Relationships of Physiologic Factors to the Progression of Acute Subdural Hemorrhage

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Disclosure

- No disclosures.
Introduction

Background
▪ Subdural hemorrhage (SDH) constitutes more than 12% of traumatic brain injuries (Servadei 2000).
▪ Most research has been conducted on intracranial hemorrhage as a general category. There is a dearth of literature on SDH progression in isolation, despite the fact that isolated SDH is associated with worse outcomes than other forms of traumatic hemorrhage (Lee 2017).

Objective
▪ This study seeks to quantify the associations of various factors with progression of acute SDH.
Methods

Data Acquisition
- 117 patients with acute SDH admitted to Rhode Island Hospital in 2010 were selected retrospectively from the trauma registry.
- SDH volumes at multiple locations and midline shifts were measured by CT.

Statistical Analysis
- Change in SDH volume was used as the dependent variable.
- The best linear models were selected using Akaike’s information criterion (ΔAIC = 2) and were used to construct a weighted multimodel to determine p-values and predictor weights.
Change in SDH Volume (cm³)
Results

All Independent Variables
- Sex
- Age
- Systolic blood pressure
- Absolute platelet count
- Blood alcohol concentration
- Initial SDH volume
- Midline shift distance
- Time between scans
- Anticoagulant use
- Presence of intraparenchymal hemorrhage
- Presence of subarachnoid hemorrhage
- Presence of epidural hemorrhage
- Platelet transfusion
- Externalized ventricular drain placement

Removed Variables
- Sex
- Age
- Absolute platelet count
- Blood alcohol concentration
- Time between scans
- Presence of intraparenchymal hemorrhage
- Externalized ventricular drain placement
<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>95% CI</th>
<th>p-value</th>
<th>Predictor Weight (w)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic Blood Pressure (mmHg)</td>
<td>0.071</td>
<td>[0.0073, 0.14]</td>
<td>0.03†</td>
<td>0.73</td>
</tr>
<tr>
<td>Anticoagulant/Antiplatelet Use</td>
<td>3.3</td>
<td>[-2.0, 8.7]</td>
<td>0.23</td>
<td>0.60</td>
</tr>
<tr>
<td>Epidural Hemorrhage (Present)</td>
<td>0.78</td>
<td>[-3.5, 5.1]</td>
<td>0.72</td>
<td>0.26</td>
</tr>
<tr>
<td>Subarachnoid Hemorrhage (Present)</td>
<td>4.0</td>
<td>[0.45, 7.6]</td>
<td>0.03†</td>
<td>0.77</td>
</tr>
<tr>
<td>Initial SDH Volume (cm³)</td>
<td>0.19</td>
<td>[0.10, 0.27]</td>
<td>&lt;0.001†</td>
<td>&gt;0.99</td>
</tr>
<tr>
<td>Initial Midline Shift (cm³)</td>
<td>-2.2</td>
<td>[-3.1, -1.3]</td>
<td>&lt;0.001†</td>
<td>&gt;0.99</td>
</tr>
<tr>
<td>Platelet Transfusion (Performed)</td>
<td>-14.2</td>
<td>[-21.9, -6.5]</td>
<td>&lt;0.001†</td>
<td>&gt;0.99</td>
</tr>
</tbody>
</table>

Variables present in overall multimodel (constructed from top 3 models).

†Statistically significant following Benjamini-Hochberg procedure with $q = 0.05$. 
Discussion

▪ Removed variables were not found in any of the top models.
▪ Platelet transfusion was negatively associated with expansion, providing a potential means for physicians to intervene in this disease process.
▪ The positive association between systolic blood pressure and expansion is possibly due to increased pressures counteracting the clotting process.
▪ The presence of subarachnoid hemorrhage was found to have a positive association with expansion, possibly due to association with more severe trauma.
▪ We hypothesize that the negative association between initial midline shift and expansion may be due to a tamponade effect.
Summary

- While we have identified variables associated with hemorrhagic expansion, our analysis does not demonstrate the mechanisms underlying these outcomes.

- Therapeutic platelet administration may provide benefit in SDH patients, but further prospective work is needed to substantiate this association.