BIS Score Predicts Transfusion Needs and Failure of NOM in Pediatric Blunt Liver and Spleen Injury

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BACKGROUND
Non-operative management (NOM), including blood transfusions, is the standard of care in the majority of pediatric patients with blunt liver and spleen injury (BLSI). A reliable bedside score to predict the need for blood transfusion and failure of NOM in pediatric trauma patients with BLSI has yet to be developed.

Our team at CHCO developed the BIS score, which has been shown to predict the need for massive transfusion.

We hypothesized that the BIS score would reliably predict both the need for blood transfusion and failure of NOM in pediatric trauma patients with BLSI.

METHODS
We identified all highest-level pediatric trauma activations admitted to CHCO between 2009-2018. BIS scores were calculated as shown in the table above. Receiver operating curves (ROC) were generated for BIS scores of ≥ 1 and ≥ 2. Sensitivity, specificity, and AUC for each score were calculated to predict need for blood transfusion and failure of NOM.

RESULTS
Four hundred and seventy-seven pediatric patients with BLSI
19.9% (95) received a blood transfusion
6.7% (32) failed NOM

<table>
<thead>
<tr>
<th>BIS scores</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>AUC ROC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood Transfusion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIS ≥ 1</td>
<td>96%</td>
<td>48%</td>
<td>0.81</td>
</tr>
<tr>
<td>BIS ≥ 2</td>
<td>87%</td>
<td>88%</td>
<td>0.70</td>
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<tr>
<td>Failure of NOM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIS ≥ 1</td>
<td>97%</td>
<td>16%</td>
<td>0.72</td>
</tr>
<tr>
<td>BIS ≥ 2</td>
<td>96%</td>
<td>41%</td>
<td>0.70</td>
</tr>
</tbody>
</table>

The novel BIS score is a reliable bedside scoring tool that is sensitive at identifying pediatric patients with BLSI, who are at risk for blood transfusion and failure of NOM.

A BIS score ≥1 was the best predictor of both the need for blood transfusion (Sensitivity= 96%, AUC of 0.81) and failure of NOM (Sensitivity=97%, AUC 0.72).

IMPLICATIONS
- This research demonstrates that like adults, pediatric patients with BLSI with concomitant shock, acidosis, and coagulopathy are more likely to require early trauma interventions.
- The BIS score is non-weighted and simple to calculate at the bedside compared to other scoring systems.
- The BIS score may be utilized in the evaluation of pediatric trauma patients with BLSI to predict the need for blood transfusion and help identify those at risk of failure of NOM.

DISCLOSURES
No Disclosures