

Diaphragmatic Hernia Following Thoracoabdominal Esophagectomy: A Case Report

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A 75-year-old woman underwent an esophagectomy for thoracic esophageal cancer via right thoracic and abdominal incisions. After resection, the gastric tube was pulled into the posterior mediastinum and intrathoracic esophagogastric anastomosis was performed. Her postoperative course was uneventful until the oxygen saturation decreased to 88% along with the sudden onset of dyspnea on the third postoperative day. A plain chest X-ray demonstrated gas extending from the posterior mediastinum to the left lower hemithorax. As a result, a diagnosis of diaphragmatic herniation of large bowel was made and an emergency laparotomy was performed. After reducing the herniated transverse colon, the enlarged esophageal hiatus was repaired with interrupted sutures and a sheet of Merlex mesh. The patient subsequently recovered well and was discharged on the 36th postoperative day.

Introduction

Postoperative diaphragmatic hernia has been described most frequently in patients undergoing surgery for paraesophageal hiatus hernia or achalasia^{1)~5)}, however, it seldom occurs after an esophagectomy. Our literature survey covering the past 20 years identified only 34 such cases^{3)4)9)~24)}.

In this report, we describe a patient who developed a diaphragmatic hernia after undergoing a thoracoabdominal esophagectomy, along a discussion of the causes and treatment.

Case

The case was a 75-year-old female patient who complained of difficulty swallowing. Her past history included a cholecystectomy in 1992. Further,

she had been undergoing treatment for hypertension since 1995. Her family history included a brother who died from laryngeal cancer.

The onset was the development of difficulty in swallowing in August 1999. The following month, upper gastrointestinal fiberoptic endoscopy was performed and she was diagnosed with thoracic esophageal cancer by a local physician. She was referred to our department for surgical treatment.

At the time of admission, her height was 153.5 cm and she weighed 38 kg. Her nutritional status was moderate. Blood pressure was 130/80 mmHg and heart rate was 70/min and regular. The bulbar conjunctiva was neither anemic nor icteric. Physical findings of the chest and abdomen were normal. Blood chemistry was normal except for a

mild decrease in hemoglobin and albumin concentrations, which were 11.4 g/dl and 3.4 g/dl respectively.

Transmittance of both lung fields was increased on plain chest X-ray films and pulmonary emphysema was suspected. No abnormalities were found in bone, soft tissue or heart shadows.

Upper gastrointestinal X-ray series revealed a circular depressed lesion with sharp marginal swelling in the middle thoracic esophagus extending partially into the upper thoracic esophagus. Its longitudinal diameter was approximately 6 cm. A circular depressed lesion with sharp marginal swelling was observed by upper gastrointestinal fiberoptic endoscopy in the esophagus 32~37 cm from the incisors.

Thickening of the middle thoracic esophageal wall was found on chest CT-scan. The middle thoracic esophageal lymph nodes were enlarged and metastasis to the primary lymph nodes was suspected. These test results were negative for remote metastasis. The diagnosis was middle thoracic esophageal carcinoma (T2, N1, M0, Stage II). On October 19, 1999, subtotal thoracic esophagectomy with lymphadenectomy of the secondary lymph nodes was performed via right thoracic and abdominal incisions. Reconstruction was accomplished by intrathoracic esophagogastrostomy. The gastric tube was lifted into the right thoracic cavity through the esophageal hiatus after the esophagus was removed. The esophageal hiatus was not sutured nor was the lifted gastric tube fixed to it. The pathological finding of the resected specimen was a 6.0 × 4.0 cm type 2 esophageal carcinoma, the infiltration of which was limited to the muscularis propria (mp). The histologic classification was well differentiated squamous cell carcinoma. The right cardiac lymph node (No. 1) was positive for metastasis. The final diagnosis was p Stage III.

