

Case Report

Simultaneous Laparoscopic Surgery for Esophageal Achalasia Combined with Epiphrenic Diverticulum: A Case Report

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Abstract: We report a case in which a 74-year-old man suffering from esophageal achalasia complicated with epiphrenic esophageal diverticulum was successfully treated with a simultaneous laparoscopic surgery. The gentleman was referred with symptoms suggestive of a passage disorder in the lower esophagus for the past 5 years. Esophagogastroduodenoscopy demonstrated an epiphrenic diverticulum at the left wall of the lower esophagus, and esophagography led to the suspicion of a combined esophageal achalasia. A simultaneous laparoscopic surgery with an abdominal approach was performed in which, following the opening of the esophageal hiatus, the diverticular wall was separated from the mediastinal organs and diverticulectomy was performed with linear staplers. After Heller's myotomy, Dor's fundoplication was subsequently performed in which both the incisional line of muscle layer and the suturing line of diverticulectomy were wrapped by the fornix of the stomach to make up for the wall strength and avoid the suture leakage. It was theoretically considered logical and effective to reinforce this vulnerable site with Dor's fundoplication. He had an uneventful recovery and a rapid relief from symptoms following surgery.

Keywords: achalasia; epiphrenic diverticulum; laparoscopic surgery



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1. Introduction

An epiphrenic diverticulum is caused by the inability of the lower esophageal sphincter (LES) to relax, which leads to an elevation of intraluminal pressure like that observed in achalasia [1]. The laparoscopic approach for epiphrenic diverticulum is a common procedure, but there are apprehensions due to the perioperative complications associated with diverticulectomy [2–5]. Here, we report a successfully treated case of esophageal achalasia combined with an epiphrenic diverticulum by a simultaneous laparoscopic procedure.

2. Detailed Case Description

2.1. Case Presentation

A 74-year-old man with a history of rheumatoid arthritis and cerebellar infarction was referred to our hospital with a complaint of ongoing chest discomfort while eating, which had been occurring for the past 5 years. An esophagogastroduodenoscopy (EGD) performed 3 years ago had indicated no abnormal esophageal findings. However, an EGD performed one year later led to the diagnosis of an epiphrenic diverticulum in the lower esophagus. The changes in appearance of the diverticulum during these 3 years are shown in Figure 1. Further examination revealed a chronologically enlarged epiphrenic diverticulum at the left wall of the lower esophagus in the EGD. He was also suspected

of having esophageal achalasia based on the L-shaped meandering of the esophagus, as observed on barium esophagography (Figure 2a). The lumen of the esophagus was narrowed due to the compression by the diverticulum at the esophagogastric junction (EGJ) (Figure 2b).

