

Surgical Excision of a Laimer's Diverticulum: A Case Report and Review of the Literature

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ABSTRACT

A pharyngoesophageal diverticulum (PED) is a rare clinical entity. This paper reports on a 79-year-old male patient with PED and symptoms of dysphagia, regurgitation and chronic cough. The diverticulum was located on the dorsal side of the cervical esophagus, midline, inferior to the cricopharyngeal muscle. These findings were consistent with Laimer's diverticulum (LD), the rarest type of PED. This case proposes a surgical treatment of LD via an external transcervical approach.

Keywords: pharyngoesophageal diverticulum, Laimer's diverticulum, case report.

INTRODUCTION

A pharyngoesophageal diverticulum (PED) is a relatively rare clinical entity comprising only 3% of esophageal diseases (1). It can occur in individuals of all ages, but there is a higher prevalence among patients older than 70 years (2). Clinically, patients with PED present with various symptoms, including, but not limited to, dysphagia, halitosis, regurgitation, chronic cough and obstruction (3). Barium swallow test is the gold standard method for an initial investigation (4). Based on the anatomical site of origin, a PED can be characterized as Zenker's (ZD), Killian-Jamieson's (KJD) or Laimer's diverticulum (LD). Zenker's diverticulum is by far the most common subtype of PED, with a prevalence of

0.01% to 0.11% in the general population (5). Of note, it is diagnosed in 2.3% of patients undergoing radiologic evaluations for dysphagia (6). Laimer's diverticulum is the rarest variant of PED, arising from a triangular area of weakness called Laimer-Haeckerman's triangle (7). Herein, we present a rare case of a PED located on the dorsal side of the cervical esophagus, inferior to the cricopharyngeal muscle, in front of the cervical vertebra. The anatomical site of the diverticulum allowed its classification as LD.

Patient and observation

A 79-year-old male patient presented with a 12-month history of progressive dysphagia, regurgitation and chronic cough. The patient had no other specific symptoms. A sizeable pharyn-

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goesophageal diverticulum was diagnosed with endoscopy of the upper digestive tract and barium swallow test (Figures 1 and 2). The rest otorhinolaryngological examination was without pathological findings. No palpable cervical lymph



FIGURE 1. Lateral view of the pharyngoesophageal diverticulum showing preoperative barium swallow



FIGURE 2. Anterior to posterior view of the pharyngoesophageal diverticulum showing preoperative barium swallow



FIGURE 3. CT scan of the neck. Axial view demonstrating the pharyngoesophageal diverticulum



FIGURE 4. Computed tomography scan of the neck – sagittal view of the neck demonstrating the pharyngoesophageal diverticulum

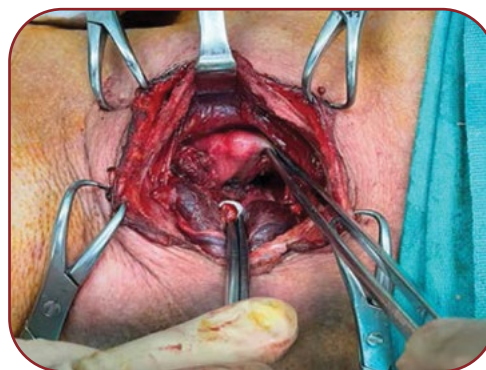


FIGURE 5. Intraoperative image



FIGURE 6. Inferior aspect of the excised pharyngoesophageal diverticulum

nodes were detected. A computed tomography (CT) scan of the neck revealed a characteristically rare posterior location of the PED, midline, in front of the cervical vertebra (Figures 3 and 4). The diverticulum was identified inferiorly to the cricopharyngeal muscle, below the sixth cervical



FIGURE 7. Anterior to posterior view of the pharyngoesophageal diverticulum showing postoperative barium swallow

vertebrae (C6), and the ultimate diagnosis of an LD was established. Under general anesthesia, pharyngoesophageal diverticulectomy, cricopharyngeal myotomy and myotomy of the cervical esophagus more distant to the neck of the diverticulum were performed (Figures 5 and 6). A barium swallow on the first post-operative day verified the success of the procedure (Figure 7). The postoperative course was uneventful and the patient was discharged on the second post-operative day with total symptom relief. There were no recurrences and no symptoms at the follow-up visit one year after the procedure. □

DISCUSSION

The pharyngoesophageal diverticulum is defined as a protrusion through a potentially weak area of the pharyngoesophageal wall (8). The most common pharyngoesophageal diverticula originate from Killian's dehiscence, a triangular area in the wall of the pharynx between the thyropharyngeal and the cricopharyngeal fibers of inferior constrictor muscle (9). These diverticula are defined as ZD and are a posterior out-pouching of pharyngeal mucosa that occurs dorsally at the pharyngoesophageal wall in an area of natural weakness between the two parts of the inferior constrictor muscles. Killian-Jamieson diverticulum (KJD) is a much rarer entity. In contrast to ZD, KJD protrudes from the Killian-Jamieson space, an area bounded inferiorly by the cricopharyngeal muscle and laterally by the longitudinal muscle of the esophagus (10). More often than not are they located on the left side, unless bilateral. Laimer's diverticulum is the rarest va-

riant of PED, which arises from a triangular area of weakness located just below the cricopharyngeal muscle, known as Laimer-Haeckerman's triangle. Similar to the KJD, the latter originates between the cricopharyngeal and the longitudinal muscle fibers of the proximal esophagus, with the difference that it is located posteriorly and midline and is covered only by the circular fibers of esophageal muscles located inferior to the cricopharyngeal muscle (10, 11).

