Blunt Abdominal Aortic Injury: Incidence, Etiology, Diagnosis And Treatment

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Disclosures

- Endologix – Consultant, Research

A rare injury or rarely survived?

Nonpenetrating Traumatic Injury of the Aorta


- Circulation, 1958.
- AFIP Autopsy Study – 296 aortic-related deaths
  - 275 complete transections
  - 21 lacerations
  - 15% alive immediately following injury
  - 1 patient survived!

Demographics (1958)

- Young male population
- Mechanisms: Top 3
  - Automobile
  - Auto vs Pedestrian
  - Falls
- 80% - Concomitant Injuries that would have resulted in death (Competing Injuries)

Distribution of Injuries

<table>
<thead>
<tr>
<th>Site of rupture</th>
<th>Isolated aortic rupture</th>
<th>Combined with cardiac injury</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ascending aorta</td>
<td>17</td>
<td>47</td>
<td>64</td>
</tr>
<tr>
<td>Arch</td>
<td>16</td>
<td>6</td>
<td>22</td>
</tr>
<tr>
<td>Isthmus</td>
<td>95</td>
<td>20</td>
<td>124</td>
</tr>
<tr>
<td>Thoracic aorta</td>
<td>85</td>
<td>9</td>
<td>94</td>
</tr>
<tr>
<td>Abdominal aorta</td>
<td>11</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td>Multiple sites</td>
<td>5</td>
<td>19</td>
<td>24</td>
</tr>
<tr>
<td>Totals</td>
<td>171</td>
<td>104</td>
<td>275</td>
</tr>
</tbody>
</table>

Mechanisms of Blunt Abd Injury

- Blunt Force Theories:
  - Direct Force - Seat-Belt Aorta
  - Acceleration or Deceleration – MVA/Plane Crashes
  - Distraction/Shear/Compression – Spine Fractures
  - Blast - Intravascular Pressure Elevation
Blunt abdominal aortic injury

- UW – Largest Single Center Experience
- 28 patients – 1996-2010
- 2 patients/ year
- 0.07% of all blunt trauma evaluations
- Mortality 32%

Starnes Classification

- Minimal Intimal Tear <10mm, absence of aortic contour abnormality
- Large Intimal Flap >10mm, absence of aortic contour abnormality
- Pseudoaneurysm
- Rupture

Type of Injury vs Management Strategy

- Minimal intimal tear: Nonop Favorable
- Large intimal flap: Nonop Favorable
- Pseudoaneurysm: Endo or Open
- Rupture: Open or Hybrid

Associated Injury Rates

- Closed Head Injuries – 21%
- Spine Fracture – 50%
- Small Bowel – 39%
- Colon – 39%
- Pelvic Fractures – 32%

Management

- Medical Therapy & Surveillance
- Enthusiastic
- Open
- Endo

Distribution

- Zone 1: 5(18%) 2 ruptures
- Zone 2: 3(11%) 3 ruptures
- Zone 3: 20(71%) 3 ruptures
Mortality

Zone 1
- 60% 2 ruptures
- 5 (18%) 2 ruptures

Zone 2
- 100% 3 ruptures

Zone 3
- 15% 20 (71%) 3 ruptures

BAAI – Western Trauma Association

- 12 Trauma centers
- 0.03% Trauma admissions
- Presented with free rupture 38%
- Mortality was 39%, 68% in 24 hrs
- Zone II – 92% mortality
- 89% Intimal tears – non-op therapy
- 92% Aortic ruptures – open therapy

Focal Intimal Flap
- 7 days post-injury

Pseudoaneurysm

Supraceliac Balloon Placement

Lessons learned
- Extremely rare and lethal injury pattern 0.5-2 patients/year
- Non-operative therapy is favorable for intimal injuries
- Most deaths occur within the first 24 hours
- Most ruptures demand open therapy or a hybrid approach to therapy