The Esophageal Anastomotic Stricture Index (EASI) for the Management of Esophageal Atresia

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Background

- Anastomotic stricture (AS) is the most common complication following repair of EA, 20-50%
- Early predictors of AS formation have been identified, but there is a need for reliable prognostic tool to risk-stratify patients after EA repair

Methods:

- A retrospective review was conducted; 45 post-operative esophagrams were assessed between 2005-2013
- Early 2 pouch ratios, upper (U-EASI) and lower (L-EASI), were generated and evaluated:
  
  \[
  \text{U/L-EASI: } \frac{\text{Lateral d/D} + \text{Antero-posterior d/D}}{2}
  \]

  Where:  
  - \(d\) = stricture diameter;  
  - \(D\) = Upper/Lower pouch diameter, respectively

- Score performances evaluated with area under the receiver operator curves (AUC) and the Fischer’s exact test for single and multiple (>3) dilatations.
- Intra-rater and inter-rater agreement evaluated using the intraclass correlation coefficient (ICC).

Results

- 41 patients (91%) received post-operative esophagrams within 12 days
- Twenty-eight (62%) patients required dilatation, 19 received > 3 dilatations (42%).
- U-EASI and L-EASI ratios ranged from 0.17-0.70

  
  \[
  \text{Receiver Operating Characteristic Curve of the L-EASI}
  \]

  \[
  \text{Receiver Operating Characteristic Curve of the U-EASI}
  \]

  
  - ICC inter-rater agreement: 0.88 (different observers)
  - ICC intra-rater agreement: 0.91 (same observer, different time-point)

Table 1 Contingency table of L-EASI for need for dilatations

<table>
<thead>
<tr>
<th>Stricture Ratio</th>
<th>Needed dilatations</th>
<th>Did not need dilatations</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 0.30</td>
<td>8</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>&gt; 0.30</td>
<td>20</td>
<td>17</td>
<td>37</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>17</td>
<td>45</td>
</tr>
</tbody>
</table>

  
  \[
  \text{Receiver Operating Characteristic Curve of the L-EASI}
  \]

  \[
  \text{Receiver Operating Characteristic Curve of the U-EASI}
  \]

  
  - ICC inter-rater agreement: 0.88 (different observers)
  - ICC intra-rater agreement: 0.91 (same observer, different time-point)

Table 2 Contingency table of L-EASI for multiple (>3) dilatations

<table>
<thead>
<tr>
<th>Stricture Ratio</th>
<th>&gt; 3 dilatations</th>
<th>≤ 3 dilatations</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 0.30</td>
<td>7</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>&gt; 0.30</td>
<td>12</td>
<td>25</td>
<td>37</td>
</tr>
<tr>
<td>Total</td>
<td>19</td>
<td>26</td>
<td>45</td>
</tr>
</tbody>
</table>

Discussion

- Our data demonstrates that the lower stricture ratio (L-EASI) is superior in determining prognosis for an EA patient; ≤ 0.30 being correlated with requiring a course of dilatations.
- Upper pouch dilatation presumably influences chronic obstruction in utero, is not a true reflection of esophageal diameter
- Early identification of an AS increases the likelihood of treating the stricture prior to the development of dense fibrosis
- Modified algorithm for the management of AS:
- Anti-reflux prophylaxis
- Baseline esophagram on POD 5/7
- Assess EASI on POD 5/7
- Upper pouch dilatation
- Conservative management
- Corrected pH
- Esophageal pH
- Esophageal manometry
- Esophageal manometry
- Esophageal manometry
- Select References:

Conclusion

- EASI is a simple, reproducible prognostic tool for evaluation of stricture after EA repair
- Standardizes reporting of AS for further research and patient follow-up
- Selects patients for early dilatation
- Identifies patients with higher risk for stricture formation

Barium swallow: lateral view

Barium swallow: antero-posterior view

0.34 = 0.27
1.28