New Developments In The Treatment Of Blunt Aortic Trauma: Is There Any Role For Open Surgery: Is Traumatic Intramural Hematoma Real And How Should It Be Treated

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Traumatic Aortic Injury (TAI): Epidemiology

- 2nd - cause of death
- Majority - MVC
- Rapid deceleration


Memorial Hermann TMC

- Level 1 trauma center
- Adult and pediatric
- >60,000 ER visits / yr
- >18,000 Trauma visits / yr
- >6000 Trauma admissions / yr
- Life Flight® air ambulance

Blunt traumatic aortic injury: Initial experience with endovascular repair

Modern Imaging
Methods

September 1999 – December 2014
76411 patients

331 (0.4%)
Admit TAI

40 (12%)
Survive w/o OR

106 (32%)
Died Admit

185 (56%)
Reported

Methods

331 Blunt Thoracic Aortic Injury
Median Age: 38 (13 – 91)

♂ 70%
♀ 30%

Mean ISS 40.2 ± 10.3

SOCIETY FOR VASCULAR SURGERY® DOCUMENTS


W. Andrew Lee, MD, L. J. J. Ajani, MD, M. H. Laharam, MD, R. Scott Hitchcock, MD, Mark A. Lederer, MD, l

The Society for Vascular Surgery® pursues development of clinical practice guidelines for the management of traumatic thoracic aortic injury to guide vascular surgeons in the treatment of patients. Individuals involved in the development of these guidelines are members of the Society for Vascular Surgery® and are representatives of the Society and its committees. The Society for Vascular Surgery® wishes to disseminate these guidelines to all vascular surgeons to make them aware of the current evidence for the treatment of traumatic thoracic aortic injury. These guidelines are intended for use in the United States and are current as of the date of publication.

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Methods

185 Repairs

- 13 (7%) Open-Clamp
- 6 (3%) CPB for Arch
- 59 (32%) Open-DAP
- 103 (56%) TEVAR

Mortality and Morbidity by Procedure

<table>
<thead>
<tr>
<th>Total=181</th>
<th>Open-Clamp N=13</th>
<th>Open-DAP N=59</th>
<th>Open-CPB N=6</th>
<th>TEVAR N=103</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paraplegia</td>
<td>3 (23%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>NS</td>
</tr>
<tr>
<td>Stroke</td>
<td>1 (8%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>2 (2%)</td>
<td>NS</td>
</tr>
<tr>
<td>Mortality</td>
<td>2 (15.4%)</td>
<td>3 (5.1%)</td>
<td>4 (66%)</td>
<td>5 (4.9%)</td>
<td>NS</td>
</tr>
</tbody>
</table>

* 4 unknown

Actuarial Survival

Mission Statement

- To improve outcomes of patients with traumatic aortic injury (TAI) through education and research.
- Structure:
  - Non-profit 501(c)(3) organization
  - Board of Directors
  - Multispecialty Medical Advisory Board

aortictrauma.org

Retrospective Multicenter Study

- ATF
- 9 ACS level 1 trauma centers
- 2008-2013
- 453 pts
- AAST Fall 2014
- J Trauma 2015
Injuries Identified

**SVS Injury Grade**  
Grade I, n (%) 94 (24.6%)  
Grade II, n (%) 68 (17.8%)  
Grade III, n (%) 192 (50.3%)  
Grade IV, n (%) 28 (7.3%)

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Independent predictors of all-cause and aortic-related mortality among BTAI patients

<table>
<thead>
<tr>
<th>Variable</th>
<th>Adjusted Odds Ratio (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All-cause mortality</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISS (continuous)</td>
<td>1.06 [1.02 - 1.09]</td>
<td>0.0006</td>
</tr>
<tr>
<td>Nonoperative Management</td>
<td>20.47 [8.02 - 52.23]</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>SVS Grade (linear continuous)</td>
<td>2.45 [1.55 - 3.87]</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Admission Glasgow Coma Score</td>
<td>0.88 [0.83 - 0.95]</td>
<td>0.0007</td>
</tr>
<tr>
<td>PRBC’s required over 1st 24 hours</td>
<td>1.10 [1.04 - 1.17]</td>
<td>0.0015</td>
</tr>
<tr>
<td><strong>Aortic-related mortality</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISS (continuous)</td>
<td>1.07 [1.01 - 1.14]</td>
<td>0.0152</td>
</tr>
<tr>
<td>SVS Grade (linear continuous)</td>
<td>17.18 [3.99 - 73.99]</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>TEVAR (dichotomous)</td>
<td>0.21 [0.05 - 0.88]</td>
<td>0.0331</td>
</tr>
<tr>
<td>AIS Chest (continuous)</td>
<td>0.41 [0.28 - 0.57]</td>
<td>0.0239</td>
</tr>
</tbody>
</table>

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ATF Survey

- SVS  
- AAST  
- STS  
- SIR

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Q11: If presented with a hemodynamically stable patient with a confirmed ISOLATED BTAI SVS Grade I Injury (intimal tear only), what is your primary treatment of choice?

- Observation (4%)
- Medical therapy (63%)
- Open repair (11%)
- Thoracic endovascular aortic repair (11%)
- Other (4%)

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Q12: If presented with a hemodynamically stable patient with a confirmed ISOLATED BTAI SVS Grade II Injury (intramural hematomas), what is your primary treatment of choice?

- Observation (4%)
- Medical therapy (39%)
- Open repair (22%)
- Thoracic endovascular aortic repair (24%)
- Other (3%)

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ATF Survey
Areas of Controversy/Future Research

- Management of intramural hematoma (Grade 2)
- Timing of repair (Urgent vs. emergent)
- Prioritizing repair of associated injuries (TBI)
- Optimal follow-up imaging regimen
- Updated multispecialty consensus on diagnosis and treatment
- Predictors of delayed rupture
- ATF prospective registry for BTAI to examine long term outcomes

What We Have Learned: (1999-2015)

- Classification of TAI has prognostic significance
- Medical TX for Grade I
- Controversy in management of Grade 2
- TEVAR is SOC for all anatomically suitable patients with Grade 3&4

Thank You