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Case Report

Peroral Endoscopic Myotomy for Zenker's Diverticulum: A Case Report.

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Abstract:

Zenker's diverticulum (ZD) is a false diverticulum involving the mucosa and submucosa of the esophagus that forms a sac-like outpouching through Killian's triangle in the upper esophagus. Symptoms associated with this condition including halitosis, dysphagia, regurgitation, and cough, are due to food trapping, incomplete opening of the upper esophageal sphincter, and compression of the esophagus by the diverticulum. ZD was historically treated with open surgical techniques including diverticulectomy, diverticulopexy, or cricopharyngeal myotomy. However, many of these methods have significant risks of complications, so endoscopic techniques have been at the forefront of permanent ZD treatment. Zenker peroral endoscopic myotomy (Z-POEM) is a novel procedure where an endoscope is passed into the esophagus and the cricopharyngeus muscle is cut following the creation of a submucosal tunnel. Z-POEM is a less invasive, lower risk, and faster procedure than surgery with comparable or improved outcomes compared to other endoscopic procedures. This is a case of a 60-year-old female patient with dysphagia found to have a Zenker diverticulum with significant symptom improvement following Z-POEM treatment.

Case

A 60-year-old female was referred to gastroenterology for over 20 years of intermittent, solid food dysphagia, regurgitation, and odynophagia on omeprazole and famotidine which offered minimal improvement of dysphagia. She had an esophagogastroduodenoscopy (EGD) done at another institution which showed a Schatzki's ring, benign gastric polyps, a Hill grade 3 hiatal hernia, mild gastritis, and a negative work up for H. pylori. Multiple esophageal dilations were performed in the past with minimal improvement in symptoms. She was referred to gastroenterology since her pharyngoesophageal dysphagia was getting progressively worse and was refractory to other treatment modalities.

Given the significant time elapsed since her previous evaluation, our team deemed an updated EGD appropriate. On initial introduction of EGD into the inlet, a moderate-sized, Zenker diverticulum was noted (Figure 1). The rest of the esophagus and GE junction were grossly normal. After the diagnosis of Zenker diverticulum, we discussed various options with the patient, and the shared decision was made to proceed

with Zenker peroral endoscopic myotomy (Z-POEM) for the definitive treatment of her dysphagia.

Zenker peroral endoscopic myotomy was performed under general anesthesia. EGD was performed and all the food contents from the pouch were removed (Fig. 2). A guidewire was passed through the esophageal lumen for identification during procedure. Saline with methylene blue was injected along the cricopharyngeal ridge and a mucosal incision was made along the ridge using a Triangular tip knife (TTJ Olympus, America) using ENDOCUTQ current (ERBE). Submucosal dissection was done to form a tunnel using spray coagulation and the esophageal mucosa and diverticular mucosa were separated from the cricopharyngeus muscle. Then a complete cricopharyngeal myotomy was performed using the same Triangular tip knife until the buccopharyngeal fascia was reached (Fig. 4 & 5). After complete hemostasis, the mucosal incision was closed using through-the-scope clips (Microtek). A total of five clips were used for the closure (Fig. 6).

The patient remained in the hospital overnight for monitoring and received a gastrografin swallow study the following day that showed no leak was present (Figure 7). She was discharged one day following her Z-POEM procedure and advised to continue a liquid diet for three days and a soft diet until her outpatient follow-up visit in 4 weeks. A month later, in the outpatient clinic the patient reported improved dysphagia with minimal discomfort. It was recommended for the patient to trial foods prior to her next visit that she has historically avoided due to her dysphagia. She is able to eat a normal diet currently without any pain or discomfort and she has been very pleased with the outcome of her procedure thus far.

Figure 1: Pre-procedure esophagogastroduodenoscopy showing a Zenker diverticulum without luminal contents.

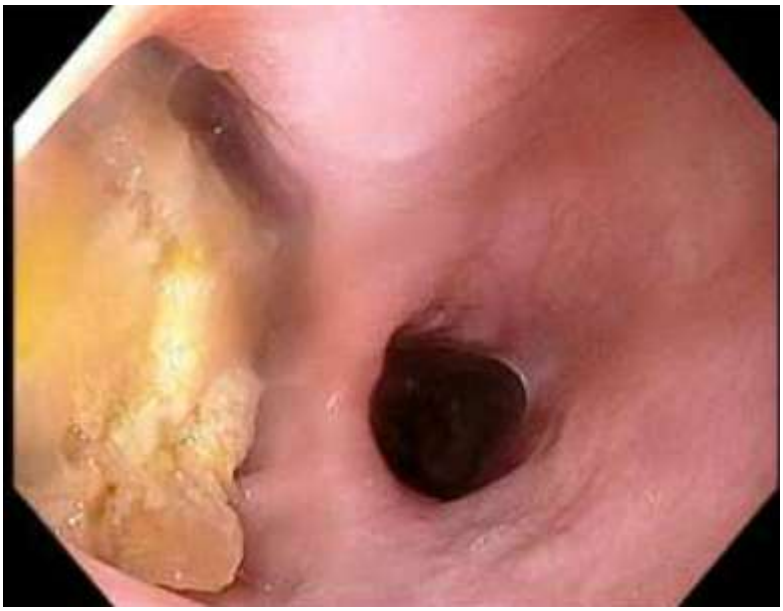

Figure 2: Procedural esophagogastroduodenoscopy showing a Zenker diverticulum with food and luminal contents.

