**Endovascular Repair of Aortic Arch Pathologies; What is available/possible in the U.S. in 2018?**

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**DISCLOSURES**

- Cook Medical: Consultant, Proctor for TX2, Zenith, Alpha, Zenith Fenestrated
- Gore & Associates: Consultant

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**ISOLATED DTA LESION?**

- Degenerative Aneurysms
  - 60% in ascending aorta
  - 10% arch aneurysm
- Descending thoracic aortic aneurysm approaching arch branch vessels
- Aortic Dissections
  - 2/3 Type A, 1/3 Type B
  - Post type A repairs with residual arch, thoracoabdominal dissection

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**TYPE B DISSECTIONS**

<table>
<thead>
<tr>
<th>Median distance (mm)</th>
<th>Overall (range)</th>
<th>Group A (range)</th>
<th>Group B (range)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Innominate to LCCA</td>
<td>8.7 (5.0-18.4)</td>
<td>8.5 (5.1-12.8)</td>
<td>8.9 (5.0-18.6)</td>
<td>0.744</td>
</tr>
<tr>
<td>2. LCCA to LSCA</td>
<td>17.2 (9.3-37.2)</td>
<td>17.1 (10.3-35.1)</td>
<td>17.8 (6.3-37.2)</td>
<td>0.691</td>
</tr>
<tr>
<td>3. LCCA to IMH</td>
<td>0 (45-283.9)</td>
<td>1 (46-216.9)</td>
<td>1 (46-216.9)</td>
<td>0.002</td>
</tr>
<tr>
<td>4. LCCA to entry tear</td>
<td>35.6 (24.5-253.4)</td>
<td>20.2 (12.2-255.4)</td>
<td>36 (24.5-257.6)</td>
<td>0.627</td>
</tr>
</tbody>
</table>

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**TREATMENT OPTIONS**

- Open repair
- Hybrid repair
- Parallel grafting TEVAR
- Fenestrated/Branched TEVAR

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HYBRID REPAIRS

- Meta-analysis of total arch debranching + TEVAR
  - Type I reconstruction
    - 10.8% endoleak
    - 3.9% 30-day mortality
  - Type II reconstruction
    - 12.5% endoleak
    - 5.3% 30-day mortality
    - 2.5% stroke

Papakonstantinou et al. Heart, Lung, Circulation 2018

PARALLEL GRAFTING

- N=27 high risk pts with 32 target arch branches
  - 33% emergent cases
  - 4% 30-day mortality (N=1)
  - 100% primary branch patency at 9 months
  - 11% stroke (N=3)
  - 33% aortic reintervention (N=9)

Voskremensky et al. JVS 2017

Case 1
Potential advantages over other endovascular LSCA incorporation

- Facilitates proximal extension with fenestrated/branched arch TEVAR
- Facilitates distal extension TEVAR
- Preserves L SCA path to visceral/renal targets for fenestrated/branched EVAR

IN SITU FENESTRATION

- Systematic review 34 articles
- 58 pts with 73 fens
  - 3.4% 30-day mortality due to aorto-aerodigestive fistulae
  - 1.7% L SCA restenosis
- Needle, Stiff wire, Energy (RFA, Laser)
  - Less fabric tear with Dacron and Laser

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CASE
• 75 M underwent emergent ascending arch replacement with frozen elephant trunk procedure for type A aortic dissection
  • Antegrade deployment of 34mm x 15cm cTAG

POSTOP COURSE
• Altered mental status
• Pseudoaneurysm at the carotid BPG anastomosis
• Dissection of L CCA to proximal ICA

L CCA REPAIR
• Left CEA exposure
• Interposition graft CCA to ICA
• Bridging Viabahn Covered Stent from intrathoracic CCA to cervical CCA

POSTOP COURSE
• Dizziness, left arm, hand weakness with left arm exercise during rehab
• Duplex: retrograde flow in left vertebral artery

IN-SITU LASER FENESTRATION

BRANCHED, FENESTRATED TEVAR
**FENESTRATED TEVAR**

- Cook Arch Fenestrated
- Preloaded catheter
- N=15 high risk pts
  - 6 Post dissection
  - 9 Aneurysms
- 93% technical success
- 20% 30-day mortality
  - 1 stroke, 1 access complication, 1 MI

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**MULTIBRANCHED TEVAR**

- Cook Inner Branch
  - Custom dual branch
  - Curved delivery system
  - Bullet nose cone option
- N=27
  - 100% technical success
  - 0% 30-day mortality
  - 7.4% major stroke
  - 3.4% minor stroke
  - 7.4% transient SCI

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**MULTIBRANCHED TEVAR**

- Inoue Arch Graft
  - Custom Unibody Graft (1~3 branches)
- N=89 (64 single, 18 double, triple branches)
  - 100% technical success
  - 4.5% 30-day mortality (29% triple branches)
  - 16% stroke (33% double, 42% triple)

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**FENESTRATED TEVAR**

- Najuta Fenestrated
  - Custom precurved
  - Unreinforced fen
- N=32
  - 91% Technical Success
    - 2 RTAD, 1 Stroke, 1 SCI, 1 Celiac occlusion
  - 97% Branch Patency at 3 years

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**MULTIBRANCHED TEVAR**

- Bolton Relay Mulitbranch
  - Custom dual branch
  - Curved delivery system
  - Two internal branch cuffs for innominate and CCA
  - No pre-wire/catheters

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**SINGLE BRANCHED TEVAR**

- Medtronic Mona LSA
  - Off-the-shelf
  - Designed for zone 2
  - Requires ≥ 10mm between CCA and LSCA, ≥ 5mm LSCA and aneurysm, ≥ 20mm proximal seal
- N=9
  - 100% technical success
  - 4 minor strokes
SINGLE BRANCHED TEVAR
- Gore TBE
  - Off-the-shelf: 8mm, 12mm inner portal
- N=22
  - Zone 2 with LSCA branch stent
  - 100% technical success
  - 0% 30-day mortality, stroke, SCI
- 100% branch patency @ 1mo
- Multi-center Pivotal Trial
  - Including Zone 0,1,2
  - Dissection, Aneurysm, Transection

CASE

Persistent chest pain- Repeat CTA 2 days later

Plan
- TAC084015C
- BND141I2C

31mm
Hybrid repair allows proximal extension of seal zone

Parallel grafting TEVAR and In-situ Fenestrated TEVAR enables total endovascular arch repair in urgent settings

Fenestrated, Branched TEVAR rapidly evolving technology

CONCLUSIONS

THANK YOU!

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