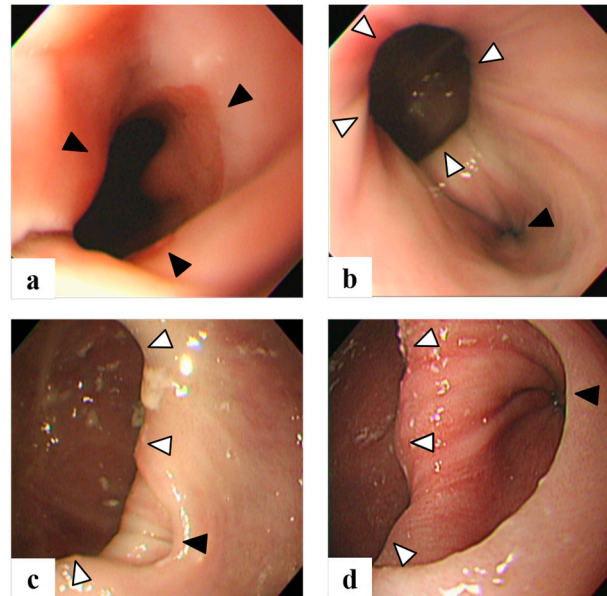


Figure 1. The changes in appearance of the diverticulum in EGD. (a) Mild esophageal dilatation with narrowing at the EGJ was observed three years ago (black arrowhead). However, there were no abnormal findings that indicated the occurrence of an epiphrenic diverticulum. (b) EGD one year ago revealed the occurrence of an epiphrenic diverticulum at the left wall of the lower esophagus (white arrowhead) with narrowing lumen at the EGJ (black arrowhead). (c) EGD five months before the operation revealed the enlargement of the diverticulum, and the true lumen of esophagus was narrowed due to the compression by the diverticulum (black arrowhead). (d) Two months before the operation, EGD revealed the further enlargement of the diverticulum (white arrowhead).

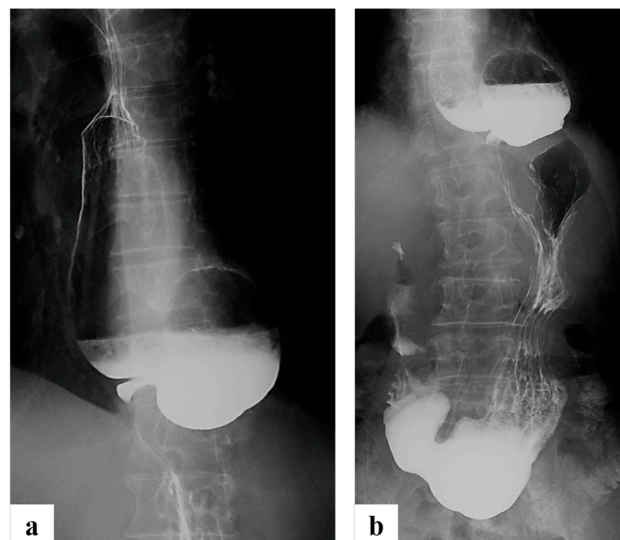


Figure 2. The findings of esophagography before operation. (a) L-shaped meandering of the esophagus and an epiphrenic diverticulum of 6.7 cm in diameter at the left wall of the lower esophagus were observed in esophagography. (b) The lumen of the esophagus was narrowed due to compression by the diverticulum at the EGJ.

2.2. Surgical Procedure

He was diagnosed with a combination of esophageal achalasia (advanced sigmoid type, Grade I) and an epiphrenic diverticulum, and a simultaneous laparoscopic surgery was performed. The surgery was performed in a lithotomy position, in which the surgeon assumed the French position. The intraoperative surgical views are shown in Figure 3. Five trocars were inserted into the abdominal cavity: (1) periumbilical 12 mm camera port, (2) 12 mm left hypochondrial right-hand working port, (3) 5 mm right hypochondrial left-hand working port, (4) 5 mm left anterior axillary retraction port and (5) 5 mm subxiphoid liver retractor port. The round ligament of the liver was fixed to the abdominal wall with a piercing ligation using a 3-0 prolene needle suture, in order to keep the operative field broad. The liver branch of the vagal nerve was preserved. After exposure of the abdominal esophagus, the diaphragm was cut at the anterior part of esophageal hiatus (Figure 3a), and the diverticular wall was separated from the surrounding organs using a combination of sharp and blunt dissection (Figure 3b). A Penrose drain was passed behind the abdominal esophagus in order to prevent direct grasping of the stomach and esophagus, and to pull the stomach into the abdominal cavity for retraction, thereby avoiding injury to both the stomach and esophagus. The diverticular wall was then properly excised using two linear staplers, taking care to avoid esophageal wall injury (Figure 3c). The most critical part is pinching the diverticular wall using a suture device horizontally along the esophagus and cutting it with several suture devices in a planned manner. After the resection of the diverticulum, a craniocaudal incision was made in the esophageal muscle layer around the suture line after diverticulectomy (Figure 3d), and both the incisional line of the muscle layer and the suture line were wrapped by the fornix of the stomach (Figure 3e,f). After the resection of the diverticulum, the absence of anastomotic leakage or intraluminal stenosis was confirmed via endoscopic intraluminal observation (Figure 3g). Heller's myotomy and Dor's fundoplication were then performed to recreate the antireflux valve. Intraoperative EGD after Dor's fundoplication revealed the enlargement of the EGJ and the easiness of the scope passage (Figure 3h). The surgery lasted 276 min, and the intraoperative blood loss was 50 g.

