

Case report

## Incomplete esophageal myotomy and early recurrence of an epiphrenic diverticulum

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**SUMMARY.** The established management of epiphrenic diverticula combines diverticulectomy with myotomy of the distal esophagus including the lower esophageal sphincter. We report a patient with prompt recurrence of an epiphrenic diverticulum after laparoscopic transhiatal diverticulectomy associated with esophagomyotomy and partial posterior fundoplication due to an incomplete myotomy.

**KEY WORDS:** epiphrenic diverticulum, esophagus, recurrence, surgery.

### INTRODUCTION

Lower esophageal pulsion diverticula occur in association with motor disorders of the esophagus, including hypertensive lower esophageal sphincter, nonspecific motor disorders, vigorous achalasia and diffuse esophageal spasm.<sup>1</sup> Progressive enlargement of the diverticula, obstruction to the passage of food and aspiration due to impaired swallowing may produce sufficient symptoms to indicate the need for surgery. Surgery consists in performing a diverticulectomy associated with esophagomyotomy and partial fundoplication. Completing a myotomy is the essential part of the operation since failure to do so has been shown to be associated with a higher incidence of diverticulum recurrence and suture line leaks.<sup>2</sup> However, the optimal length of the myotomy remains controversial. The left thoracotomy approach has been traditionally preferred but during recent years laparoscopic transhiatal diverticulectomy has also been used for the treatment of epiphrenic diverticula.<sup>3</sup>

We present a patient with prompt recurrence of an epiphrenic diverticulum after laparoscopic transhiatal diverticulectomy associated with esophagomyotomy and partial posterior fundoplication.

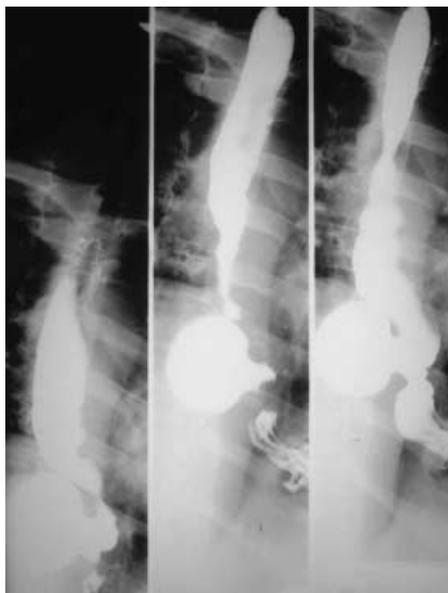
### CASE

A 45-year-old man with a 10-year history of intermittent dysphagia was referred to our unit for evaluation of worsening dysphagia to solid foods and liquids and weight loss caused by an epiphrenic diverticulum. The patient's medical history was remarkable for a lung abscess 3 years prior to coming to the unit. The patient's dysphagia was also associated with coughing and continuous retrosternal aching.

A barium swallow demonstrated a 6-cm epiphrenic diverticulum situated 4 cm above the cardia and delayed passage of contrast into the stomach (Fig. 1). Esophagoscopy visualized a large, food-filled diverticulum in the right side of the distal esophagus. The stationary manometric study showed the lower esophageal sphincter to be slightly hypotensive (10 mmHg) and a nonspecific motor disorder characterized by 20% nontransmitted contractions and 30% simultaneous waveforms was also identified in the distal esophageal body. The esophageal body amplitudes were within normal values. Twenty-four-hour esophageal pH monitoring was normal.

The surgical approach chosen was a laparoscopic transhiatal resection of the diverticulum combined with myotomy and partial fundoplication. The distal esophagus was encircled and dissected in the mediastinum until the epiphrenic diverticula pouch was reached. The pouch was carefully dissected until the diverticula neck was completely cleaned of all adherent tissue. Three linear endoscopic staplers

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**Fig. 1** Preoperative roentgenogram demonstrates large epiphrenic diverticulum presenting to the right.

(Endo GIA Universal, Tyco Healthcare, Spain) were used to perform the diverticulectomy after placing a 54F Maloney bougie inside the esophagus. The muscular layer was partially closed over the mucosal staple line. A myotomy was performed on the anterior esophageal wall and extended cranially to the lower level of the diverticula neck and extended distally for almost 1.5 cm onto the stomach. The hiatus was closed posteriorly to the esophagus and a partial posterior fundoplication was then constructed. On the first postoperative day a gastrografin swallow showed no leak and good esophageal emptying. The patient was discharged home 4 days after the operation, tolerating a soft diet.