Postoperatively, the patient was initially main-

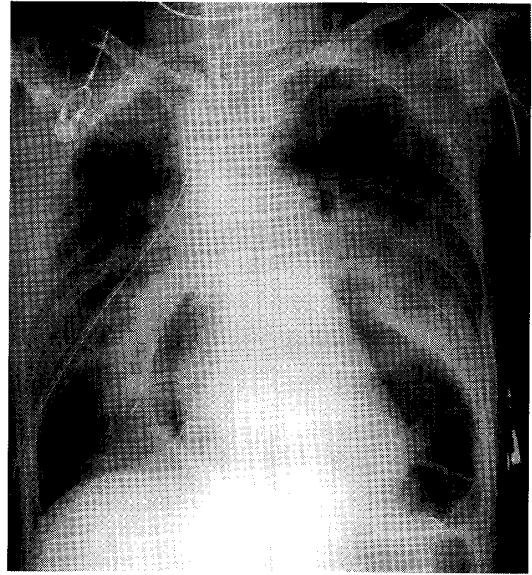


Fig. 1 Plain chest X-ray

A huge gas-filled viscus with haustra extends from the posterior mediastinum to the left lower hemithorax.

tained on mechanical ventilation, but her course was uneventful and the endotracheal tube could be removed on the third postoperative day. Because a plain abdominal X-ray suggested the presence of paralytic ileus, the administration of a drug to stimulate intestinal peristalsis was started on the same day. About 12 hours after the first dose, dyspnea occurred. When a blood gas analysis was subsequently performed, it showed an acute decrease in oxygen saturation to 88%.

An examination showed the patient's breath sounds to be diminished on both inspiration and expiration. The abdomen was distended and intestinal sounds were hypoactive, without any evidence suggestive of peritonitis. On plain X-rays of the chest and abdomen, the accumulation of gas, which was continuous with the intraperitoneal bowel gas, was demonstrated from the posterior mediastinum to the left lower hemithorax (Figs. 1 and 2).

Based on these findings, a diagnosis of diaphragmatic herniation of the bowel was made

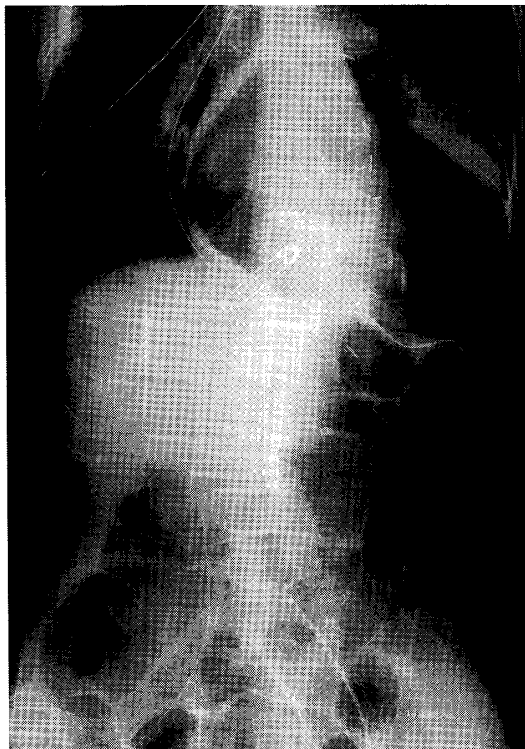


Fig. 2 Plain thoracoabdominal X-ray
The huge area of collected gas demonstrated in Fig. 1 is continuous with the intraabdominal bowel gas.

and an emergency laparotomy was performed.

After the abdomen was opened, the transverse colon was found to be herniated into the posterior mediastinum and left lower hemithorax through the esophageal hiatus along the left side of the reconstructed esophagus. The herniated transverse colon was reduced while the colonic contents were removed by intraoperative colonoscopic aspiration in order to achieve decompression. The blood supply to the herniated colonic segment was preserved and, as a result, no bowel resection was required. The enlarged hiatus was reduced in size by gathering the margin with interrupted sutures and the repaired area was strengthened by placing a sheet of Merlex mesh (BARD Co, Ltd) over the hiatus (Fig. 3). The patient subsequently showed a good recovery, and was discharged on the 36th postoperative day.

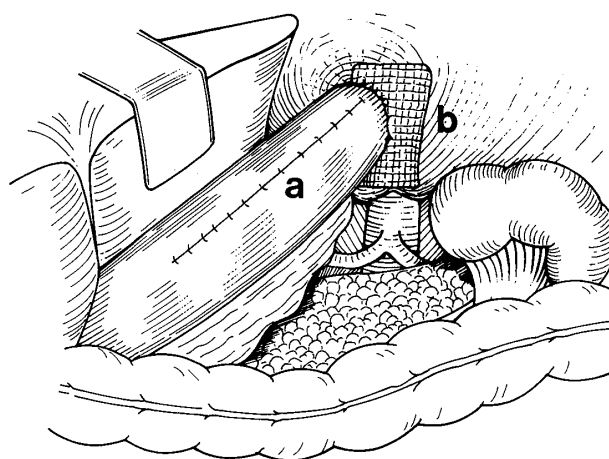


Fig. 3 The enlarged hiatus was repaired with interrupted sutures and a sheet of Merlex mesh was placed over the hiatus.
a: gastric tube, b: merlex mesh.

