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Petersen's Hernia after Esophagectomy With Antesternal Jejunal Reconstruction: Case Report

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Petersen's hernia after esophagectomy is quite rare. The patient was a 75-year-old man who had undergone esophagectomy via right thoracotomy and reconstruction with a jejunal loop by the antesternal route in 2014. In March 2015, severe acute abdominal pain occurred the next day. A contrast-enhanced abdominal computed tomography scan revealed a diffuse low density area in the abdominal cavity and partial dilatation of the small intestine with torsion of the superior mesenteric artery. The patient underwent emergency laparotomy, revealing chyle-like ascites and pallor of almost the entire small intestine due to circulatory impairment because of strangulation after herniation through Petersen's defect. After strangulation was relieved, the color and motility of the small intestine recovered rapidly. Then we closed the defect between the jejunal pedicle and the transverse mesocolon. This is the first English report showing Petersen's hernia after esophagectomy.

Key words: Petersen's hernia – Esophagectomy – Complication

Recently, internal hernia has been recognized as a potential complication of Roux-en-Y gastric bypass (RYGBP), with an incidence of 3.1% to 9.7%.[1–5] Weight loss is considered to be a risk factor for internal hernia in patients with Roux-en-Y (R-Y) reconstruction.[3,6,7] In addition, elevation of intra-abdominal pressure increases the risk of herniation by a small intestine loop.[6,8] This is the first English report showing Petersen's hernia after esophagectomy. Herein we report this case together with discussion of the relevant literature.

Case Report

The patient was a 75-year-old Japanese man who had undergone esophagectomy via right thoracoto-

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Table 1 Results of blood gas analysis (room air) on admission

Test item	Value
pH	7.642
pCO_2	13.1 mmHg
pO_2	85.9 mmHg
HCO_3	13.8 mmol/L
Base excess	−7.0 mmol/L
AnGap	17.3 mmol/L
sO_2	97.1%

Table 2 Laboratory findings on admission

Test item	Value	Test item	Value
White blood cell	3400 /μL	Alb	3.7 g/dL
Red blood cell	412×10^4/μL	T-bil	0.6 mg/dL
Hemoglobin	13.5 g/dL	AST	56 IU/L
Hematocrit	40.0%	ALT	26 IU/L
Platelet	15.3×10^4/μL	ALP	271 IU/L
Prothrombin time	77.8%	BUN	17.7 mg/dL
Prothrombin time (international normalized ratio)	1.13	Cr	0.89 mg/dL
Fibrin/fibrogen degradation products	3.5 μg/mL	CRP	0.08 mg/dL
D-dimer	1.3 g/dL		

my and reconstruction with a jejunal loop by the antesternal route in 2014 (pT1b.sm1/N0, /M0, and pStage I).

In March 2015, endoscopy was performed at 155 days after esophagectomy. The next day, the patient developed severe acute abdominal pain and was transported to hospital by ambulance with a diagnosis of acute abdomen.

On admission, the patient was 157.5 cm tall and weighed 49 kg. His temperature was 36.7°C, blood pressure was 116/85 mmHg, respiration rate was 24 breaths/min, and pulse rate was 90 beats/min. There was an upper abdominal scar from the transverse incision of his previous esophagectomy. Blood gas analysis revealed compensatory respiratory alkalemia in response to metabolic acidosis (Table 1). Hematologic tests and biochemistry tests showed no abnormal findings (Table 2).

A contrast-enhanced abdominal computed tomography (CT) scan displayed a diffuse low density area in the abdominal cavity (edema of the small bowel mesentery) and partial dilatation of the small intestine with torsion and obstruction of the superior mesenteric artery (Fig. 1). Based on these findings, a diagnosis of internal hernia after esophagectomy was made, and emergency laparotomy was performed.

During surgery, chyle-like ascites were noted, and almost the entire small intestine was pale, indicating circulatory insufficiency. There was strangulated herniation of the small intestine through Petersen's defect (the defect between the mesentery of the Roux limb and the transverse mesocolon after esophagectomy and reconstruction with a jejunal loop by the antesternal route), which is a defect between the mesentery of the Roux limb and the transverse mesocolon that occurs after esophagectomy with jejunal reconstruction (Fig. 2). We relieved the strangulation, after which the color and motility of the strangulated intestine recovered rapidly. Then we closed the jejunojejunal mesenteric defect and Petersen's defect under direct vision using 3-0 nonabsorbable sutures (Fig. 3).

