

## Medical & Clinical Case Reports Journal

<https://urfpublishers.com/journal/case-reports>

Vol: 3 & Iss: 1

Case Report

### Zenker's Diverticulum: Case report and Surgical Management

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**Citation:** Ouiam K, Meryem M, Meryem L, et al. Zenker's Diverticulum: Case Report and Surgical Management. *Medi Clin Case Rep J* 2025;3(1):771-773. DOI: doi.org/10.51219/MCCRJ/Kich-Ouiam/200

**Received:** 05 March, 2025; **Accepted:** 07 March, 2025; **Published:** 10 March, 2025

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### ABSTRACT

Zenker's diverticulum, also known as a pharyngeal pouch, is a mucosal diverticulum of the pharynx that occurs just above the cricopharyngeal muscle, adjacent to the upper esophageal sphincter. This condition predominantly affects elderly patients, typically over 70 years old and presents with symptoms such as dysphagia, regurgitation, chronic cough, aspiration and weight loss.

In this report, we present a case of a 64-year-old man with a history of chronic oropharyngeal dysphagia due to Zenker's diverticulum. He was successfully treated using a cervical approach cricopharyngeal myotomy with diverticulectomy. The postoperative evolution was positive, with good recovery and adequate progression of the diet.

**Keywords:** Oropharyngeal dysphagia; Pharyngeal pouch; Zenker's diverticulum

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### Introduction

Zenker's diverticulum (ZD), also referred to as a cricopharyngeal, pharyngoesophageal or hypopharyngeal diverticulum, is an acquired pseudodiverticulum resulting from the herniation of the mucosal and submucosal layers at the pharyngoesophageal junction. This pulsion-type diverticulum develops posteriorly within the pharyngoesophageal wall, specifically in the anatomically vulnerable area between the inferior pharyngeal constrictor and the cricopharyngeus muscle, known as Killian's triangle or Killian's dehiscence<sup>1</sup>.

The first description of a pharyngeal pouch was made by Ludlow in 1769<sup>2</sup>. However, it was not until 1877 that the German pathologists von Zenker and von Ziemssen described this phenomenon in a case series, giving it an eponymous name.

ZD may cause dysphagia by two mechanisms: incomplete opening of the upper esophageal sphincter (UES) and extrinsic compression of the cervical esophagus by the diverticulum itself<sup>3</sup>.

The pathophysiology of Zenker's diverticulum (ZD) is characterized by impaired compliance of the cricopharyngeus muscle and elevated intrabolus pressure. Reduced upper esophageal sphincter (UES) compliance and inadequate sphincter relaxation for effective bolus transit contribute to an increased hypopharyngeal pressure gradient. Studies have demonstrated significantly higher intrabolus pressures in patients with ZD compared to age-matched healthy individuals<sup>4</sup>. Given the predilection of ZD for the elderly population, UES dysfunction and age-related muscular degeneration have been implicated in its pathogenesis<sup>5</sup>. Various open surgical techniques

and transoral endoscopic approaches have been described for the management of ZD; however, there remains no consensus on the optimal treatment modality.

We report a case of ZD in an adult patient, the diagnostic approach and the surgical management.

### Case Report

64 years-old male patients with a history of inguinal hernia surgery performed three years ago. His symptoms began seven years ago with the onset of odynophagia, followed by progressive dysphagia to solid foods, accompanied by food regurgitation. There was no difficulty initiating swallowing; however, he occasionally experiences a sensation of food sticking in his neck. Due to fear to eat, the patient had experienced a 10-kg weight loss, but denied any history of dysphonia, nasal regurgitation or dysarthria. There were no signs of arthritis or skin rash affecting his musculoskeletal system. Additionally, no similar conditions were reported among his family members. His chest, cardiovascular, abdomen and CNS were all normal. No evidence of respiratory tract infection was found. Laboratory blood tests were unremarkable.

An esophagogastroduodenal transit study (EGD transit) revealed a Left-sided pharyngoesophageal diverticulum at the level of C6 with a narrow neck, suggestive of Zenker's diverticulum (**Figure 1**).



**Figure 1:** An esophagogastroduodenal transit study (EGD transit) showing the large diverticulum at the level of C6.

The patient underwent a cervical approach cricopharyngeal myotomy with diverticulectomy (**Figure 2**).

The postoperative course was uneventful and the patient was able to resume adequate oral intake. He was discharged on the second postoperative day. Histopathological examination showed no evidence of malignancy. 6 months after surgery, the patient remains asymptomatic.

### Discussion

Zenker's diverticulum is an uncommon condition, with an estimated incidence of 2 cases per 100,000 individuals and a prevalence ranging from 0.01% to 0.11%<sup>6</sup>. Its incidence and prevalence may be underestimated as many diverticula may

remain clinically silent and many elderly patients with small pouches and minimal symptoms may not seek medical advice<sup>6</sup>.



