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A – Open and Endovascular Aortic Repair

Publishing Title:
Risk Factors for Mortality After Endovascular Repair for Traumatic Thoracic Aortic Injury

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Abstract Body:

Objective(s): Despite high utilization of endovascular repair, traumatic thoracic aortic injury leads to significant mortality. We sought to identify risk factors and create a risk predictive model for mortality after thoracic endovascular aortic repair (TEVAR) based on available preoperative clinical data.

Methods: We queried the Vascular Quality Initiative (VQI) TEVAR dataset from 4/2011-11/2017 to identify patients with trauma as the indication for repair. Patient characteristics, injury grade, timing of repair, and technical aspects including left subclavian artery (LSCA) involvement and coverage were evaluated. Logistic regression was used to identify univariate predictors of the primary outcome of in-hospital mortality. A multivariate model was constructed to predict in-hospital mortality after TEVAR for traumatic aortic injury. The model was tested as a prediction tool and internally validated using both a 33% split-sample and 10-fold cross-validation approach.

Results: We identified 658 TEVAR cases performed for trauma at 82 centers (7.2% of all VQI
TEVAR cases). The majority of patients were male (73.6%) with median age 38 (range 12-90). The most common mechanism was blunt injury (95.0%). Though 18.6% documented zone 2 or proximal involvement, 28.3% documented involvement or treatment of the LSCA. 8.9% of repairs were performed for a grade 1 injury, with an increase from 4.2% in 2015 to 15.9% in 2017. The overall in-hospital mortality rate was 7.1%. Adjusting for confounders, independent predictors of mortality (Table) were age ≥60, creatinine ≥1.2, Glasgow Coma Scale score <15, male gender, LSCA involvement (but not whether it was covered), and concomitant facial trauma (but not head/neck trauma). The model predicted in-hospital mortality with a C-statistic of 0.86, adjusted downward to 0.83 by split-sample validation and 0.81 by cross-validation.

Conclusions: Given the availability of endovascular repair, there appears to be a trend toward treatment of milder-grade thoracic injuries in the VQI. The most significant risk factors of mortality include age, male gender, renal impairment, LSCA involvement, and select concomitant injuries. A model based on these variables robustly predicts in-hospital mortality and may assist in appropriate patient selection and risk stratification.

Table: Preoperative Risk Factors for In-Hospital Mortality

<table>
<thead>
<tr>
<th>Variable</th>
<th>OR</th>
<th>95% CI</th>
<th>Beta</th>
<th>SE</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age ≥60</td>
<td>9.33</td>
<td>4.51 - 19.32</td>
<td>2.23</td>
<td>0.37</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Cr ≥1.2</td>
<td>4.67</td>
<td>2.24 - 9.76</td>
<td>1.54</td>
<td>0.38</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>GCS &lt;15</td>
<td>2.71</td>
<td>1.11 - 6.63</td>
<td>1.00</td>
<td>0.46</td>
<td>.03</td>
</tr>
<tr>
<td>Male</td>
<td>2.62</td>
<td>1.03 - 6.66</td>
<td>0.96</td>
<td>0.48</td>
<td>.04</td>
</tr>
<tr>
<td>LSCA Involved</td>
<td>2.48</td>
<td>1.24 - 4.97</td>
<td>0.91</td>
<td>0.35</td>
<td>.01</td>
</tr>
<tr>
<td>Facial Trauma</td>
<td>2.45</td>
<td>1.10 - 5.42</td>
<td>0.89</td>
<td>0.41</td>
<td>.03</td>
</tr>
<tr>
<td>Intercept</td>
<td>--</td>
<td>--</td>
<td>-6.33</td>
<td>0.74</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

Author Disclosure Block: