

Treatment of Zenker Diverticulum

Yogesh Vashist, Stefan Groth, Uwe Seitz

Endoscopic Approach

The Zenker diverticulum (pharyngoesophageal diverticulum) arises from the triangle of mucosa located between the inferior pharyngeal constrictors and the cricopharyngeal muscle (Killian triangle). This type of diverticula is a false diverticulum and more common than true esophageal diverticula. The treatment options range from various endoscopic techniques to open surgical resection.

Treatment of Zenker diverticulum with a flexible endoscope provides an alternative to surgery or the intraluminal approach with a rigid endoscope (Weerda laryngoscope). The “septum” between the diverticulum and the esophagus is transected, thereby creating a common cavity of esophageal lumen and diverticulum, allowing easier food passage. It is not always necessary to divide the complete septum between the esophagus and the diverticulum because patients already have a good relief of symptoms after incision of one third to one half of the septum. That is why the aim of the endoscopic treatment is the relief of symptoms and not necessarily the complete separation of the septum.

Indications and Contraindications

Feasible in any patient including those not appropriate for general anesthesia.

Preoperative Investigations and Preparation for the Procedure

- Clinical examination
- Contrast swallow (water-soluble)
- Ultrasound
- A large gastric tube is carefully placed in the upper esophagus

Procedure

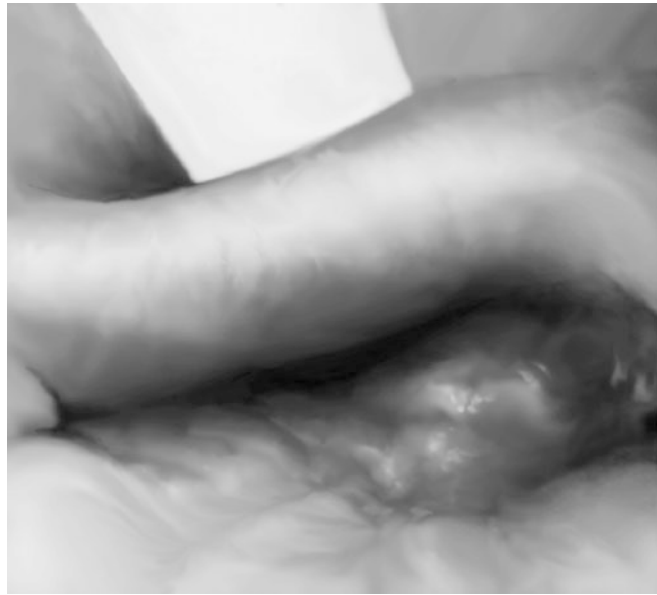
Intubation of the esophagus is often difficult in patients with a Zenker diverticulum. A pediatric endoscope can be used to facilitate intubation. If the diverticulum is filled with food, cleaning by using a large-channel endoscope should be first performed to avoid aspiration.

After intubating the esophagus, a Savary-Guillard wire is placed in the antrum, the endoscope is withdrawn, and a nasogastric tube is placed over the wire through the mouth.

The nasogastric tube indicates the entrance into the esophagus. This tube provides a better anatomical overview and simultaneously protects the esophageal wall during treatment (■ Fig. 16.1).

Alternatively a flexible diverticuloscope (Cook Endoscopy, Winston Salem, NC) can be introduced via the endoscope. It is designed as an overtube on the basis of the “Weerda” laryngoscope from otolaryngology. It has a double duckbill extremity, one to be placed in the esophagus and one for the diverticulum leaving the septum in the middle of the two bills. This device allows an excellent anatomical overview. Sometimes it can be quite challenging to get the device in position.

Once the endoscope is in position, there are different options on how to transect the septum. The most common ones are the treatment with argon-plasma coagulation and with a needle knife.