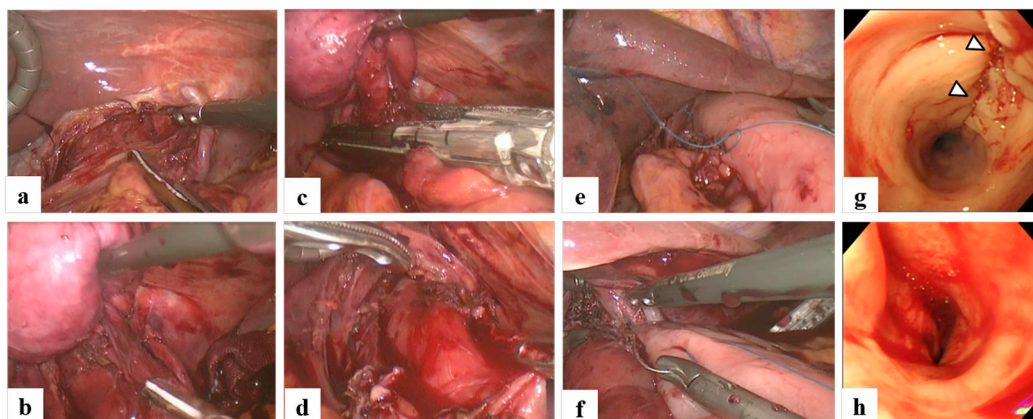


Figure 3. The scenes in laparoscopic surgery for the treatment of esophageal achalasia combined with epiphrenic diverticulum. (a) After exposure of the abdominal esophagus, the diaphragm was cut at the anterior part of esophageal hiatus. (b) The diverticular wall was separated from the surrounding organs using a combination of sharp and blunt dissection. (c) The diverticular wall was cut using two linear staplers horizontally along the esophagus in a planned manner. (d) After the resection of the diverticulum, a craniocaudal incision was made in the esophageal muscle layer around the suture line (Heller's myotomy). (e,f) Both the incisional line of the muscle layer and the suture line were simultaneously lapped by the fornix of the stomach to recreate the antireflux valve and avoid a suture failure (Dor's fundoplication). (g) In intraoperative endoscopic examination after diverticulectomy and Heller's myotomy, suture failure was not observed (white arrowhead). (h) Intraoperative EGD after Dor's fundoplication revealed the enlargement of the EGJ and the easiness of the scope passage.

2.3. Clinical Follow-Up

He started taking oral intake on the next operative day after confirming the absence of suture leakage. Postoperative esophagography at five days after operation revealed no evidence of interference in the passage at the lower esophagus and no apparent regurgitation. He was discharged on the twelfth postoperative day without any postoperative complications. The preoperative symptoms of the passage disorder rapidly improved after surgery and had not relapsed by the follow-up review at 70 months.

