Development of Intestinal Metaplasia in Children With Esophageal Atresia/Tracheoesophageal Fistula

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BACKGROUND

- Children who have had surgery for an esophageal atresia/tracheoesophageal fistula (EA-TEF) are at high risk for gastroesophageal reflux disease (GERD) due to esophageal dysmotility.
- GERD occurs in 30 to 70% of children after EA-TEF repair. These children, like their adult counterparts, are at greater risk for complications of GERD, namely Barrett’s esophagus (BE).
- We used the Montreal Definition and Classification of GERD, published in 2006, which defines BE as the presence of endoscopically suspected esophageal metaplasia (ESEM) with histological evidence of metaplasia (with or without intestinal metaplasia).
- The diagnosis of intestinal metaplasia (IM) in these children is of clinical importance considering the proven risk of progression from IM to dysplasia and, eventually, to esophageal adenocarcinoma (EAC). In the adult population, the risk of developing EAC in patients with BE is 40 times higher than that of the general population, and the incidence of malignant transformation in patients diagnosed with BE is 0.5 to 1% per year.

OBJECTIVES

- In a pediatric population who have had surgery for an EA-TEF, our aim is to:
  1. Identify children with IM.
  2. Describe the clinical, endoscopic and histological factors that may be associated with the development of IM.

MATERIALS AND METHODS

- A retrospective review of the charts of children born with EA-TEF at Sainte-Justine University Health Center, Montreal, Canada, between 1997 and 2012, and followed at this hospital’s EA-TEF clinic.
- IM was diagnosed when the following two (2) criteria were both present:
  1. During endoscopy, presence of modification of the gastric mucosa above the gastric folds suggesting metaplasia (ESEM);
  2. Presence of IM on microscopic analysis of biopsy specimens.

RESULTS

- Of the 137 children evaluated, 2 (1.5%) had endoscopically suspected esophageal metaplasia with positive esophageal biopsies indicating IM.

Table 1: Clinical, Endoscopic and Histological Factors That May Be Associated With the Development of IM in Two (2) Children Diagnosed With IM

<table>
<thead>
<tr>
<th>Clinical, Endoscopic and Histological Factors</th>
<th>Patient A</th>
<th>Patient B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perinatal Events</td>
<td>Prematurity (32 weeks); Perinatal Anoxia</td>
<td></td>
</tr>
<tr>
<td>Associated Congenital Anomalies</td>
<td>VACTERL</td>
<td></td>
</tr>
<tr>
<td>Type of EA-TEF</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>Symptomatic GERD</td>
<td>Severe symptomatic GERD (i.e. hematemesis)</td>
<td>Symptomatic</td>
</tr>
<tr>
<td>Treatment of GERD</td>
<td>Uncontrolled by PPI; Required Nissen Fundoplication + PPI</td>
<td>Controlled with PPI</td>
</tr>
<tr>
<td>Age at First Diagnosis of BE</td>
<td>6 years of age</td>
<td>8 years of age</td>
</tr>
<tr>
<td>Type of Metaplasia at First Diagnosis of BE</td>
<td>Gastric metaplasia</td>
<td>Gastric metaplasia</td>
</tr>
<tr>
<td>Age at First Diagnosis of IM</td>
<td>11 years of age</td>
<td>14 years of age</td>
</tr>
</tbody>
</table>

DISCUSSION

- Barrett’s esophagus can complicate EA-TEF repair through severe GERD possibly caused by congenital or acquired esophageal dysmotility. In a concurrent study, we have shown that children diagnosed with gastric metaplasia present more often with severe GERD associated with the inability to discontinue PPI and requiring anti-reflux procedures. Our two (2) children with IM also had severe GERD, one not controlled by PPI and requiring a Nissen Fundoplication.
- In Schneider et al’s review, while gastric metaplasia was diagnosed at an average age of seven (7) years old, IM was more commonly diagnosed at the end of the second decade and at the beginning of the third decade of life. A much earlier diagnosis (at 11 and 14 years old) of IM in our study could be attributed to the earlier endoscopic screening which was performed as a result of the children’s symptomatic GERD. An asymptomatic child still remains at risk for BE as demonstrated by the progression of gastric metaplasia to IM during the period that our two (2) children were asymptomatic.
- Progression of gastric metaplasia to IM remains a controversial subject. Whereas gastric metaplasia is often diagnosed first or concurrently with IM, some patients are diagnosed initially only with IM. It is not known if gastric metaplasia is a precursor lesion to IM or if these two (2) types of metaplasia represent a continuum in the adaptation of the esophagus to more severe or prolonged GERD.

CONCLUSION

- Despite aggressive treatment of GERD, children who have had surgery to repair an EA-TEF are still at risk of developing IM, a precursor lesion to esophageal adenocarcinoma. More importantly, the age at which IM is diagnosed may be significantly younger than currently documented, therefore, close endoscopic screening may be required even in the absence of symptomatic GERD.
- The optimal age at which to begin endoscopic screening and the frequency at which to repeat this screening require further prospective studies.

CONFLICTS OF INTEREST

The authors have no conflicts of interest.

REFERENCES