Scholars Journal of Medical Case Reports
Abbreviated Key Title: Sch J Med Case Rep
ISSN 2347-9507 (Print) | ISSN 2347-6559 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Medical Science

Modified Z POEM Technique for the Treatment of a Giant Zenker Diverticulum

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DOI: https://doi.org/10.36347/sjmcr.2026.v14i05.075 | **Received:** 10.04.2026 | **Accepted:** 20.05.2026 | **Published:** 23.05.2026

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Abstract | **Case Report**

Zenker diverticulum is a rare condition caused by dysfunction of the cricopharyngeal muscle, leading to progressive dysphagia and regurgitation. Endoscopic approaches, particularly Zenker per-oral endoscopic myotomy (Z-POEM), have emerged as effective minimally invasive treatments. However, giant diverticula remain technically challenging. We report the case of a 72-year-old man with a giant Zenker diverticulum measuring 110 mm, successfully treated using a modified Z-POEM technique. The procedure included bilateral submucosal injection, extended septal myotomy, additional distal fiber sectioning, and transverse clip closure of the mucosal defect. The intervention was completed without complications, and the patient experienced complete resolution of symptoms with an uneventful recovery. Modified Z-POEM may represent a valuable technical adaptation for the management of a giant Zenker diverticula, although further studies are required to validate its safety and long-term efficacy.

Keywords: Zenker Diverticulum, Z-POEM, Endoscopic Septotomy, Submucosal Tunneling.

INTRODUCTION

Zenker diverticulum is a pulsion diverticulum caused by dysfunction of the cricopharyngeal muscle and typically presents with dysphagia and regurgitation in elderly patients [1, 2]. The main objective of treatment is division of the cricopharyngeal muscle to relieve functional obstruction at the upper esophageal sphincter [3]. In recent years, endoscopic approaches have progressively replaced surgery because of their lower morbidity and faster recovery, with Zenker per-oral endoscopic myotomy (Z-POEM) emerging as a promising minimally invasive technique [4, 5].

We report the first case of a giant Zenker diverticulum successfully treated using a modified Z-POEM approach in Morocco.

CASE REPORT

A 72-year-old man presented with a six-month history of progressive dysphagia, associated with intermittent vomiting and painless regurgitation of undigested food. The patient did not report weight loss or odynophagia.

An upper gastrointestinal endoscopy, initially performed at a private center, revealed esophageal candidiasis and suspected gastric stenosis. Due to persistent symptoms, further investigations were performed.

A barium swallow study demonstrated a large esophageal diverticulum measuring 110 mm in transverse diameter and 85 mm in anteroposterior diameter, consistent with a Zenker diverticulum. The examination also showed incomplete opacification of the distal esophagus, suggesting a possible compressive effect caused by the diverticular pouch (figure 1).

Figure 1: Barium swallow study demonstrating a giant Zenker diverticulum

Given the giant size of the diverticulum and the broad septal surface, a modified Z-POEM approach was selected in order to optimize septal exposure, facilitate complete myotomy, and improve final opening of the diverticular neck.

Endoscopic Technique

The procedure was performed under general anesthesia with endotracheal intubation using a standard therapeutic gastroscope fitted with a transparent distal cap. Carbon dioxide insufflation was used throughout the procedure. The procedure was completed in 120 minutes.

1. Assessment

The endoscope was first introduced into the esophageal lumen and then into the diverticular pouch in order to clearly identify the septum separating the diverticulum from the esophageal lumen. In this patient, the diverticulum was particularly large, which made orientation challenging. A guidewire was therefore placed into the esophageal lumen to facilitate anatomical orientation and to maintain clear distinction between the true esophageal lumen and the diverticular cavity (figure 2).

2. Submucosal Injection

After adequate exposure of the septum, a sterile methylene blue solution was injected into the submucosal layer at the level of the cricopharyngeal septum. The injection was performed bilaterally on each side of the cricopharyngeal muscle to create submucosal cushions, which acted as protective barriers by separating the mucosa from the underlying muscular septum. This facilitated safer dissection and reduced the risk of inadvertent mucosal injury during the myotomy (figure 3).

3. Mucosotomy

A mucosal incision was then created directly over the cricopharyngeal septum using a triangle knife. This initial mucosotomy allowed entry into the submucosal space and provided access to the septal plane for subsequent dissection (figure 4).

4. Submucosal Tunneling and Septal Exposure

Submucosal dissection was performed on both sides of the septum in order to create a tunnel and progressively expose the cricopharyngeal muscle fibers. The endoscope was advanced through the submucosal space, allowing direct visualization of the septum and controlled dissection under endoscopic guidance. This step was essential to obtain adequate exposure of the muscular septum, especially given the large size of the diverticulum (figure 5).

