Aortic Arch Hybrid Repair
With Supra-Aortic Trunks Re-routing:
Current Indications, Long-Term Results
And Complication Management In Patients
With Degenerative Aneurysms And Dissections

Y Tshomba, R Chiesa
Vascular Surgery, Università “Vita-Salute”
San Raffaele Scientific Institute, Milano - Italy

Open aortic arch repair
Contemporary series (647 patients)

- Mortality: 10.8%
- Stroke: 10.6%

Endovascular aortic arch repair
Contemporary series

- De-branching
- 2-3 Incisions
- 38 pts. 10 centers
- Mortality: 13%
- Cerebrovascular Complications: 15%
- Other Complications: 18%

Disclosures
Lecturer at symposia hosted by Cook, Inc., Bolton Medical, Jotec® s.r.l., Medtronic, Inc., W.L. Gore and Associates, TriVascularTM, Cordis Corporation, Maquet Getinge Group
Hybrid aortic arch repair

Main concept

- Surgical supra-aortic vessels rerouting
- Stent-graft repair of aortic arch aneurysm

Hybrid repair: current outcomes

Literature review (2001-2014)

581 patients

- Mean mortality: 7.9%
- Mean stroke: 5.9%

Hybrid aortic arch: OSR 208 pts

2001-2015

Zone 0
61 cases

Zone 1
39 cases

Zone 2
108 cases

Ishimaru classification

Zone 0
61 cases

Degenerative
172 cases

TBD
27 cases

Residual TAD
9 cases

Etiology

Zone 0

Coverage of all supra-aortic vessels

Tailored revascularizations

Mainly “Y” graft

Bovine arch

Trifucated graft

Right sided arch

Tailored
**Zone 0**
- Adjuncts

**EEG debranching**
- Rapid pacing deployment
- TEE dissection

**Perioperative results**

<table>
<thead>
<tr>
<th>Zone</th>
<th>Zone 0 (n=61)</th>
<th>Zone 1 (n=39)</th>
<th>Zone 2 (n=108)</th>
<th>Arch (n=208)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality</td>
<td>6.5%*</td>
<td>5.1%**</td>
<td>1.8%***</td>
<td>4.0%</td>
</tr>
<tr>
<td></td>
<td>(4)</td>
<td>(2)</td>
<td>(2)</td>
<td></td>
</tr>
<tr>
<td>Stroke</td>
<td>4.9% (3)</td>
<td>2.6% (1)</td>
<td>1.8% (2)</td>
<td>3.0%</td>
</tr>
<tr>
<td>Spinal cord ischemia</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>1.8% (2)</td>
<td>1.0%</td>
</tr>
</tbody>
</table>

* 3 cases of stroke; 1 case of retrograde dissection
** 1 case of bleeding, 1 case of AAA rupture
*** 1 case of MOF and 1 intraoperative migration

**OSR Stroke pathogenesis**
- Stroke rate: 3.0%

- Shaggy aorta: 3 cases
- Heavily calcified: 2 case
- Floating thrombus: 1 case

**OSR Stroke pathogenesis**

**Stroke - localization**
- Fatal: 67%

- Hemispheric: 2 case
- Cerebellar: 4 cases

**Prevention strategy #1**
- Shaggy aorta ➔ Controindication
**Prevention strategy #2**

Occlude or ligate all supra-aortic trunks before endo-manipulation

Melissano, Tshomba, [...], & Chiesa. Eur J Vasc Endovasc Surg 2012

**Midterm clinical success**

Follow-up 29 ± 20 months

<table>
<thead>
<tr>
<th>Zone</th>
<th>Zone 1</th>
<th>Zone 2</th>
<th>Arch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone 0</td>
<td>Zone 1</td>
<td>Zone 2</td>
<td>Arch</td>
</tr>
<tr>
<td>(n=61)</td>
<td>(n=39)</td>
<td>(n=108)</td>
<td>(n=208)</td>
</tr>
<tr>
<td>Related mortality</td>
<td>0</td>
<td>5.3%</td>
<td>0</td>
</tr>
<tr>
<td>Open conversion</td>
<td>1.8%</td>
<td>0</td>
<td>2.9%</td>
</tr>
<tr>
<td>New onset type I EL</td>
<td>1.8%</td>
<td>10.3%</td>
<td>2.9%</td>
</tr>
</tbody>
</table>

* 2 ruptured aneurysms in zone 1
** 3 cases for retrograde dissection
*** 1 case for type III endoleak

Treated with endovascular procedures

**Late retrograde dissection**

- Male, 68 yrs
- TEVAR Zone 0 for degenerative aneurysm
- Late (3 months) acute retrograde dissection with syncope and acute chest pain


**HCA Emergent open repair**

- Aortic tear
- Graft-to-endograft anastomosis
- Y graft


**Postoperative CT scan**


**Conclusions**

- Good short and midterm results
- Ductility and "in situ" customization
- Arch-adaptable endografts
- Extended indications