Arch Hybrid procedures are effective and durable for arch aneurysms

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Disclosure of Interest

Speaker name: Colin Bicknell

I have the following potential conflicts of interest to report:

• Medtronic: Consultancy, Speakers fees, travel and conference fees
• Orzone: Institutional level capital funding
• Bolton Medical / Vascutek: Consultancy, speaker, travel and conference fees
• Gore: Travel and conference fees
TAAs involving the arch
ARCH HYBRID PROCEDURES
ARCH HYBRID PROCEDURES
### Variable (N=55)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median age</td>
<td>67</td>
<td>38-88</td>
</tr>
<tr>
<td>Male sex</td>
<td>36</td>
<td>65.5%</td>
</tr>
<tr>
<td>ASA Grade 1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>ASA Grade 2</td>
<td>7</td>
<td>12.8%</td>
</tr>
<tr>
<td>ASA Grade 3</td>
<td>35</td>
<td>63.6%</td>
</tr>
<tr>
<td>ASA Grade 4</td>
<td>13</td>
<td>23.6%</td>
</tr>
<tr>
<td>Renal impairment (eGFR &lt;60ml/min/1.73m²)</td>
<td>14</td>
<td>25.5%</td>
</tr>
<tr>
<td>Previous aortic repair/surgery</td>
<td>18</td>
<td>32.7%</td>
</tr>
<tr>
<td>Connective tissue disorder</td>
<td>3</td>
<td>5.5%</td>
</tr>
<tr>
<td>Emergency (&lt;24hrs from presentation)</td>
<td>7</td>
<td>12.7%</td>
</tr>
<tr>
<td>Symptomatic</td>
<td>28</td>
<td>51.0%</td>
</tr>
<tr>
<td>Aortic aneurysm</td>
<td>40</td>
<td>72.7%</td>
</tr>
<tr>
<td>Acute Type B dissection</td>
<td>10</td>
<td>18.2%</td>
</tr>
<tr>
<td>Acute Type A dissection</td>
<td>1</td>
<td>1.8%</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
<td>7.3%</td>
</tr>
<tr>
<td>Mean number stents</td>
<td>2.5</td>
<td>(1-9)</td>
</tr>
<tr>
<td>Spinal drain</td>
<td>40</td>
<td>72.7%</td>
</tr>
<tr>
<td>Ishimaru landing zone (N=53)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>14</td>
<td>26.4%</td>
</tr>
<tr>
<td>1</td>
<td>19</td>
<td>35.9%</td>
</tr>
<tr>
<td>2</td>
<td>20</td>
<td>37.7%</td>
</tr>
</tbody>
</table>
IMPERIAL EXPERIENCE: PROCEDURAL

- Primary technical success achieved in 52/55 (94.5%) of cases
  - Aneurysm rupture between stages
  - Stent graft deployment failure (access)
  - Type 1a
Mortality (30D) 3.6% (2/55).
  • Elective 2.1% (1/48)
  • Emergency 14.3% (1/7)

In Hospital Mortality 9.1% (5/55)

8 complications related to extra-anatomical bypass grafts

4 Further interventions (unrelated to procedure)
Early endoleak rate
- 1a – treated with chimney and extension
- 1b – treated with extension
- Two type 2, planned subclavian occlusion
- Two type 2, under surveillance

Stroke rate
- 6/48 elective/urgent
- 2/7 emergency
REDUCTION OF STROKE RISK

Perera A, BJS 2017

Procedural Stage

EMBOLI number

Grade of Atheroma

Perera A, unpublished
FIVE YEAR SURVIVAL

Cumulative Survival vs Time (months)

<table>
<thead>
<tr>
<th>Time</th>
<th>Cumulative Survival</th>
<th>Standard Error (SE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Year</td>
<td>0.70</td>
<td>0.048</td>
</tr>
<tr>
<td>2 Year</td>
<td>0.68</td>
<td>0.069</td>
</tr>
<tr>
<td>5 Year</td>
<td>0.57</td>
<td>0.078</td>
</tr>
</tbody>
</table>

At risk patients: 55, 36, 25, 23, 11, 8
Overall mean follow-up was 74.6 months (95% CI 57.5-91.7).

Long term reintervention
- 2 type 1a endoleaks
- 6 type 1b endoleaks
- 6 type 2 endoleaks
- 2 type 3 endoleaks

Bypass patency rate of 98.7% (78/79).
ENDOVASCULAR APPROACHES

• Bolton double arch branch Imperial:
  • Technical success
  • One type A dissection and one CVA
  • No re-intervention in the short term

• Czerny 2018
  • STROKE RATE 13.3%
  • ENDOLEAK 6.7%

Orthotopic branched endovascular aortic arch repair in patients who cannot undergo classical surgery

Martin Czerny, Bartosz Rylski, Julia Morlock, Holger Schröfel, Friedhelm Beyersdorf, Bertrand Saint Lebes, Olivier Meyrignac, Fatima Mokrane, Mario Lescan, Christian Schlensak, Constatijn Hazenberg, Trijntje Bloemert-Tuin, Sue Braithwaite, Joost van Herwaarden, Herve Rousseau
ENDOVASCULAR APPROACHES

COOK inner branched device 
(38 patients)
• Early mortality and neurologic events 17.9% after learning curve
  
12 month follow up for 33 survivors
• Further 12.1% mortality, 1 stroke
• Endoleaks in 9.1%, only one type 1
• 1 branch obstruction, 1 open conversion

GORE branched endografts for distal arch aneurysms
• No stroke/death at 30 days
• 94.7% 6-month survival
• No late endoleaks
Consider in:
• Emergency
• Hostile chest
• Co-morbid patient

Useful but....
Make sure it seals!
CONCLUSIONS

• Acceptable mortality and morbidity in the short term in elective patients
• Long term re-intervention rate excellent
• Stroke remains the major complication

These data are a benchmark for totally endovascular repair to aim for but before we move to an endovascular utopia:

• In the short term we need to understand the results in those less anatomically suitable for arch branch devices and with disease in arch
• In the long term we need to understand the results over extended follow up

Until endovascular approaches are ready for prime time and suitable for all anatomies these procedures will have a place