td>
<td>2 (33%)</td>
</tr>
<tr>
<td>Infection/fistulization (12)</td>
<td>5 (42%)</td>
</tr>
</tbody>
</table>
Conclusions

• Close follow-up after TEVAR

• Open conversion
  – Technical challenge
  – Acceptable results in High Volume Centers

• Increased mortality in case of retrograde dissection and infection
Waiting for you

In Milano

15th-17th December 2016