ENDOVASCULAR MANAGEMENT OF VISCERAL MALPERFUSION IN ACUTE TYPE I AORTIC DISSECTION

Edward P. Chen MD
Emory University School of Medicine
Atlanta, Georgia
Disclosure

Edward P. Chen, MD

✓ I do not have any potential conflict of interest
Background

- Acute Type A Aortic Dissection complicated by mesenteric malperfusion (ATAMM)
  - Rare: 3-6%
  - High mortality: 38-75%
  - Independent predictor for mortality (OR 3.0-9.5)
Acute Type I AD with Mesenteric Malperfusion: Etiology of the Problem

- Massive TL compression in DTA and Abdominal Aorta due to dynamic flap
- Inflow problem to the distal aorta
- Insufficient flow to Celiac and SMA vascular beds
- High association with renal and ileofemoral malperfusion
This is a problem....
Background

• Traditional Surgical Strategy
  1. Asc/Arch using HCA
  2. Exploratory laparotomy
     • Possible bowel resection
Emory Algorithm for acute Type I AD with Mesenteric Malperfusion

**Diagnosis**

- If Hemodynamically stable and:
  - NO Pericardial effusion
  - NO Ongoing chest pain
  - NO Signs of rupture
  
  **TEVAR 1st** with angiographic evidence of Celiac and SMA reperfusion
  
  ICU Resuscitation/Reperfusion
  
  Resolution of abdominal pain and lactic acidosis
  
  Delayed proximal aortic replacement in 24 hours

- If Hemodynamically unstable or signs of rupture
  
  Emergent proximal aortic replacement +Pre-CPB Ax-Bifemoral bypass +Antegrade TEVAR

- Persistent abdominal pain and lactic acidosis
  
  Exploratory laparotomy NO Aortic surgery
53 yo morbidly obese female presents to an OSH with severe abdominal and right leg pain
- Transferred to Emory
- On arrival, complaining of abdominal pain
- PE
  - ABD: Soft, tender to palpation in the epigastrum
  - Cool, pulseless right leg
- Cr. 2.1
- “Pain out of proportion” to exam
Stage I: TEVAR + Peripheral Stent

- Hybrid room
- Open exposure of R femoral artery (pulseless)
- 5 Fr Sheath in L CFA
- Pressure Measurements
  - R Radial (Thoracic TL)
  - ABD TL
  - Femoral arteries
    - Right: 45/28 mm Hg
    - Left: 117/60 mm Hg

Physiologic Proof of Mesenteric Malperfusion
Type A with Mesenteric Malperfusion: IVUS

- Thoracic+ABD Aorta
- Visceral segment
Type A with Mesenteric Malperfusion: Aortograms
Post-TEVAR Angiograms: Robust visceral perfusion/right renal malperfusion
Type A with Mesenteric Malperfusion: Post-TEVAR IVUS

- Thoracic + ABD Aorta
- Visceral Segment
Post-TEVAR Hemodynamics

- ABD TL: 101/52 mmHg
- R femoral
  - Palpable pulse
  - Pressure: 101/52 mm Hg

Malperfusion Resolved:
Angiographic and Physiologic
Stage II: ICU Resuscitation and Reperfusion

- Extubated
- Neurologically intact
- 6 liters of IV fluid
  - Normalization of Lactate level
- 24 hours later, Proximal aortic replacement
  - Anxious time period
  - Keep pain free
  - SBP<120-140 mm Hg
Stage III: Proximal aortic replacement

- Aortic root replacement
  - 6cm root aneurysm
- Ascending aortic replacement
- Subtotal arch replacement
  - Large arch tear in Zone 2
  - Distal anastomosis at LSA
  - Reimplanted Innominate and LCCA
  - DID NOT SEW to TEVAR graft
## Operative Results

<table>
<thead>
<tr>
<th></th>
<th>Asc/Lap (n=13)</th>
<th>Ax-Bifem/Asc (n=3)</th>
<th>Asc/TEVAR (n=5)</th>
<th>TEVAR-1st (n=10)</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPB (min)</td>
<td>151±32†</td>
<td>208±37</td>
<td>214±71†</td>
<td>263±98†</td>
<td>0.046*</td>
</tr>
<tr>
<td>X-Clamp (min)</td>
<td>90±20</td>
<td>131±82</td>
<td>144±55</td>
<td>178±78</td>
<td>0.056</td>
</tr>
<tr>
<td>HCA (min)</td>
<td>33±10</td>
<td>36±7</td>
<td>37±18</td>
<td>43±15</td>
<td>0.530</td>
</tr>
<tr>
<td>Bladder temp at HCA (°C)</td>
<td>25±4.4</td>
<td>25±3.5</td>
<td>26±4.2</td>
<td>27±1.6</td>
<td>0.510</td>
</tr>
<tr>
<td>Hemiarthc</td>
<td>13 (100)</td>
<td>2 (100)</td>
<td>4 (80)</td>
<td>8 (80)</td>
<td>0.355</td>
</tr>
<tr>
<td>Root replacement</td>
<td>0</td>
<td>1 (33)</td>
<td>1 (20)</td>
<td>2 (20)</td>
<td>0.083</td>
</tr>
<tr>
<td>Length of TEVAR (mm)</td>
<td>n/a</td>
<td>n/a</td>
<td>150±32</td>
<td>211±55</td>
<td>0.028*</td>
</tr>
<tr>
<td>Renal failure</td>
<td>8 (62)</td>
<td>2 (67)</td>
<td>4 (80)</td>
<td>2 (20)</td>
<td>0.059</td>
</tr>
<tr>
<td>Bowel necrosis/resection or postoperative acidosis</td>
<td>10 (77)†</td>
<td>0</td>
<td>4 (80)</td>
<td>0†</td>
<td>&lt; 0.001*</td>
</tr>
<tr>
<td>Mortality</td>
<td>9 (69%)</td>
<td>0</td>
<td>4 (80)</td>
<td>3 (30%)</td>
<td>0.108</td>
</tr>
</tbody>
</table>
“TEVAR-First” Approach to Type A with Mesenteric Malperfusion

- Avoidance of circulatory arrest to ischemic visceral organs!!
- Bridge to decision making
- Improved outcomes in early experience