Update On An Improved Classification System, TEVAR Devices And Techniques For Blunt Thoracic Aortic Injury (BTAI)

Ali Azizzadeh, MD
Professor & Chief
Program Director in Vascular Surgery
Department of Cardiothoracic and Vascular Surgery
McGovern Medical School
The University of Texas Science Center at Houston
Memorial Hermann Heart & Vascular Institute

Disclosure

- Consultant
  - WL Gore
  - Medtronic

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

Classification of Traumatic Aortic Injury

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Intimal Tear</td>
<td>Med TX</td>
</tr>
<tr>
<td>II</td>
<td>Intramural Hematoma</td>
<td>TEVAR / OR</td>
</tr>
<tr>
<td>III</td>
<td>Pseudoaneurysm</td>
<td>TEVAR / OR</td>
</tr>
<tr>
<td>IV</td>
<td>Rupture</td>
<td>TEVAR / OR (Emergent)</td>
</tr>
</tbody>
</table>

Treatment Algorithm

- Grade I: Intimal Tear: Med TX
- Grade II: Intramural Hematoma: TEVAR / OR
- Grade III: Pseudoaneurysm: TEVAR / OR
- Grade IV: Rupture: TEVAR / OR (Emergent)

W. Andrew Lee, MD; Yip S. Minozama, MD; R. Aaron Mitchell, MD; Mark A. Farkas, MD; Ben R. Greeneberg, MD; Ali Atkinson, MD; Mohanad Khanea Moula, MD; ARUP; and Brenton M. Shuman, MD. East Carolina, West Virginia, Ohio, and Philadelphia, PA.

The Society for Vascular Surgery® pursued development of clinical practice guidelines for the management of traumatic thoracic aortic injury (TAAI) with emphasis on endovascular repair. A multidisciplinary panel of experts including vascular surgeons, interventional radiologists, emergency medicine physicians, anesthesiologists, and critical care specialists reviewed the available evidence and developed guidelines for the management of TAAI. These guidelines have been developed to provide a framework for decision-making to assist health care providers in the management of patients with TAAI. This document has not been peer-reviewed by the Society for Vascular Surgery®.

Retrospective Multicenter Study

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

SVS Grade I - II

- No difference in outcomes for patients treated with NOM vs. TEVAR for "Minimal BTAI" (SVS Grade I – II injuries)
- SVS presently suggests treatment for SVS Grade II injuries
- More investigation needed in this subgroup

Injuries Identified

SVS Injury Grade

<table>
<thead>
<tr>
<th>Grade</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>94 (24.6%)</td>
</tr>
<tr>
<td>II</td>
<td>68 (17.8%)</td>
</tr>
<tr>
<td>III</td>
<td>192 (50.3%)</td>
</tr>
<tr>
<td>IV</td>
<td>28 (7.3%)</td>
</tr>
</tbody>
</table>

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>All-cause mortality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISS (continuous)</td>
<td>1.04 (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>2.48 (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>
</tbody>
</table>

Aortic-related mortality

<table>
<thead>
<tr>
<th>Variable</th>
<th>Adjusted Odds Ratio (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<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>17.16 (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>6.41 (1.28 - 32.11)</td>
<td>0.0239</td>
</tr>
</tbody>
</table>

SVS Grade I - II
Once the diagnosis of BTAI has been made, what decision aid do you utilize to determine which patients require aortic repair?

- Society for Vascular Surgery (SVS) guidelines: 27.39% (109)
- Institution-specific guidelines: 12.8% (51)
- Personal knowledge of the literature and experience: 50.50% (201)
- Other (please specify): 9.30% (37)

Total Respondents: 399

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

- Observation alone without medical therapy: 0.76% (3)
- Medical therapy & blood pressure control: 46.60% (165)
- Open repair: 0.00% (0)
- Thoracic Endovascular Aortic Repair (TEVAR): 46.55% (164)
- Other (please specify): 6.30% (25)

Total Respondents: 397

Non-Operative Management?

New Classification?

Call for a new classification system and treatment strategy in blunt aortic injury

Rafael E. Moutinho, MD, Babuvar Anvari, MD, Edna Quiroga, MD, Harvey E. Green, MD, Nina Singh, MD, and Benjamin M. Storrow, MD, mph, Iowa City, Ia.
Determinants and Outcomes of Non-operative Management of Blunt Traumatic Aortic Injuries


ATF International Multicenter Prospective BTAI Registry

- Multispecialty consensus on diagnosis and treatment
- Predictors of early rupture
- Establish natural history & outcomes
- Collaboration AAST
- Centralized, online data reporting

Summary

- Prognosis: Classification of TAI
- Medical TX: Grade I
- Controversy in management of Grade II
- Repair: Grade III-IV
- TEVAR is SOC
- Prospective registry in progress

Thank You

aortictrauma.org
aortictraumafoundation@yahoo.com