**Figure 2:** Intraoperative view showing gentle grasping of the diverticulum with an atraumatic Babcock forceps.

Zenker's diverticulum (ZD) can lead to a range of symptoms and complications, including aspiration pneumonia. Rarely, carcinoma can develop within the diverticulum<sup>7</sup>. Ulceration and bleeding can also occur due to retained foreign objects, such as aspirin. Endoscopy and nasogastric tube placement require caution to avoid inadvertent perforation of the diverticulum. Surgical intervention remains the primary treatment for symptomatic Zenker's diverticulum (ZD)<sup>8</sup>.

Regarding the differential diagnosis, carcinoma should be considered. Cricopharyngeal muscle achalasia may present with symptoms similar to those of Zenker's diverticulum. Additionally, the presence of cervical esophageal membranes should be considered as a potential differential diagnosis<sup>9</sup>. The management of patients with pharyngeal pouch may be either conservative (for smaller than 1 cm, asymptomatic diverticula) or surgical through an incision in the neck (open) or mouth (endoscopic). Surgery - either open or minimally invasive - is the main therapeutic approach. Various surgical approaches are available<sup>10,9</sup>:

- **Cricopharyngeal myotomy:** Used for small diverticula (<2 cm). It reduces resistance after the procedure. Advantages include eliminating the cricopharyngeal constrictive effect, avoiding sutures and enabling rapid recovery.
- **Diverticulopexy with Cricopharyngeal Myotomy:** This procedure involves inverting the diverticular sac and suturing it to the prevertebral fascia. It is recommended for diverticula between 1 and 4 cm. Disadvantages include potential sac prolapse, missed carcinoma diagnosis and recurrence.
- **Diverticulectomy with Cricopharyngeal Myotomy:** This involves excision of the diverticular sac along with a myotomy. It is recommended for sacs >4 cm and is the preferred technique in the authors' institution. A study of 87 surgically treated patients reported a 3.5% mortality rate, 24% complication rate and 78% asymptomatic outcome, with a mean follow-up of 7.5 months.

- **Endoscopic Diverticulotomy:** First described by HP Mosher in 1906 but abandoned for 50 years due to mediastinitis. It was later reintroduced by FA Dohlman and involves dividing the septum between the cervical esophagus and the diverticular pouch. The procedure can be performed using electrocautery, laser or staplers. Advantages include short operative time and rapid return to oral intake. Scher et al. performed endoscopic esophagodiverticulostomy using staples in six cases, with no morbidity or mortality, an average operative time of 22 minutes, resumption of oral intake on postoperative day 1 and a mean hospital stay of two days. Narne et al. treated 102 Zenker's diverticulum patients (mean size: 4 cm) using Endo-GIA 30 staplers, with success in 98 cases and no morbidity or mortality. They concluded that diverticula <2 cm are not ideal for this approach due to insufficient sphincter division and those >6 cm are contraindicated due to potential inadequate emptying of the residual pharyngeal pouch.

When evaluating the technical and clinical outcomes of Zenker's diverticulum (ZD) treatment based on available literature, it is essential to acknowledge the limitations of direct comparisons between studies. The heterogeneity and lack of standardized data across multiple variables make such comparisons challenging. Key factors contributing to this variability include differences in symptom classification (isolated dysphagia, dysphagia with regurgitation or a broader symptom spectrum), methods of symptom assessment (objective dysphagia scores vs. subjective grading of symptom relief and patient satisfaction), criteria for selecting treatment approaches (stepwise management, diverticulum size, patient clinical status, institutional protocols), definitions of clinical success (complete symptom resolution vs. resolution with improvement), methods for assessing treatment success and recurrence (single vs. multiple treatment sessions) and variability in follow-up duration. Notably, follow-up tends to be shorter in studies evaluating flexible endoscopic treatment compared to more recent transoral surgical series and historical cohorts of patients undergoing open surgical repair<sup>1</sup>.

## Conclusion

Zenker's diverticulum, a pulsatile diverticulum, is a low-prevalence condition that typically affects patients between 50 and 70 years of age, predominantly males. The most common symptom is dysphagia. Diagnosis is confirmed by contrast radiography of the upper digestive tract and corresponding endoscopy. Treatment options include diverticulectomy with cricopharyngeal myotomy, which is the most commonly used technique, as well as endoscopic treatment, which is also a viable option according to various authors.

Currently, no randomized controlled trials directly compare surgical and endoscopic approaches for the management of Zenker's diverticulum. Comparative studies remain scarce and the criteria informing treatment selection are frequently unstated or insufficiently defined. This limitation is largely attributable to the low prevalence of the condition, the small sample sizes required for meaningful analysis and the highly specialized expertise concentrated in select centers.

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