The patient was essentially symptom free until 1 month after the operation, when moderate dysphagia with solids reappeared with a barium swallow showing nonperistaltic esophageal contractions and slight delay in passage of contrast into the stomach. Two months later symptoms aggravated with severe dysphagia with solids and liquids and regurgitations. The esophagogram revealed a recurrent epiphrenic diverticulum, the presence of nonperistaltic esophageal contractions and gentle tapering of the esophagus just below the diverticula neck (Fig. 2). The endoscopist did not find an organic stricture but some difficulty was encountered in passing the endoscope through the distal esophagus at the level of the lower limit of the neck of the diverticulum. After two dilatations, the patient was temporarily able to swallow liquids. An esophageal manometry revealed severe esophageal body hypomotility with aperistalsis and a moderate lower esophageal sphincter hypotony (8 mmHg).

An incomplete myotomy was suspected as the cause of the distal esophageal outflow obstruction



**Fig. 2** Recurrent epiphrenic diverticulum. Note esophageal spasm below the lower limit of the neck of the diverticulum.

and to explain the diverticulum recurrence. A reoperation was suggested to the patient. A left posterolateral thoracotomy was completed and the esophagus was dissected free from the aortic arch to the diaphragm. A 5-cm diverticulum was individualized. The neck of the diverticulum was stapled using a TA-60 stapler under endoscopic control. A wide myotomy was performed from 5 cm above the upper limit of the diverticula neck to the cardia. A short, thick band of residual hypertrophic muscle, probably left intact at the first operation, was clearly identified at the level of the diverticula neck. The postoperative gastrografin swallow showed disappearance of the diverticulum and good contrast advance toward the stomach without leak. On the sixth postoperative day the patient was discharged with good oral tolerance. Ten months after the reoperation the patient is reporting an excellent outcome with complete relief of symptoms and a gain in weight.

## DISCUSSION

Abnormal esophageal motility is present in all patients with epiphrenic diverticulum and is the underlying cause of its development. In some patients stationary manometry may fail to demonstrate the intermittent esophageal dysmotility. Nehra *et al.* have suggested the use of 24-hour motility recording in this category of dysfunction.<sup>1</sup> The established management of epiphrenic diverticula combines diverticulectomy with myotomy of the distal esophagus including the gastroesophageal junction.<sup>1,4</sup> Duranceau believes that the coordination dysfunction identified in his series of patients at the lower esophageal sphincter (LES) level should be taken into consideration, thereby justifying extending the myotomy to include the LES and 1 to 1.5 cm of the gastric muscularis.<sup>4</sup> Myotomy is an essential part of the treatment in patients with

symptomatic epiphrenic diverticula. Removing the diverticulum without addressing the abnormal motility has been associated with a higher incidence of diverticulum recurrence and a suture line leak rate of 10% to 20%.<sup>2,5</sup>

Habein *et al.* first reported recurrence of the diverticulum in four patients.<sup>6</sup> Three of these patients had pre-existing diffuse esophageal spasm; and three had leakage at the suture line early in the postoperative course. One of the patients had a recurrence of the diverticulum within a month of operation. Two more patients have been reported in two further series,<sup>2,7</sup> always in patients without added myotomy. Recently, Nehra *et al.* described a patient with a recurrent diverticulum after laparoscopic diverticulectomy with myotomy.<sup>1</sup>

Controversy persists about how long the esophagomyotomy should be and to what level it should extend, both proximally and distally. Streitz *et al.* advocate performing myotomy only in the area of the motor disorder,<sup>8</sup> sparing the lower esophageal sphincter unless it was hypertensive, thus avoiding the need for an added antireflux repair. Nehra *et al.* suggest that the myotomy should include the entire sphincter zone and the proximal length of motor abnormality, as determined by the preoperative manometric findings.<sup>1</sup> The usual practice is to perform the myotomy to the neck of the diverticulum, but if the symptoms are due primarily to the motor disorder rather than the diverticulum, failure to extend the myotomy over the length of the motor disorder may lead to persistent symptoms. In a series of 18 patients reported by Nehra *et al.*,<sup>1</sup> myotomy was limited to the LES in 10 patients, and in seven it extended with various lengths over the distal esophagus. In our patient the myotomy was correctly indicated but it was not extended cranially beyond the diverticula neck. This limitation of the myotomy might have played a role in allowing a recurrent diverticulum by not reducing enough the abnormal contractions recorded initially by manometry. An incomplete myotomy, a myotomy that did not

entirely remove the abnormal LES function, even if intermittent, or the incomplete healing of the initial myotomy certainly contributed to creating a distal functional obstruction, which is also a possible explanation for the recurrence.

Different groups are reporting good clinical results using a laparoscopic approach to perform the diverticulectomy and the myotomy. It may be technically difficult however, when using the laparoscopic approach, to reach the upper limit of the collar of the diverticulum, especially if the pouch is located more than a few centimeters from the gastroesophageal junction. It may also be difficult to perform a myotomy long enough to treat an extensive spastic abnormality by a laparoscopic approach alone.

Following this observation we believe that a myotomy is essential to treat the motor abnormality. However extension of the myotomy onto the stomach wall in order to remove any functional obstruction from an abnormally functioning LES is essential as well.

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