**ABSTRACT**

Zenker's diverticulum (hypopharyngeal pouch) is a rare medical entity caused by herniation of esophageal mucosa and submucosa through an anatomical defect between the layers of the inferior constrictor muscle. It is believed that this occurs mainly due to incoordination between the stages of swallowing and timely opening of the cricopharyngeus. It usually affects the elderly and patients usually present with dysphagia, regurgitation of food, halitosis and aspiration. We describe one case of Zenker's diverticulum in a 75-year Saudi female whom we successfully managed in Ear Nose Throat (ENT) department, North West Armed Forces Hospital, Tabuk, Saudi Arabia by endoscopic staple-assisted diverticulotomy resulting in successful division of the intervening septum between the diverticulum and the esophagus. This technique was well-tolerated by the patient with early return to oral feeding and shorter hospital stay. Endoscopic staple-assisted diverticulotomy is a relatively safer technique of dealing with this problem as compared to the traditional open procedure causing more morbidity, and we advocate its use to reduce patient morbidity in selected cases.

**Key Words:** Zenker's diverticulum. Hypopharyngeal pouch. Endoscopic staple-assisted diverticulotomy.

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**CASE REPORT**

A 75-year female patient was seen in our unit with 4-5 months’ history of dysphagia, regurgitation of undigested food particles and halitosis. There was no history of weight loss or recurrent chest infections. She was otherwise healthy with history of well-controlled hypertension and osteoarthritides involving the joints of the lower limbs. Her office ear, nose and throat (ENT) examination including laryngopharyngoscopy using 70° and 90° rigid endoscopes was unremarkable. Her barium swallow showed accumulation of barium in a pouch posterior to the esophagus and to the left of midline (Figure 1). Computed tomography (CT) showed about 5 x 3.1 cm pouch posterior and to the left of esophagus (Figure 2). She was, hence, diagnosed as having Zenker's Diverticulum and surgery was planned. She was cleared by the internists and the anesthesiologists before the procedure; and she underwent endoscopic diverticulotomy using stapler under general anesthesia (GA). Using a Weerda's distending diverticuloscope, with one of its blades within the esophageal lumen and the other within the lumen of the pouch, the intervening septum comprising the cricopharyngeus and mucosa was clearly identified within the two blades. A nasogastric (NG) tube was inserted through the diverticuloscope for proper identification of esophagus and then removed. The pouch was cleansed of all the debris and the septum between the esophagus and the pouch was identified (Figure 3-left) and it was cut using Endopath® Endoscopic Linear Cutter 35 mm staple line (Ethicon Endo-Surgery Inc., OH, USA). Before that, to engage this septum fully within the jaws of the stapling gun, a traction silk suture was applied to the septum just to right side of midline and, as this suture was gently pulled, the jaws of the stapling gun were engaged up to the base of the pouch and the gun was fired. This slit the septum longitudinally and opened up the pouch into the esophagus (Figure 3-right). A NG tube was inserted for...
feeding purposes postoperatively. She tolerated the procedure well. She had gastrograffin study done on the second postoperative day that showed no leak and no collection anywhere; and she was allowed to start oral sips by mouth and then soft diet. The NG tube was removed on the third postoperative day. She was discharged home on the fifth postoperative day as she was freely ingesting almost normal diet. Her last post-operative visit to the clinic was 14 weeks after the surgery and she was completely asymptomatic.

**DISCUSSION**

Zenker's diverticulum is an acquired pulsion-type of diverticulum that develops in the elderly, most likely due to ageing process. Anatomically, there is a defect in the muscular walls (Killian's dehiscence) between the longitudinal (thyropharyngeus) and the circular muscle fibers (cricopharyngeus) of the inferior constrictor muscle through which the esophageal mucosa and submucosa herniate.\(^1\)\(^2\) Hence, by strict definition, it is not a true diverticulum as its wall is not composed of all the layers of the pharyngeal wall.

