Knowledge Driven Approach to TAAA Repair

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Disclosure

Speaker name: Tara M Mastracci

I have the following potential conflicts of interest to report:

☑ Consulting: Cook Medical and CYDAR Medical
☐ Employment in industry
☐ Stockholder of a healthcare company
☑ Owner of a healthcare company: SeedChange
☐ Other(s)

☐ I do not have any potential conflict of interest
12 (historic) facts that guide our treatment of TAAA repair.
Survival Improves with Endovascular Intervention

Estes, Circulation 1950
Mastracci, JVS, 2014
Durability is More than a Buzz Word: It’s Predictable

Schanzer et al, Circulation 2011

Diehm et al, 2008

Mastracci 2021
Things other than Diameter are Important...

<table>
<thead>
<tr>
<th>Variable</th>
<th>Complications</th>
<th>Hazard Ratio</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neck Thrombus &gt;25%</td>
<td>17%</td>
<td>0.96</td>
<td>0.018</td>
</tr>
<tr>
<td>Neck Calcification</td>
<td>25%</td>
<td>1.06</td>
<td>0.044</td>
</tr>
<tr>
<td>Neck Angulation</td>
<td>27%</td>
<td>1.02</td>
<td>0.079</td>
</tr>
</tbody>
</table>

Wyss et al, JVS 2011

Karkkainen et al, JVS 2020
Heritable Aortic Disease is Aggressive

Family history predicts outcome

People with a family history have more extensive disease

Van de Luijtgaarden et al, JVS 2014

Frankel, JTCVS 2019

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When it comes to adjuncts for SCI, staging works

- Staging decreases SCI
- Staging may protect against mortality

O’Callaghan et al, JVS 2015

<table>
<thead>
<tr>
<th>Staging Group</th>
<th>N</th>
<th>SCI</th>
<th>30 d Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Stage</td>
<td>32</td>
<td>12/32 (38%)</td>
<td>19%</td>
</tr>
<tr>
<td>Two Stage</td>
<td>27</td>
<td>3/27 (11%)</td>
<td>0%</td>
</tr>
<tr>
<td>Unintentional Stage</td>
<td>28</td>
<td>4/28 (14%)</td>
<td>10.7%</td>
</tr>
</tbody>
</table>

Mastraccai 2021
Custom Devices are likely better than Off the Shelf

During planning and implantation, it should be considered that branch stability can be maximized with a branch total length between 60 and 100 mm, a vertical length of 25-50 mm. A tortuosity index greater than 1.15 may require more careful follow-up.

Le Huu et al, JTCVS 2019

Piazza et al, JVS 2020
Branch stent technology still has a long way to go

<table>
<thead>
<tr>
<th>Study</th>
<th>Celiac</th>
<th>SMA</th>
<th>Renal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premprabha et al 2015</td>
<td>98%</td>
<td>100%</td>
<td>90%</td>
</tr>
<tr>
<td>Branch Collaboration 2016</td>
<td>97%</td>
<td>98%</td>
<td>92%</td>
</tr>
<tr>
<td>Pannucio et al 2015</td>
<td>98%</td>
<td>99%</td>
<td>96%</td>
</tr>
<tr>
<td>Martin Gonzalez et al 2015</td>
<td>--</td>
<td>--</td>
<td>97%</td>
</tr>
<tr>
<td>Eagleton et al 2015</td>
<td>97%</td>
<td>99%</td>
<td>96%</td>
</tr>
</tbody>
</table>
Ease of Implantation Cannot Influence Durable Device Design

Type Ia endoleaks after fenestrated and branched endografts may lead to component instability and increased aortic mortality

Adrian O’Callaghan, M.B., Roy K. Greenberg, M.D. Matthew J. Tegarden, M.D., Laura West M.S., and Tara Marie Manitets, M.D., Cleveland, Ohio

Objectives: Fenestrated and branched endografts allow for proximal sealing at extended innominate; thus, the visceral arteries are preserved. We describe the incidence, causes, and implications of proximal endoleak development in patients undergoing complex endovascular aortic aneurysm repair.

Method: All patients undergoing a fenestrated or branched repair were entered into a prospective database, and the endoleaks included all those with at least one endoleak on computed tomographic angiography. Preoperative and postoperative three-dimensional imaging was required to characterize morphology and exclude endoleaks. A blinded, independent, preprocedural imaging to ensure the selection of the renal sub-group and matched cases of patients without endoleaks. The outcome measures were proximal endoleak development, mortality, and component survival, and comparisons were made with all patients undergoing complex aortic repair.

Results: From 2001 to July 2013, 941 patients underwent repair in a prospective randomized interventional aortic aneurysm trial. Excluded were 24 emergency patients and 21 patients without required imaging, leaving 902 eligible for analysis. A proximal type Ia endoleak developed in 20 patients (2.2%). Mean time of endoleak was 11.3 months, with an area of sealing in the visceral arcs, compared with the thoracic arcs, being significantly higher with endoleaks developing (P = .01). Aortic-related mortality was significantly higher in the multisite group (14.0%) than in the group without endoleaks (4.5%; P = .01). These patients also experienced a higher incidence of component instability at 30.8% compared with 9.0% in patients without type Ia endoleaks (P < .05).

Conclusions: Fenestrated/branched endograft repair is a less invasive option for clinical needs, lowering increased complexity. However, development of a proximal endoleak decreases the repair rate and increases mortality. Increasing complexity of design seems to improve the long-term outcome for patients requiring complex aortic repair. (J Vasc Surg 2013;57:14–23.)
Higher Volume Practices Improvements in Device Design are paying off in durability

<table>
<thead>
<tr>
<th>Author</th>
<th>Type</th>
<th>N</th>
<th>Years to Failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affifi et al, 2017</td>
<td>Open after OSR</td>
<td>266</td>
<td>7.3 years</td>
</tr>
<tr>
<td>Oikonomou et al, 2014</td>
<td>Endo after OSR</td>
<td>35</td>
<td>10.5 years</td>
</tr>
<tr>
<td>Coscas et al, 2010</td>
<td>EVAR after OSR</td>
<td>104</td>
<td>10.8 years</td>
</tr>
<tr>
<td>Dias et al, 2018</td>
<td>Endo or Open after EVAR</td>
<td>247</td>
<td>5.1 years</td>
</tr>
<tr>
<td>Falkensammer et al, 2017</td>
<td>Endo After EVAR</td>
<td>12</td>
<td>3.6 years</td>
</tr>
<tr>
<td>Metha et al, 2011</td>
<td>Endo after EVAR</td>
<td>27</td>
<td>2.14 years</td>
</tr>
<tr>
<td>Holzbein et al, 1998</td>
<td>Open and Endo after EVAR</td>
<td>11</td>
<td>&lt;1 year</td>
</tr>
</tbody>
</table>
Aneurysm-Related Mortality is not sacrificed in Centres that cover more Aorta

Mastracci et al, JVS 2015

Katsagyris A et al, JVS 2017
High volume centres MAY be the best places to do TAAA....
We are only just learning the natural history of the Disease

- 1991 - 2014
- 244/1797 patients required 266 redo operations (14%)
- Mean age 62 (+/-16 years)
- 32.7% (87 of 266) women
- 32.7% (87 of 266) had chronic aortic dissection.
- Mean time from the index DTAA/TAAA repair was 7.3 +/- 6.5 years.

Afifi et al, ATS 2017
Ultimately, a knowledge based approach to TAAA repair is to design a repair that Fails Late, and Fails Well
Constant re-evaluation of our practice
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