The differential diagnosis between pharyngoesophageal diverticula is challenging. Despite the barium swallow test is considered the gold standard for the diagnosis of a PED, it is unable to differentiate between the various PED subtypes (12). Thus, a CT scan of the neck is required not only for the exact diagnosis of the PED subtype but also for the presurgical planning. Of note, LD may not be easily differentiated from ZD using preoperative contrast studies. For an accurate diagnosis, clinical and surgical findings, such as location of the diverticulum or the relationship between diverticula and nearby pharyngeal muscles, are important. Endoscopy could also be diagnostic in differentiating ZD and LD because the second one has a broad base. In the present case report, the results of clinical examination in combination with the prevalence of ZD directed the initial diagnosis in this direction. However, preoperative imaging and intraoperative data revealed the location of the diverticulum below the cricopharyngeal muscle, on the dorsal side of the cervical esophagus, establishing the diagnosis of LD.

Various surgical approaches, varying from external to modern endoscopic transoral, have been implemented for the treatment of symptomatic ZD. However, the ideal surgical treatment is still considered to be a point of debate. The strategy behind every technique is common, aiming for a thorough and complete cricopharyngeal myotomy. This is considered the key to a successful surgical procedure and could be the only intervention required for the treatment of small symptomatic diverticula (13). To elaborate further, the open approach usually involves an external neck incision with cricopharyngeal myotomy, either alone or with diverticulectomy (14). Other, more conservative external procedures consist of inversion of the pharyngeal pouch or diverticulopexy. However, for ZD in particular, although initially treated exclusively

by an open transcervical diverticulum approach with cricopharyngeal myotomy, in recent years, endoscopic transoral approaches, including endoscopic laser (15, 16) and endoscopic stapling (17), have gained popularity, since they allow a precise approach to the cricopharyngeal muscle, minimizing the risk of invading the mediastinum. These methods involve only a diverticulectomy and aim to sever the septum between the esophageal lumen and the diverticulum containing the cricopharyngeal muscle to create a single channel. Of note, a current meta-analysis (18) did not prove that the open transcervical diverticulum approach had superior outcomes compared to endoscopic laser and endoscopic stapling techniques. Any method of surgical intervention yielded a large effect in terms of improvement in dysphagia and regurgitation, comparing patient-reported symptoms before and after surgery. Endoscopic treatment of KJD using submucosal tunneling diverticulotomy technique has also been proposed (19). So far, in the literature there are no reports on endoscopic surgery for LD excision.

The choice of treatment for symptomatic ZD may be influenced by various factors. Recent data have suggested that an external approach should be favored in cases of small diverticula, when there is inadequate endoscopic exposure of the diverticulum due to anatomic reasons (20) and insufficient protection of the diverticulum sac by the dorsal esophageal wall (13). Interestingly enough, Koch *et al* demonstrated that the transversion of an endoscopic to open technique was necessary in nearly 40% of treated patients with ZD, indicating their irreplaceable role in the treatment of PED (21). In the same study (21), a statistical superiority of endoscopic versus external approach in terms of surgical time, duration of hospitalization and occurrence of minor complications was documented. However, the recurrence rate was statistically significantly lower in the open approach (21).

For patients with LD in particular, external transcervical approach is the most commonly applied procedure (22, 23). Considering the course of the recurrent laryngeal nerve (RLN) which lies in close proximity to the diverticulum, an external approach allows the accurate identification and dissection of the pouch, with preservation of the surrounding tissues, minimizing morbidity and mortality rates. Hence, in patients with LD, a

transcervical diverticulectomy and an esophageal myotomy distal to the diverticulum, with or without myotomy of the cricopharyngeal muscle, is considered the method of choice. The cervical side for the operative approach should be chosen based on the preoperative findings regarding the location of the diverticulum.

The treatment of LD in the limited cases described in the literature included exclusively external approaches for diverticulectomy. Kumoi *et al* performed a transcervical diverticulectomy through an external approach with a vertical skin incision. The left RLN was identified and separated from the diverticulum. The diverticulum was resected with an auto suture instrument and the esophageal muscle was repaired with silk (7). Similarly, Ujiie *et al* performed transcervical diverticulectomy, approaching the diverticulum from the anterior border of the sternocleidomastoid muscle. The diverticulum did not adhere to the surrounding tissues, including the RLN. The resection of the diverticulum was achieved using an auto suture device without executing a cricopharyngeal myotomy (24). In a case series study by Guo *et al* (25), three external transcervical excisions of Laimer's diverticula were described in detail, and, unlike all other published reports on that topic, the authors conducted a transverse skin incision along the skin crease immediately above the clavicle on the left side for cosmetic considerations; they approached the diverticula from the anterior border of the sternocleidomastoid muscle, which was mobilized and retracted laterally to expose the carotid sheath, in order to be retracted laterally as well. The left thyroid lobe could be visualized, mobilized and retracted medially with RLN monitoring. After identifying the cricopharyngeal muscle superior to the diverticulum, diverticulectomy was undertaken and the cervical esophagus was repaired with three layers of manual sutures. Nguyen dissected the diverticulum and conducted a myotomy just distal to the inferior margin of the diverticulum, extending it 3 cm distally (26). The last method was the most similar to the technique implemented in our case report. In the present case, the patient underwent an external left transcervical approach, a pharyngoesophageal diverticulectomy, a cricopharyngeal myotomy and a myotomy of the cervical esophagus more distant to the neck of the diverticulum. The left RLN was identified and preserved intraoperatively. The

successful outcome of the procedure was proved by a postoperative barium swallow and the absence of symptoms on the follow-up. □

of the surrounding tissues prior to diverticulectomy, the external transcervical approach to these diverticula is indicated. □

CONCLUSION

Laimer's diverticulum is the rarest variant of the PED. It is located in the posterior midline of the pharyngoesophageal wall inferior to the cricopharyngeal muscle. For a better visualization

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Patient consent obtained.

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