Discussion

Postoperative diaphragmatic hernia has been described most frequently in patients undergoing surgery for either a paraesophageal hiatus hernia or achalasia of the cardia^{1)~5)}. This complication has also been reported after a rib resection for drainage of a left subphrenic abscess⁶⁾, a thoracoabdominal splenectomy⁷⁾, and a proximal gastric resection with Billroth II anastomosis⁸⁾.

However, a diaphragmatic herniation after an esophagectomy, as occurred in the present case, is a rare event. Our literature survey covering the past 20 years identified only reports of 34 such cases^{3)4)9)~24)}. According to van Sandick et al²³⁾, diaphragmatic hernia occurs in about 2% of patients who undergo an esophagectomy, with an equal distribution between the genders. The main risk factor is an enlargement of the esophageal hiatus during esophagectomy. Neither the approach used for the esophagectomy (transthoracic or transhiatal) nor the method of reconstruction (pulling up a gastric tube or colonic interposition) has any impact on its occurrence.

We consider that the following factors were involved in the present case : ① an enlargement

and weakening of the esophageal hiatus by surgical procedures during an esophagectomy, ② increased intraabdominal pressure because of paralytic ileus, ③ enhanced intestinal peristalsis because of medication for ileus, and ④ an elongation of the transverse colon.

If the diagnosis is delayed, then strangulation and perforation of the herniated viscus can occur⁽⁴⁾¹⁰⁾, thus necessitating emergency surgery with its attendant high mortality²³⁾²⁴⁾. The development of dyspnea and the findings on a plain chest X-ray permitted us to make an early diagnosis in the present case. When this complication develops soon after surgery, it can be asymptomatic in some cases²³⁾.

The performance of careful routine radiography of the chest is very important to detect such asymptomatic hernias. Small and asymptomatic hernias in patients with esophageal carcinoma or in patients for whom long-term survival cannot be expected are an indication for conservative management, including observation, but a surgical repair is necessary in all other cases. Of the 34 patients reported during the past 20 years, 28 were treated by surgery.

As a rule, the surgical treatment of a diaphragmatic hernia consists of a reduction of the herniated viscus and a repair of the enlarged esophageal hiatus. The hiatus is usually reduced in size by gathering the margin with interrupted sutures. A sheet of Merlex mesh or other material is occasionally added to strengthen the repaired area, as in the present case. The transabdominal approach was used in our patient and is the preferable approach, being employed in 19 of the 28 reported cases. If there are intrathoracic adhesions, however, a transabdominal reduction may be difficult to perform. In such cases, a thoracotomy should be performed, and reduction surgery was carried out by a thoracotomy in 9 of the 28 reported patients. With the other 8 patients, no

information regarding the approach was given. The esophageal hiatus is always enlarged by an esophagectomy. To prevent postoperative herniation, the hiatus should be routinely reduced in size after an esophagectomy. If a hernia is diagnosed early and reduced correctly, the outcome is usually good and this complication is thereafter no longer life-threatening. No operative death was reported among these 28 patients. After an esophagectomy, the risk of diaphragmatic herniation should therefore be kept in mind and included in the differential diagnosis when complications occur.

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開胸開腹食道切除術後に発生した横隔膜ヘルニアの1例

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食道癌術後3日目に横行結腸が嵌頓した食道裂孔ヘルニアの1例を経験したので報告する。症例は75歳，女性。2型の胸部中部食道癌に対して右開胸開腹胸部食道亜全摘術，胸腔内食道胃管吻合術を施行したが，術後3日目に突然の呼吸困難を呈した。胸腹部単純X線上，縦隔内に巨大な大腸ガス像を認め，大腸を内容とした食道裂孔ヘルニアと診断し，同日緊急開腹術を施行した。食道裂孔の左側より横行結腸が縦隔内に脱出し，裂孔部で嵌頓していた。ヘルニア内容を腹腔に還納し，食道裂孔の縫縮とメッシュによる補強を行った。術後経過は比較的良好で，術後36日目に軽快転院となった。食道癌術後の食道裂孔ヘルニアはきわめてまれな合併症であるが，その治療として食道裂孔の縫縮およびメッシュによる補強が有用であった。