Maximizing endoscopic exposure for Zenker’s diverticulum repair

Nausheen Jamal, MD1; Michael Orestes, MD2; Dinesh Chhetri, MD2
1Department of Otolaryngology-HNS, Temple University School of Medicine, Philadelphia, PA
2Department of Head & Neck Surgery, David Geffen School of Medicine, UCLA, Los Angeles, CA

INTRODUCTION

- Zenker’s Diverticulum (ZD) was named for the landmark clinical and pathological description of the pathology published in 1877.1,2
- ZD occurs in an area of structural weakness between the inferior pharyngeal constrictor and the cricopharyngeus muscle (CPM).1,3
- Endoscopic surgery for ZD was first described in 1906 by Mosher.1,4
- Use of carbon dioxide (CO2) laser for diverticulotomy was first described in 1981 by van Overbeek.1,5
- Endoscopic diverticulotomy became popularized with the introduction of the endoscopic stapler in 1993.1,6,7
- Open trans-cervical surgery is now typically reserved for patients in whom endoscopic exposure is difficult or impossible.8
- A modified approach to endoscopic exposure (Advanced Exposure Technique, AET) is presented that allows for diverticulotomy in particularly challenging cases without conversion to open surgery.
- Results with this technique over an 8-year period are presented.

METHODS

- Institutional Review Board approval from the University of California, Los Angeles was obtained for this study.
- A retrospective review was performed of all endoscopic Zenker’s diverticulotomies and open diverticulotomies at a tertiary care referral center by a single surgeon (DKC).
- The following data points were recorded:
  - Patient age and gender
  - Surgical type (endoscopic versus open)
  - Whether or not conversion to an open approach occurred
  - History of prior ZD surgery
  - Use of the AET
  - Need for subsequent revision ZD surgery
  - Post-operative complications

RESULTS

- Table 1: Demographic Data

<table>
<thead>
<tr>
<th>Description of patients</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of ZD surgeries</td>
<td>69</td>
<td>24 (36.4%)</td>
</tr>
<tr>
<td>Total number of AET surgeries</td>
<td>72</td>
<td></td>
</tr>
<tr>
<td>Total number of endoscopic diverticulotomies</td>
<td>69</td>
<td></td>
</tr>
<tr>
<td>Successful use of the Advanced Exposure Technique in cases with difficult exposure</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>Flexible esophagoscope-balloon dilation</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Dohlman laryngoscopy</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Total number of open diverticulotomies</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Total number of cases converted to open approach due to continued inadequate exposure</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Total number of cases performed open for other reasons</td>
<td>1 (Multiple prior recurrences)</td>
<td></td>
</tr>
</tbody>
</table>

- Table 2: Results of AET vs. Overall ZD Population

<table>
<thead>
<tr>
<th>Description of patients</th>
<th>No. of AET+ Patients</th>
<th>No. of Non-AET+ Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previous Failed Attempt at Endoscopic Exposure</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Prior Surgery</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Subsequent Revision Surgery Needed</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>No. of Cases with Complications (Complication Type)</td>
<td>1 (Subaortic empysema)</td>
<td>2 (Retropharyngeal air; Vocal fold paralysis)</td>
</tr>
</tbody>
</table>

Fig 1: Example of difficult exposure with narrow esophageal inlet.

SURGICAL TECHNIQUE

- Following administration of general anesthesia, the Weerda diverticuloscope (WD) is advanced to the post-cricoid space in the close pharynx.
- The proximal and distal ends are opened gently within the upper esophageal sphincter. If the WD is entirely within the pouch, it is slowly withdrawn until the party wall is seen.
- If the WD is withdrawn too far proximally without visualizing the party wall, both ends should be opened with the WD placed into suspension. A zero degree telescope can be advanced for a close-up view to identify the party wall.
- If the esophageal entry point is not obvious, an ultra-slim flexible esophagoscope (or nasogastric tube) can be used to identify the lumen.
- If the esophageal lumen is too small to allow cannulation with the WD, an esophageal dilator can be used. The authors’ preference is to use a Controlled Radial Expansion (CRE) balloon catheter (Boston Scientific, Natick, MA) with dilation up to 20 mm.
- Following dilation, the anterior limb of the cove is easily and automatically advanced into the esophagus.
- In cases of significant pharyngeal narrowing, such as with cervical osteophytes, a Dohlman laryngoscope is more easily advanced than a Weerda.
- Diverticulotomy method of choice can then be employed. The authors’ preference is to use the CO2 laser with microscope micromanipulator attachment.
  - A moist cotton pledge is placed in the esophageal lumen to protect the anterior wall.
  - The laser is used at a setting of 4-6 W, continuous mode, to divide the party wall until it is just flush with the esophagus. Some muscle fibers remain; the pharyngeal fascia is not visible.
  - Balloon dilation at this point achieves further separation of the muscle fibers and maximizes esophageal opening.5
  - The WD is then closed and withdrawn from the pharynx.
  - Clear liquid diet is started on post-operative day (POD) 0, followed by soft diet on POD 1. The latter is continued for two weeks, followed by regular diet as tolerated.
  - Patients are discharged on POD 1 without performance of routine post-operative swallow studies.

DISCUSSION

- Endoscopic surgery is typically preferred over open surgery for ZD due to its safety profile, decreased surgical time, relative technical ease (typically), and lower post-operative morbidity.8
- CO2 laser is preferred by the authors over endoscopic stapler due to a more complete diverticulotomy under constant visualization, with ability to repair even small pouches.
- Complication and recurrence rates are comparable for the two techniques, although recurrence rate may be lower with the laser.10
- In this series, out of 72 total ZD repairs attempted in 65 patients, 26 particularly difficult endoscopic exposures were encountered.
- Use of the described AET allowed for endoscopic diverticulotomy in 17 out of these 26 cases with addition of flexible esophagoscope and balloon dilation.
- Dohlman laryngoscopy enabled an additional 7 endoscopic repairs.
- 3 were performed as open surgeries.
  - Of these, 2 were performed open due to difficult endoscopic exposure.
  - 1 additional surgery was performed open due to multiple prior recurrences.
  - Total rate of conversion to open surgery was 2.9% of all attempted endoscopic diverticulotomies.

CONCLUSION

- If instrumentation can at all be advanced to the post-cricoid space, the AET can typically be employed to accomplish endoscopic diverticulotomy.
- Use of flexible esophagoscopy, balloon dilation, and in select cases, Dohlman laryngoscopy, allows for successful diverticulotomy in a majority of patients with ZD without a need to convert to an open approach.

REFERENCES