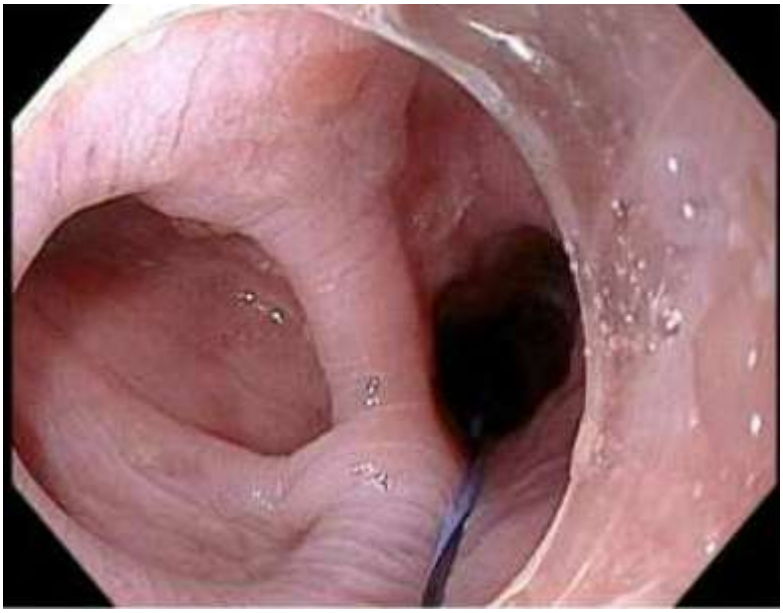

Figure 3: Esophagogastroduodenoscopy of Zenker and esophagus with guidewire placed in the stomach for orientation during the procedure

Figure 4: Triangle knife extended to create the submucosal tunnel to the cricopharyngeus of the Zenker diverticulum.

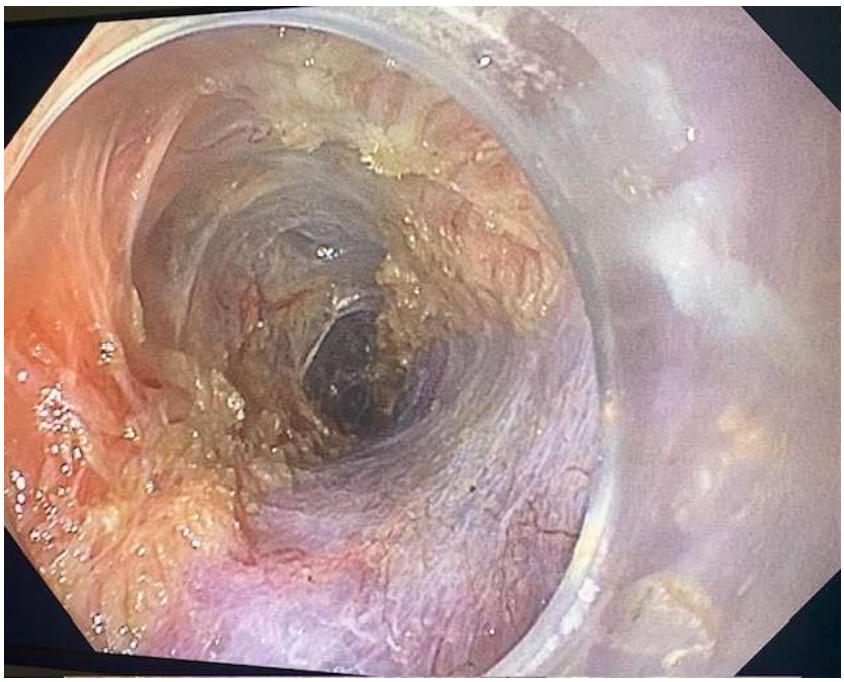

Figure 5: Submucosal tunnel with complete myotomy of the cricopharyngeus.

Figure 6: Post-procedure clipping for submucosal tunnel closure.

Figure 7: Post-procedure gastrografin swallow study showing mild persistence of Zenker diverticulum without an air leak.