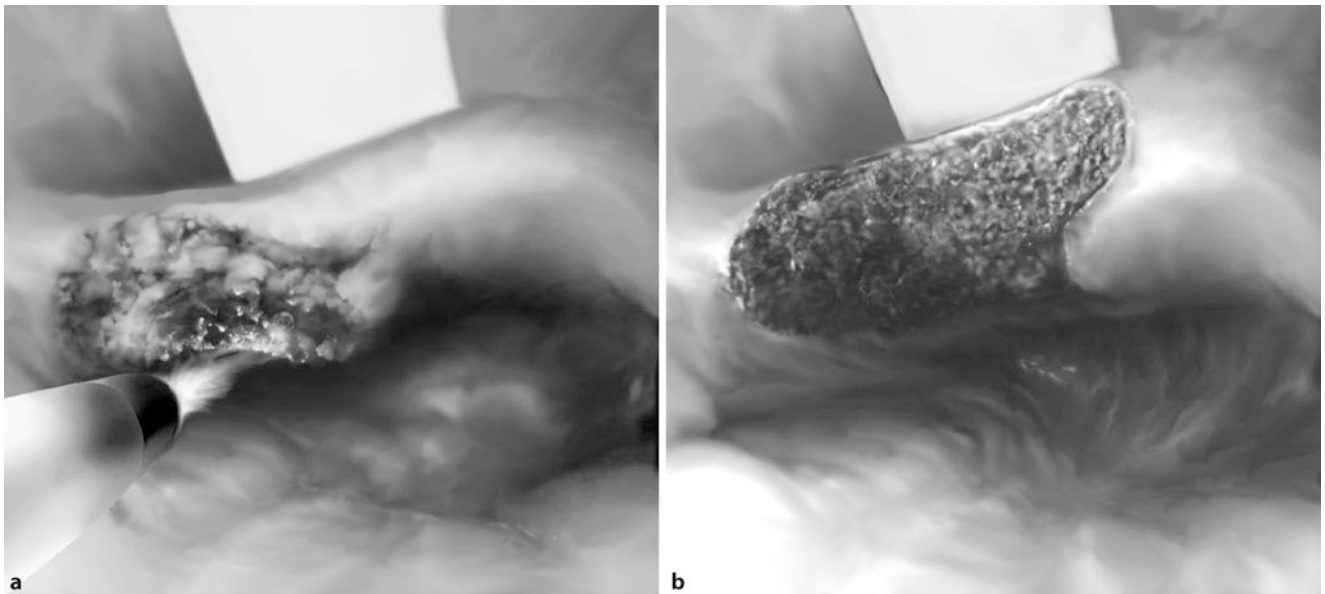


■ Fig. 16.1

Argon-plasma coagulation of the septum

The septum is treated with argon-plasma coagulation. The advantage of this method over conventional diathermy is the spray-like application. Bleeding from smaller vessels is avoided. In one session 1 cm of the septum is coagulated. The session is repeated after 4 weeks if required (■ Fig. 16.2a). The limitation of this method is that you can treat only the septum about a depth of 1 cm per session because the strong coagulation effect does not allow further treatment.

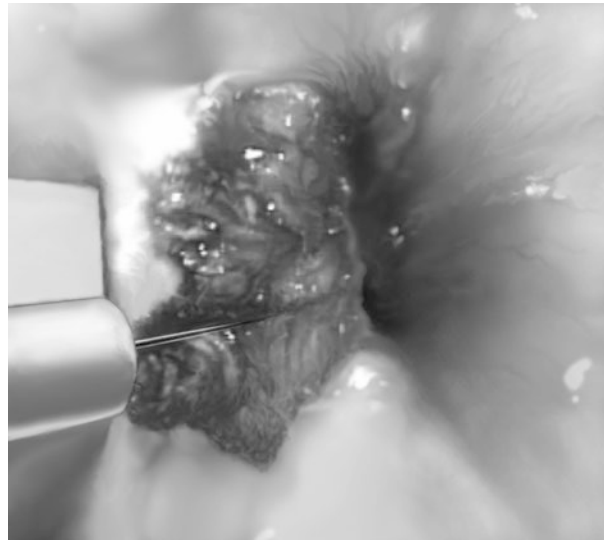
■ Figure 16.2b shows the effect of argon-plasma coagulation at the end of the first session.



■ Fig. 16.2

Needle knife incision

The beginning and the end of a session of needle knife incision are shown (■ Fig. 16.3). Fibers of the cricopharyngeal muscle are visualized. In our experience the risk of bleeding is slightly higher using the needle knife than using argon-plasma coagulation, particularly in the first session. Therefore fewer treatment sessions (on average, one) are needed for a good relief of symptoms. To avoid perforation on the distal end of the septum, one to two clips can be placed at the ground (at the distal end of the area treated).



■ Fig. 16.3

Residual septum

— Residual septum after successful endoscopic treatment (■ Fig. 16.4)



■ Fig. 16.4

Standard Postoperative Investigations

— No specific investigations are necessary.

Postoperative Complications

- Bleeding
- Perforation
- Mediastinitis
- Sepsis

Tricks of the Senior Surgeon

- Control bleeding with hemoclips and injection of diluted epinephrine (1:20,000) or with a hot biopsy forceps.
- Pay attention to keep the incision of the septum central to avoid bleeding.
- Use CO₂ insufflation for the endoscope.

Open Approach

- Most Zenker diverticula are located left dorsolateral. This is due to the vertebra, which represents the posterior rigid plane; hence the Zenker diverticulum juts out to the left and follows a vertical growth parallel to the esophagus.
- Zenker diverticula are classified according to Brombart, Morton and Bartley and Lahey.
- Lahey classification differentiates between three stages:
 - Stage I: no symptoms, local mild inflammation
 - Stage II: dysphagia and regurgitation
 - Stage III: esophageal obstruction, dysphagia, and regurgitation.

