Not So: Many TAAA’s Are Best Treated By Open Surgery: Technical Pearls to Improve Outcomes

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2018 Vieth Symposium

Mortality ≈ 10%
Total Spinal Cord Ischemia → 16%
half (8%) devastating paraplegia

Impact of Spinal Cord Ischemia

Adjuncts to prevent paraplegia → operative conduct

 considantly for CSFD

CSF Drainage

Cerebrospinal fluid drainage to prevent paraplegia during thoracic and thoracoabdominal aortic

- Meta-analysis of 3 RCT with 289 pts
- SCI 12% vs. 33% with CSFD
- Pooled OR 0.26 p = .0002
CSFD very important

Disclosures

Speaker name: Virendra I. Patel MD MPH
I have the following potential conflicts of interest to report:
- COOK Speaker/Proctor
- Cryolife Consultant

Thoracoabdominal Aneurysms

Crawford Benchmark Series

J Vasc Surg 1993; 17:357-70

J Vasc Surg 2004;40:36-44

• Meta-analysis inc. 3 RCT with 289 pts
• SCI 12% vs. 33% with CSFD
• Pooled OR 0.26 p = .0002
CSFD very important
Spinal Cord Blood Supply

- Intercostal re-implantation

Routine sacrifice of segmental aortic branches can be carried out without neurologic injury

- Delayed MRA show collaterals

Magnetic resonance angiography of collaterals shows blood supply to spinal cord through collateral circulation.

- Distal aortic perfusion

- Use of adjuncts independently reduced the risk of mortality and morbidity
- Advocate use of distal perfusion in all TAA types
- SCI 2.4%

- Distal aortic perfusion significantly reduced risk of:
  - Organ dysfunction (Liver / Kidney)
Extracorporeal Circulation

Use of extracorporeal bypass is associated with improved outcomes in open thoracic and thoracoabdominal aortic aneurysm repair

- 4230 Medicare patients (DTA/TAA)
- 57% repaired with EC

Multivariable results – 30 day

<table>
<thead>
<tr>
<th>Variable</th>
<th>Extracorporeal Circulation OR (95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Death</td>
<td>0.8 [0.65-0.97]</td>
<td>0.02</td>
</tr>
<tr>
<td>Any Comp.</td>
<td>0.67 [0.65-0.97]</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Pulmonary</td>
<td>0.68 [0.59-0.79]</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>ARF</td>
<td>0.52 [0.44-0.61]</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

Long term Survival

- 67 ± 1%
- 52 ± 2%

Cambria Experience/Outcomes

Further experience with distal aortic perfusion and motor-evoked potential monitoring in the management of extent I-III thoracoabdominal aortic aneurysms

Evolution of operative approach

Extent I – III: routine use:
- At-fem bypass
- MEVOP
- Spinal drain
- Permissive hypothermia

mortality 5/128 = 4%
*paraplegia 3/128 = 2.3%

Extent IV TAA

- ~ 20% of TAA
- Aneurysm extends to diaphragm
  - Total abdominal aortic aneurysm
Conduct of Operation

- Risk of SCI in Type IV → LOW
- Adjuncts not utilized in Type IV repair:
  - Axial-femoral bypass
  - CSF drain
  - Motor evoked potential monitoring
  - Permissive hypothermia
- Type IV ? Open ? Endo ? hybrid

Standardized Clamp and Sew

Type IV Experience

Continued favorable results with open surgical repair of type IV thoracoabdominal aortic aneurysms

- Retrospective analysis
- Thoracic Aortic Center database
- All open Type IV TAA
- 178 patients

Clinical Outcomes

N=178
- Mortality: 5 (2.8%)  
- SCI: 4 (2.2%)
- HD / renal failure: 5 (2.8%)
- Any complication: 45 (25%)

Update Type IV Experience

Durability of open surgical repair of type IV thoracoabdominal aortic aneurysms

- 226 patients
- 3% Mortality
- 2% SCI
- 97% 5yr. freedom from graft comp.

Hospital Volume

Surgical treatment of intact thoracoabdominal aortic aneurysms in the United States: Hospital and surgeon volume-related outcomes
**Hospital Volume**

Impact of hospital volume and type on outcomes of open and endovascular repair of descending thoracic aneurysms in the United States Medicare population

- 763 hospitals
- 3554 DTA or TAA
- HV = ≥ 8 / yr.
- HV improved mortality OR 0.7 [0.6 – 0.9]

**Downstaging**

- 25 Staged vs. 88 Standard
- Lower MAE 20% vs. 49% (p=0.01)
- Lower EBL, Op Time, LOS
- Mortality ~4%

**Technical Pearls**

- Patient selection – anatomy, physiologic risk
- CSFD
- Neuromonitoring w. MEVOP
- Distal perfusion techniques for organ and spinal protection
- Permissive hypothermia
- High volume center
- Downstaging to mitigate risk

**Open vs. Endo TAAA**

A propensity-matched comparison for endovascular and open repair of thoracoabdominal aortic aneurysms

3 centers / 2007 – 2014
341 pts. - 25% Endo v. 75% open

<table>
<thead>
<tr>
<th>30 DAY</th>
<th>ENDO</th>
<th>OPEN</th>
</tr>
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<tbody>
<tr>
<td>Death:</td>
<td>7.7%</td>
<td>6.2%</td>
</tr>
<tr>
<td>Paraplegia:</td>
<td>9.2%</td>
<td>10.8%</td>
</tr>
</tbody>
</table>

**Multi-center French Experience**

Results and Factors Affecting Early Outcome of Fenestrated

Op mortality →21%
SCI →16.6%

**Thank You**