5. Myotomy

Once the cricopharyngeal muscle was adequately exposed, the myotomy was initiated and progressively extended along the septum. An initial myotomy of approximately 2 cm was performed first, which progressively widened the operative field and facilitated deeper dissection. The muscular fibers were then carefully divided down to the base of the diverticulum and extended approximately 5 cm into the esophageal side in order to ensure complete division of the dysfunctional cricopharyngeal muscle and minimize the risk of recurrence (figure 6).

6. Closure

Because of the large size of the diverticulum, the residual mucosal flap was relatively bulky after septal division. At the end of the procedure, the mucosal entry and the residual mucosal defect were closed transversely using 11 through-the-scope hemostatic clips, achieving

complete approximation of the incision edges and secure closure of the tunnel entry (figure 7).

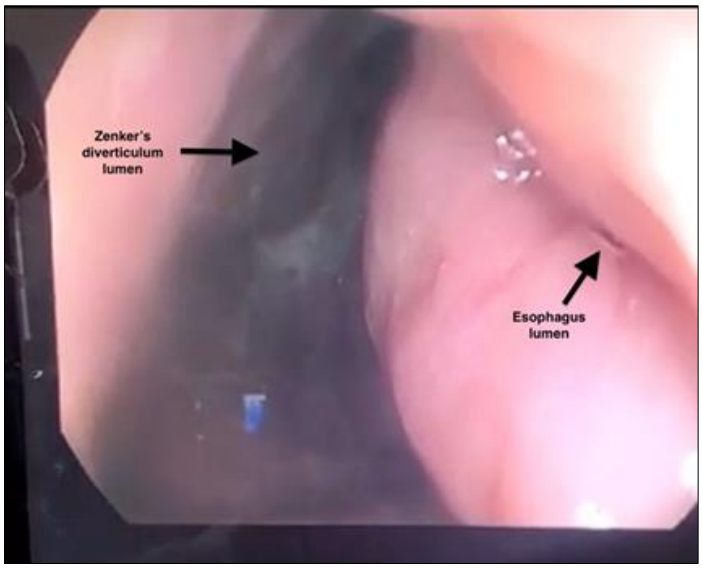

Figure 2: Assessment

Figure 3: Submucosal injection

Figure 4: Mucosotomy

Figure 5: Submucosal tunneling

Figure 6: Myotomy

Figure 7: Closure

The procedure was completed successfully without any intra-procedural complications. The postoperative course was uneventful, with complete resolution of dysphagia and regurgitation. The patient received intravenous antibiotic therapy based on a third-generation cephalosporin for 3 days, followed by oral

antibiotic therapy with a fluoroquinolone and metronidazole for an additional 7 days. Oral intake was progressively resumed, and the patient was discharged on postoperative day 3 without the need for further treatment.

DISCUSSION

Zenker diverticulum results from impaired relaxation of the cricopharyngeal muscle, leading to increased hypopharyngeal pressure and herniation of the mucosa through Killian's triangle, typically presenting with dysphagia and regurgitation [1, 2].

The therapeutic objective is division of the cricopharyngeal muscle in order to relieve the functional obstruction at the upper esophageal sphincter [3]. While open surgical approaches were historically considered effective, they are associated with higher morbidity, particularly in elderly patients, and have progressively been replaced by minimally invasive endoscopic techniques [3, 4].

Among these, Z-POEM has emerged as a promising third-space endoscopic approach, allowing direct visualization of the septum and controlled myotomy of the cricopharyngeal muscle. Compared with conventional septotomy, Z-POEM may offer improved exposure of the muscular layer, a more complete myotomy, and secure closure of the mucosal entry [5, 6].

However, classical Z-POEM may remain technically challenging in patients with large diverticula because of the limited working space at the level of the upper esophageal sphincter and the broad septal surface [7]. In the present case, involving a giant Zenker diverticulum measuring 110 mm, the modified technique improved septal exposure and facilitated complete myotomy. In particular, bilateral protective submucosal injection, extended septal division and additional distal fiber sectioning appeared useful in optimizing the final opening and reducing the risk of incomplete myotomy.

The favorable clinical outcome observed in this patient suggests that this modified approach may represent a useful technical adaptation in selected cases of large Zenker diverticulum. Nevertheless, this remains a single case report, and larger studies are required to confirm the reproducibility, safety, and long-term efficacy of this technique.

CONCLUSION

The modified Z-POEM technique appears to be a safe and effective minimally invasive approach for the treatment of Zenker diverticulum. By improving access to the submucosal space and facilitating controlled muscular dissection, this technique may overcome some technical limitations of classical Z-POEM, particularly in large diverticula. Further studies are required to confirm its long-term efficacy and reproducibility.

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