Indications

- Progress over time. Treatment is recommended for patients who have moderate to severe symptoms/complications (pneumonia or aspiration).

Contraindications

- Severe physical constitution

Preoperative investigations and preparation for the procedure

- Clinical examination
- Contrast swallow (water-soluble)
- Upper gastrointestinal endoscopy
- Ultrasound
- Manometry
- A large gastric tube is carefully placed in the upper esophagus

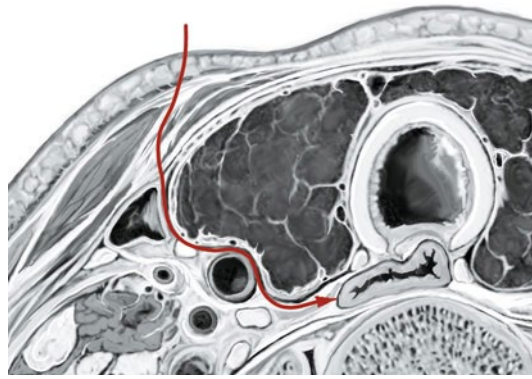
Procedure

Access

The left arm should be adjacent to the patient's body and the patient placed in a supine position with the head rotated to the right.

Approach

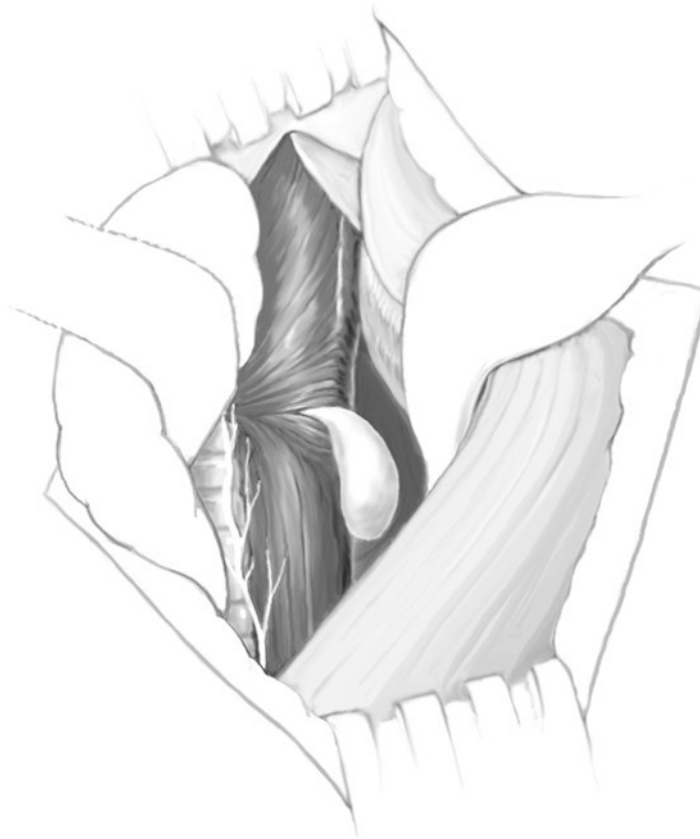
The approach to the diverticulum for surgical therapy comes through a left cervical incision (most Zenker diverticula present on this side) at the level of the cricoid cartilage on the anterior aspect of the sternocleidomastoid muscle just above the clavicle. The anatomical overview of the access to the cervical esophagus is given in [Fig. 16.5](#).



■ Fig. 16.5

Dissection

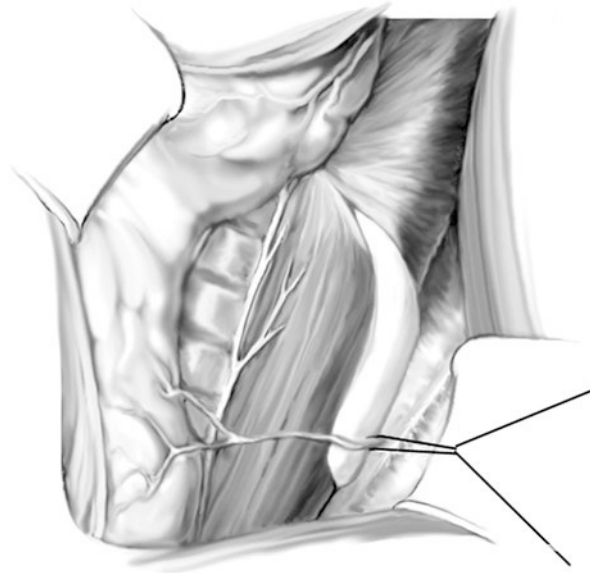
Dissection is performed between the medial aspect of the sternocleidomastoid muscle, which is pulled laterally, and the strap muscles by retracting the carotid sheath laterally and preserving the recurrent laryngeal nerve. The omohyoid muscle may be either retracted or transected. The thyroid gland is mobilized and vessels are dissected (■ Fig. 16.6).