While it was first described by Ludlow in 1769, the diverticulum bears the name of Friedrich Albert von Zenker, a German pathologist, who described it in 1877. Later, Killian identified its origin as described above.\(^2\)

The pathogenesis of Zenker's diverticulum is believed to be due to chronic obstruction to the outflow of food bolus that occurs when there is loss of coordination of the buccal squirt and the opening of the cricopharyngeus.\(^3\)-\(^6\)

Zenker's diverticulum causes retention of food particles within the pouch. This accumulation leads to complaints of halitosis, regurgitation, aspiration and dysphagia.\(^7\)

The patient may note food particles on the pillow upon awakening in the morning. Very large diverticula may be seen as a mass in the neck. Cancer has been reported in the Zenker's diverticulum.\(^5\),\(^6\),\(^8\)

The diagnostic procedure of choice is barium swallow.\(^2\),\(^4\),\(^7\)

It not only defines its structural appearance, but also provides clues to underlying motility abnormalities. Upper GI endoscopy or any other modality is usually not required for the diagnosis.

Since most of the patients suffering from Zenker's diverticulum are elderly and this disease usually is responsible for causing aspiration and pneumonia, this makes it a justifiable reason to treat it surgically. Not to operate is probably only warranted, if the pouch is small i.e., less than 2cm,\(^9\),\(^10\) or if the patient's comorbid conditions do not allow. There is no medical treatment.

As for the surgery to be successful, two objectives have to be achieved. One is complete division of the cricopharyngeus to eliminate the zone of elevated intrapharyngeal pressure (cricopharyngeal myotomy) and the other is to eliminate the pouch as a reservoir of trapped fluid and food particles.\(^9\),\(^10\)

Historically, cricopharyngeal myotomy has been performed as treatment, but had been commonly associated with recurrence and poor resolution of symptoms. The surgical options are non-endoscopic and endoscopic. The non-endoscopic surgical options are open neck procedures that include diverticulectomy with cricopharyngeal myotomy, diverticulopexy with cricopharyngeal myotomy and diverticulopexy with cricopharyngeal myotomy.\(^9\)

The former procedure had been the commonly done method until now, when the endoscopic diverticulotomy has probably become the more commonly done procedure. The literature in recent times is full of studies advocating endoscopic treatment of Zenker's diverticulum as a safe procedure in most of the patients.\(^1\)-\(^3\),\(^5\)-\(^7\),\(^9\),\(^10\)
the esophagus and the pouch has been divided endoscopically using various techniques. It has been divided using diathermy. But the most commonly done division method is by utilizing endoscopic stapler gun for its ease of use, safety and easy availability. The endoscopic stapling technique was first used by Collard who described it in 1993. Carbon dioxide laser has also been used to divide this septum.

Another issue regarding endoscopic treatment of Zenker's diverticulum is the exposure of the intervening septum. This is because there are certain factors that result in poor endoscopic exposure of the septum and in such cases an open procedure may be more suitable. A study enumerated such factors including short neck, short hyomental distance and body mass index (BMI) higher than 27.2 kg/m². Another study highlighted the main limiting factors for proper exposure as prominent upper incisors, limited mouth opening and cervical spine problems that prevent adequate neck extension. This usually leads to abandonment of procedure, which in one UK audit has been reported to be up to 7.7%. Open procedure is then performed, a consent for which is usually taken before surgery or flexible endoscopic technique may have to be used. Also in such situation, flexible endoscopic septal division (FESD) has been shown to be a safer option.

In our case, we used the stapler gun. The stapler divides the intervening septum comprising of cricopharyngeus and mucosa and opens up the pouch into the esophagus. The pouch gradually becomes incorporated within the walls of the esophagus. Important point is that small pouches, preferably less than 3 cm long, are not advocated to be stapled, as the stapler blade is too long for the pouch and the chances of perforation of the pouch and mediastinitis are increased. Some have tried multiple rows of staples to divide the septum but there was no added benefit and there was risk of perforation.

The complication rates are low (2.6%) using the endoscopic technique as compared to open technique (11.8%). The main complication by either method is the risk of developing mediastinitis, which in the age group of patients with Zenker's diverticulum, could carry significant morbidity and mortality. Other procedure-specific complications reported are dental trauma. The average mortality is low (0.3%) and recurrence rates average 6% with a range of 0-22%.

To summarize, it is now well-established fact that endoscopic staple-assisted diverticulotomy has low morbidity and mortality with acceptable favorable outcome and is considered by surgeons as a preferable first-line treatment and the patients return to oral feeding within 12-24 hours after surgery, and discharged home within 24-48 hours. Our experience to manage the patient corroborates this fact. Only those patients, who are not deemed as suitable candidates or those who have recurrence after the endoscopic procedure, have the option to undergo open surgery.

REFERENCES