Assessment of the Accuracy of Blood Loss Measurements during Cesarean Deliveries

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INTRODUCTION

• The most common way of quantifying blood loss during cesarean deliveries was through visual estimation, or Estimated Blood Loss (EBL).
• The California Maternal Quality Care Collaborative1 and American College of Obstetricians and Gynecologists2 have recommended the use of Quantitative Blood Loss (QBL) method because it is considered more accurate than visual estimation in measuring blood loss.3,4
• Not all studies agree, with Wesley et al.5 questioning its utilization and/or superiority to EBL during cesarean deliveries.

AIMS

• To assess if QBL is superior to EBL in quantifying blood loss during cesarean deliveries in comparison to Calculated Blood Loss (CBL).
• Determine the sensitivity and specificity of EBL and QBL in comparison to CBL for predicting hemorrhage.

METHODS

• Quality improvement study that retrospectively reviewed all cesarean deliveries in one urban teaching hospital between 12/1/2018-12/1/2019 who had both EBL and QBL recorded.
• EBL was documented by the anesthesia team, while QBL was documented by nursing staff.
• CBL, identified as our gold standard for identifying postpartum hemorrhage, was calculated as:

  CBL = Calculated blood volume x Percent of blood volume lost

  - Calculated blood volume = 0.75 x (maternal height (inches) x 50) + (maternal weight (pounds) x 25)
  - Percent of blood volume lost = (Predicted delivery hematocrit - postdelivery hematocrit) / Predicted delivery hematocrit

• The sensitivity, specificity, positive predictive value, and negative predictive value of both QBL and EBL in detecting postpartum hemorrhage (≥1,000 ml) were calculated and compared to CBL.
• Wilcoxon signed-rank test was used to compare QBL and EBL to CBL.

RESULTS

Figure 1. Flowchart for inclusion in final cohort.

Table 1. Number of hemorrhages detected by method.

<table>
<thead>
<tr>
<th>Method</th>
<th>Number of Hemorrhages Detected</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBL (gold standard)</td>
<td>211</td>
</tr>
<tr>
<td>EBL</td>
<td>55</td>
</tr>
<tr>
<td>QBL</td>
<td>65</td>
</tr>
</tbody>
</table>

Figure 2. Distribution of blood loss values.

Table 2. Comparison of blood loss methods.

<table>
<thead>
<tr>
<th>Method</th>
<th>Blood loss, median (IQR)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBL, mL</td>
<td>929.4 (551.5-1351.5)</td>
<td>Ref</td>
</tr>
<tr>
<td>EBL, mL</td>
<td>600.0 (500.0-800.0)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>QBL, mL</td>
<td>557.0 (350.0-424.0)</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

Table 3. Diagnostic tests*

<table>
<thead>
<tr>
<th>Method</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
<th>PPV (%)</th>
<th>NPV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EBL</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>QBL</td>
<td>19.4 (14.1-24.8)</td>
<td>54.9 (92.2-97.5)</td>
<td>74.6 (63.0-86.1)</td>
<td>60.3 (55.6-64.9)</td>
</tr>
<tr>
<td>CBL</td>
<td>23.2 (17.5-28.9)</td>
<td>94.1 (91.3-96.9)</td>
<td>75.4 (64.9-85.9)</td>
<td>61.2 (56.6-69.9)</td>
</tr>
</tbody>
</table>

*SENSITIVITY, SPECIFICITY, PPV, AND NPV PRESENTED AS ESTIMATE (95% CI).

CONCLUSIONS

• Quantitative blood loss measurements are only slightly superior to estimated blood loss measurements in the detection of postpartum hemorrhage.
• Given the time and resources necessary to calculate QBL, this study questions its utilization and/or superiority to EBL during cesarean deliveries.

REFERENCES


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