Discussion

Zenker diverticulum (ZD) is a false diverticulum that can form posteriorly in the upper esophagus involving the mucosa and submucosa of the esophagus. It forms a sac-like outpouching through Killian's triangle, a weak area of transition between the cricopharyngeus and the inferior pharyngeal constrictor muscle. Symptoms associated with this condition, including halitosis, dysphagia, regurgitation, and cough, are primarily due to food trapping and esophageal dysfunction. Beyond these symptoms, it is important to recognize that this condition may also impair medication absorption and lead to bleeding and ulceration if oral medications become trapped within the diverticulum1. ZD is the most common upper esophageal diverticulum, but it still has a prevalence ranging from 0.01-0.11% of the population depending on the region2. ZD forms most commonly in elderly males with peak prevalence starting at 70 years of age. The etiology is still uncertain but is believed to be due to increased intraluminal pressures combined with senescence causing fibrosis, necrosis, and weakness of the upper esophageal sphincter muscles: the cricopharyngeus, the inferior pharyngeal constrictor, and the cervical fibers of the esophagus3.

ZD is typically first suspected based on clinical assessment and patient interview, but imaging is essential in forming the diagnosis. Esophagogastroduodenoscopy (EGD) and modified barium swallow study are commonly used tests for making the diagnosis of this condition. However, dynamic, continuous fluoroscopy is a better study, especially in patients with a small ZD. A sac-like protrusion should be noted in the posterior esophagus frequently filled with barium-contrast dye at the time of the study4. In asymptomatic patients with incidental ZD diagnosis, the patient can be monitored until the diverticulum increases, or they develop symptoms. There are no efficacious medications for the treatment of symptoms related to ZD. Otherwise, there are several open surgical and endoscopic approaches developed for permanent treatment of ZD.

Open surgical approaches to ZD treatment include diverticulectomy (with or without stapling), diverticulopexy, or pouch inversion. Each open approach comes with an increased risk of morbidity and longer recovery times when compared to endoscopic techniques. In open surgical procedures, an incision is made in the anterior neck with dissection down to the cricopharyngeus muscle and the diverticulum. A cricopharyngeal myotomy is performed to achieve complete septotomy, followed by either resection, inversion, or diverticulopexy of the remaining diverticular tissue5. While open surgical techniques have been used for decades to treat ZD, they have been associated with increased risks of adverse events when compared to endoscopic treatment, including bleeding, esophageal perforation, esophageal leak, infection, recurrent laryngeal nerve damage, aspiration pneumonia, and mortality6. However, the need for reoperation due to symptom recurrence is much lower in open surgical treatment options7.

Endoscopic approaches to managing ZD include flexible septotomy, rigid septotomy, and a newer approach, Zenker peroral endoscopic myotomy (Z-POEM). The transoral approaches were developed due to the high prevalence of morbidity and mortality related to open surgical approaches to ZD treatment8. Rigid septotomy is performed using a rigid diverticuloscope for visualization and transection of the septum. Flexible septotomy uses a flexible endoscope and similarly to the rigid approach, divides the septum using the endoscopists preferred method. While both approaches have decreased morbidity, procedure time, and length of hospital stay compared to open surgical approaches, studies have shown an increased rate of symptom recurrence and incidence of persistence9.

Z-POEM is a novel endoscopic approach to ZD treatment using techniques derived from third-space endoscopy for achalasia and gastroparesis called esophageal and gastric peroral endoscopic myotomy, respectively10. In the Z-POEM procedure, there is complete septotomy due to clear visualization of the cricopharyngeus from the submucosal tunnel, while both rigid and flexible septotomies are considered partial septotomies due to the mucosal incision approach providing limited visualization and transection of the cricopharyngeal muscle. This difference explains the development of the Z-POEM procedure, however the first comparison of recurrence rate outcomes and symptoms resolution using a multicenter retrospective study by Al Ghamdi et al. showed similar rates of recurrence at 12-months between flexible septotomy, rigid septotomy, and Z-POEM (9.2%, 9.1%, and 14.7%)11. In contrast, Papaefthymiou et al. reported in a multicenter cohort study that the recurrence rate for symptoms following Z-POEM was lower than for other endoscopic approaches, although the difference was not statistically significant ($p = 0.5$)12. Additionally, in Zhang et al, in their systematic review and meta-analysis, found that clinical success was significantly higher in the Z-POEM group compared to the flexible septotomy group13. While all of the endoscopic procedures discussed have shown improved symptom resolution, there is still substantial debate on the preferred method of permanent ZD treatment due to limited data from the novelty of Z-POEM and the low prevalence of ZD, conflicting data from what is available on recurrence rates and adverse events, and comparable clinical success among all three procedures in available studies14. Additionally, there are no randomized, controlled trials comparing different methods, so the American Society for Gastrointestinal Endoscopy currently recommends choosing ZD treatment based on the physician's expertise and preference.

In this case report, we present an interesting case of a patient with a longstanding history of dysphagia who was incidentally found to have a moderate-sized ZD. She underwent Z-POEM, a novel procedure with promising outcomes as a common future treatment option for patients with ZD. Our patient had a short hospital stay, clinical success, and symptom improvement at 1-month following the procedure with minimal

discomfort reported. Further studies are required to elucidate clear indications for the preferred method for endoscopic treatment of ZD. While endoscopic treatment methods are preferred due to lower adverse events, adequate symptom resolution, and good clinical success over open treatment methods, it is still uncertain if Z-POEM offers significant clinical benefit over other endoscopic treatments.

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