3. Discussion

The co-existence of an epiphrenic diverticulum and achalasia has been observed in only 2.2–10% of cases of achalasia [2]. Thoracoscopic or laparoscopic diverticulectomy is necessary after treating abnormal esophageal motility dysfunction [2–5]. Achalasia is defined as an esophageal motor dysfunction characterized by LES relaxation failure and esophageal motility functional disorder [6,7]. In cases with severe symptoms such as dysphagia, regurgitation to the oral cavity, chest pain, and body weight loss caused by achalasia or diffuse esophageal spasm (DES), endoscopic intervention or surgical procedure is often chosen [6,7]. Peroral endoscopic myotomy (POEM) is one of the non-surgical endoscopic procedures for the treatment of achalasia and DES and is the emerging treatment of choice in Japan and worldwide [8,9]. However, in cases where achalasia and epiphrenic diverticulum are joint illnesses, POEM is not sufficient. In recent years, diverticular peroral endoscopic myotomy (D-POEM), which is a septotomy of the diverticulum using the POEM technique, has also been reported to be an effective endoscopic intervention for the treatment of an epiphrenic diverticulum [9,10]. Additionally, diverticulum septotomy for Zenker's diverticulum using the POEM technique (Z-POEM) has also been attracting attention as a revolutionary, effective, and safe endoscopic approach for Zenker's diverticulum. Further improvement in the results of minimally invasive treatment for esophageal diverticulum using the POEM technique can be expected [11]. However, in recent years, there have been some instances in which the occurrence of reflux symptoms and persistence of passage disorders have been observed after POEM [7]. Therefore, surgical treatment for refractory esophageal diverticula should remain a last resort option.

A major disorder of motility is found in most patients with epiphrenic diverticulum, being achalasia-like in a consistent number of cases. Rossetti came up with a new three-step technique to cure the disease (diverticulectomy) and its cause (myotomy), finally adding a fundoplication to prevent postoperative reflux (Nissen–Rossetti's fundoplication) [12]. The advent of laparoscopic techniques made this operation feasible through laparoscopic access. Generally, a Heller–Dor operation including the myotomy of the lower esophagus and fundoplication is performed as the surgical procedure for combined achalasia and epiphrenic diverticulum, and the success rate is around 90% [13]. Moreover, many institutions prefer the laparoscopic procedure due to its widespread applications and superiority [14]. There have been several reports of laparoscopic surgery for esophageal achalasia with epiphrenic diverticula, because of its minimally invasive nature [12–14]. However, it should be noted that this procedure is not necessarily safe due to suture leakage and associated complications. Melman et al. and Achim et al. have reported that suture leakage after the diverticulectomy occurs in approximately 18–23% of all cases [4,14,15]. It has previously been reported that the diverticulectomy is commonly reinforced with layered sutures, and Heller–Dor's procedure is performed at the contralateral wall of the esophagus [15]. However, this method may result in poor dilatation and obstruction due to the contralateral suture line in the lower esophagus. Our method was to cover and suture both the staple line of the epiphrenic diverticulum and the edge of the incised muscle layer with the gastric fundus which has a firm serosa. This can reduce the LES pressure in the lower esophagus and reinforces the diverticulum staple line and the missing part of muscle layer together. We believe that this procedure is an additional technique that can provide further reinforcement to the common Heller myotomy and Dor fundoplication. Therefore, considering the

occurrence of suture leakage at the site, it is theoretically considered logical and effective to reinforce this vulnerable site with Dor's or Nissen–Rossetti's fundoplication.

In our study, there were some limitations. Firstly, the diagnosis of esophageal achalasia was not confirmed by manometry. It is possible that dilatation and motility dysfunction in the oral esophagus after obstruction due to an epiphrenic diverticulum can occur in a manner similar to that of achalasia. Secondly, the functional improvement of LES, the esophageal motility, and the degree of postoperative gastro esophageal reflux were not examined by manometry or 24 h pH monitoring. The most important point of our procedure is that the incisional line of the muscle layer and the suturing line of diverticulectomy were wrapped by the fornix of the stomach to make up for the wall strength. The result of this procedure was satisfactory without any complications. Depending on the location and size of the epiphrenic diverticulum and the degree of achalasia, further adjustments may be required for each case.

4. Conclusions

We focused on approaches and surgical innovations while performing simultaneous laparoscopic Heller–Dor's surgery for treating patient suffering from esophageal achalasia with an epiphrenic diverticulum.

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Abbreviations

LES, lower esophageal sphincter; EGD, esophagogastroduodenoscopy; EGJ, esophagogastric junction; DES, diffuse esophageal spasm; POEM, peroral endoscopic myotomy; D-POEM, diverticular peroral endoscopic myotomy.

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