■ Fig. 16.6

Mobilization of the esophagus and the diverticulum

The esophagus is mobilized from the prevertebral fascia, and the diverticulum is evident posterior to the esophagus. Large diverticula may extend into the mediastinum, but gentle traction and blunt dissection are sufficient to mobilize even the largest diverticula. ■ Figure 16.7 shows the anatomy of the cervical diverticulum.



■ Fig. 16.7

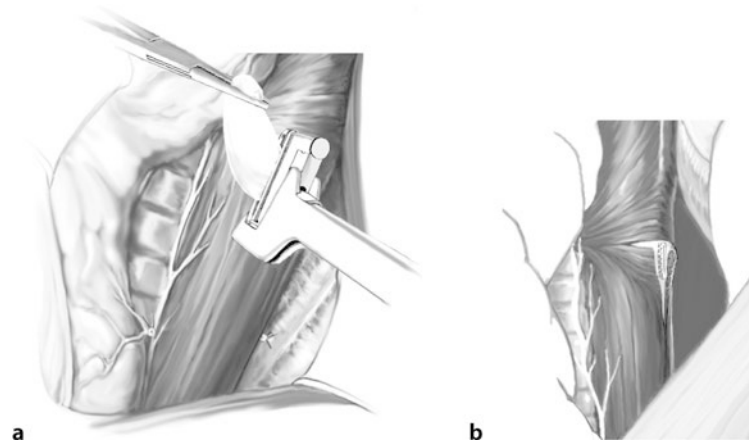
Preparation of the diverticulum

The neck of the diverticulum is dissected. Gentle traction on the diverticulum exposes the fibers of the cricopharyngeus muscle. Oral insufflation of air may help to find the diverticulum.

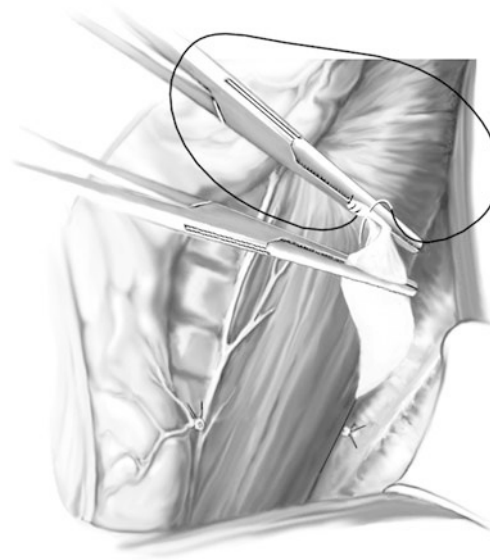
Myotomy

The cricopharyngeus muscles are divided and bluntly dissected from the mucosa. Myotomy of the pars transversa and of the upper esophagus is performed and is essential.

After myotomy the diverticulum can be addressed differently, depending on the size of the diverticulum. Small diverticula measuring up to 2 cm virtually disappear after the myotomy is completed and may be left alone or fixed cranially with the apex. They may be inverted and sutured to the prevertebral fascia, which prevents food retention without necessitating creation of a staple line or suture line that is at risk for fistula formation. Larger diverticula are resected with a linear stapler parallel to the esophageal lumen, taking care not to compromise the diameter of the esophagus. Alternatively open resection and two-layer closure is performed (■ Figs. 16.8 and 16.9).



■ Fig. 16.8



■ Fig. 16.9

Closure

A soft Penrose drain is placed at the resection line. The skin is closed after placing only a few subcutaneous sutures.

Standard postoperative investigations

- Contrast study of the upper gastrointestinal tract (not routinely performed before starting oral intake).
- Most patients may be started on a liquid intake within hours of the operation.
- The duration of hospitalization has been declining, and may be necessary for only 3 to 5 days.
- The drain is left *in situ* until solid food intake is possible.
- A solid intake should be started after the third postoperative day.

Postoperative complications

- Recurrent laryngeal nerve injury.
- Wound infection.
- Fistula formation/stump leakage – conservative treatment with drainage and opening of the wound is usually the appropriate treatment.
- Retropharyngeal abscess may require surgical intervention.
- Recurrence rates after resection of a cricopharyngeal diverticulum are low, if the cricopharyngeus muscle has been divided completely.

Tricks of the Senior Surgeon

- Placement of a large gastric tube helps to identify the esophagus and the diverticulum.
- Tension-free resection helps to avoid leakage.