Treatment of TAA's:

WHICH PATIENTS ARE STILL BETTER SERVED WITH OPEN REPAIR?

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The “Gold Standard” in 2012 a Relative Consideration

- The results of open operation vary considerably as a function of environment
- Is the “question” → endograft vs. open
- Is the “question” → hybrid vs. open

GOOD RISK VS HIGH RISK

TAA Repair: MGH Results

- 23% non-elective cases
- Overall mortality 8%
- Paraplegia/paraparesis any degree 9.5%

TAA Repair: Late Results

- TAA a durable operation
- Late “events” in 10% → most other aneurysm resection: 3% with graft-related events
  - female sex, rupture predictive
- Late survival ≈ 60% @ 5 yrs = AAA
**TAA Repair: Late Results**

At 5 years after open operation, permanent loss of functional capacity occurred rarely.

**TAA Repair in “Real World”**

- Overall mortality 22.3% for elective cases!

**Recovery After Open TAA Repair**

- 1010 TAA repairs (21% ruptured)
- 19% overall op. mortality
- 31% one year mortality with linear correlation patient age

**Patient Criteria**

In “elective” management of degenerative TA/TAAs posture towards pt. whose:

- Advanced age
- Systemic (cardiopulm/renal) comorbidities
- Poor functional status

Makes open operation illogical.
Total Endovascular Repair: WHY NOT?

- Logistic/Regulatory Considerations
- Durability Concerns
- Patient Features
  - Urgent/Emergent Presentations
  - Good risk patients in . . . environment
  - Anatomic Considerations
- Type IV TAA
- Chronic Dissections/MARFAN's Narrow/angulated visceral segments
- SCI Considerations

TAA Repair (455 operations)

**Independent Predictors of In-Hospital Mortality**

<table>
<thead>
<tr>
<th>Variable</th>
<th>p (OR; 95% CI)</th>
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</thead>
<tbody>
<tr>
<td>Pre-operative Cr&gt; 1.8</td>
<td>0.048 (3.1; 1.4-6.8)</td>
</tr>
<tr>
<td>Total Operative Transfusion</td>
<td>0.008</td>
</tr>
<tr>
<td>Intraoperative Hypotension</td>
<td>0.015 (3.0; 1.2-7.3)</td>
</tr>
<tr>
<td>Cardiac Complications</td>
<td>0.016 (3.1; 1.2-7.8)</td>
</tr>
<tr>
<td>Severe Renal Failure</td>
<td>&lt; 0.0001 (7.8;3.4-17.9)</td>
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</tbody>
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TAA Repair (455 operations)

**Variable**

- Non-elective OR                  | 0.02 (2.1; 1.1-4.0)                  |
- TAA extent (I/II)                | 0.015 (2.2;1.17-4.1)                 |
- Intra-Operative Hypotension      | 0.0049 (3.3; 1.4-7.7)                |
- Total Cross-clamp time           | 0.012                                |
- Epidural Cooling (Protective)    | 0.02 (0.4; 0.2-0.8)                  |
- Severe Renal Failure              | 0.031 (2.4; 1.1-5.2)                 |
- Pulmonary Complications           | 0.0003 (4.0; 1.9-8.6)                |

Anatomy Limitation?

Not applicable with present technology to genuine TAA extent???
⇒ Not so after 4/05
**Hybrid Operation: Question Less Invasive Alternative**

- Combination of debranching bypasses creates distal seal zone for TEVAR
- Aortic Arch
- Visceral Segment

**Hybrid TAA**
St. Mary’s Hospital, London

- Update in Houston 4/08 with approx 45 pts mortality/paraplegia in 20% range!

**Hybrid Repair – MGH Results**

- 23 high-risk pts (2005-07) → hybrid
- concurrent open TAA compared
- composite mortality/paraplegia DOUBLED in hybrid group (22% vs 11.7%)!

**Preliminary Results of the North American Complex Abdominal Aortic Debranching (NACAAD) Registry**


For the NACAAD investigators
**NACAAD registry**

**Aneurysm classification**

- Thoracoabdominal: 78%
- Pararenal: 22%

- Total patients: 208
- Aneurysm size: 6.6 ± 1.3 cm

**Mortality**

- 30 early deaths (14%)
  - Multisystem organ failure, 11
  - Cardiac event, 10
  - Ruptured aneurysm, 4
  - Ischemic stroke, 2
  - Intracranial hemorrhage, 2
  - Intraoperative hemorrhage, 1

- Mortality in centers with > 10 cases: 11% (0 – 21%)

**Morbidity**

- 140 patients (73%) had complications

<table>
<thead>
<tr>
<th>Complication</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Respiratory complications</td>
<td>45</td>
<td>22</td>
</tr>
<tr>
<td>Acute renal insufficiency</td>
<td>39</td>
<td>19</td>
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<tr>
<td>GI Complications</td>
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<td>14</td>
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<tr>
<td>Bleeding</td>
<td>23</td>
<td>14</td>
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<tr>
<td>Vascular complications</td>
<td>24</td>
<td>11</td>
</tr>
<tr>
<td>Bleeding</td>
<td>24</td>
<td>11</td>
</tr>
<tr>
<td>Spinal cord injury</td>
<td>21</td>
<td>10</td>
</tr>
<tr>
<td>Wound complications</td>
<td>19</td>
<td>9</td>
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<tr>
<td>Myocardial infarction</td>
<td>18</td>
<td>8</td>
</tr>
<tr>
<td>Dialysis</td>
<td>14</td>
<td>7</td>
</tr>
<tr>
<td>Ischemic colitis</td>
<td>13</td>
<td>6</td>
</tr>
<tr>
<td>Stroke</td>
<td>13</td>
<td>5</td>
</tr>
</tbody>
</table>

**Length of stay**

- ICU: 10 ± 15 days
- Hospital: 20 ± 17 days

**Type IV Results**

Continued favorable results with open surgical repair of type IV thoracoabdominal aortic aneurysm.
**Clinical Outcomes**

N=178

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

**Type IV Specific Outcomes**

- 108 patients – 92% intact TAA
- 30-day mortality – 5.6%
- 1 case pplegia
- Impact of preop GFR

**TEVAR - Recent Expert Consensus**

- Op. mortality approx. 7.5% in hands of experts
- Favorable durability/freedom from reintervention
- Chronic Dissections/Marfans → Open Surgery

**Survival Advantage for Chronic Dissection**

- p=0.049
Conclusions: In patients with TAAA, blood supply to the spinal cord depends upon a highly variable collateral system.

SCI Considerations

SCI Extent I vs. II

• The importance of lumbar/pelvic collaterals, i.e. the observed SCI risk difference Extent I vs. II
• Implications for I.C. repair despite nl MEVOP in Extent II TAA

Conclusion

• Limitations on availability of total endovascular repair
• Poor experience with hybrid operations
• Open repair with current operative strategies remains “gold standard”

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