Discussion

In gastric cancer patients who undergo laparoscopic distal gastrectomy with Roux-en-Y (R-Y) reconstruction, Petersen's defect is created as the space between the Roux limb and the transverse mesocolon. Petersen's defect also exists after esophagectomy with reconstruction using a jejunal loop. Thus, there is a possibility of internal hernia occurring after laparoscopic distal gastrectomy with R-Y reconstruction. In fact, laparoscopic Roux-en-Y gastric bypass (RYGBP) is reported to be associated with a high rate of postoperative internal hernia, ranging from 3.1% to 9.7%.[1–5]

It was reported that 7.5% to 27.6% of internal hernias occurred through Petersen's defect after laparoscopic RYGBP, and these hernias were associated with a high frequency of bowel resection and high mortality rate.[2–5] The incidence of internal hernia may be higher after laparoscopic RYGBP because laparoscopy causes less surgical trauma and fewer adhesions than open surgery.[5]

We conducted a literature search of the MEDLINE and PubMed databases using the key words "Petersen's hernia" and "esophagectomy," but found no papers until 2015.

An internal hernia can occur when rapid weight loss reduces intraperitoneal fat and enlarges a surgically created mesenteric defect, as well as loosening the mesenteric sutures.[6,7] In addition, increased intra-abdominal pressure during pregnancy due to enlargement of the uterus increases the risk of herniation of a small intestinal loop.[6,8]

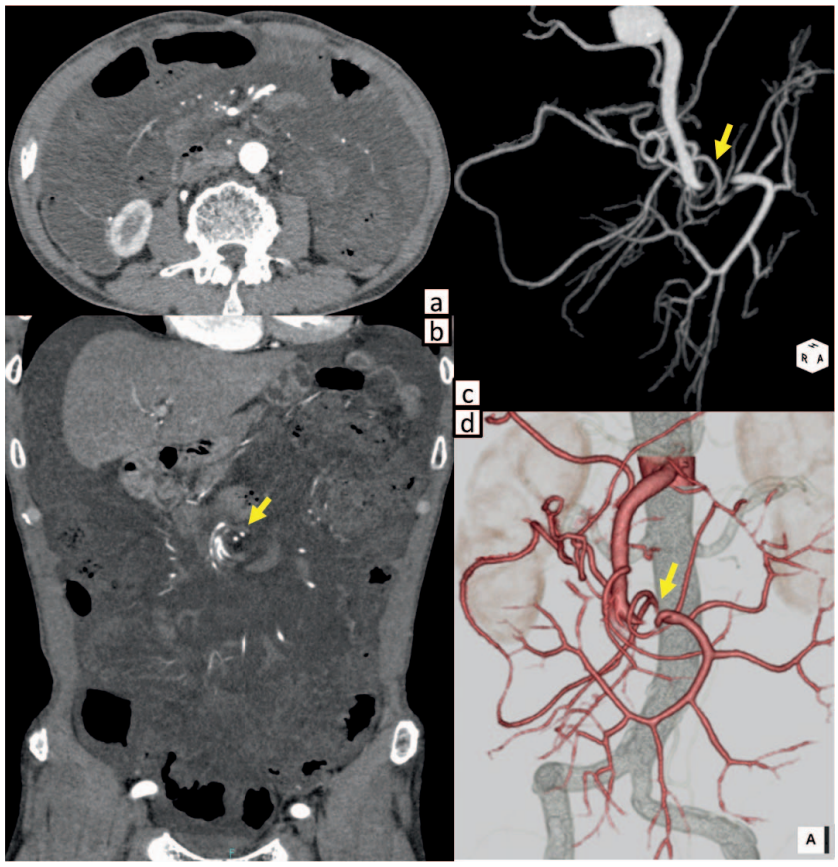

Fig. 1 CT findings on admission. (a and b) The small bowel mesentery shows edema and is twisted (arrow in b). (c and d) Torsion of the mesenteric artery (arrows).

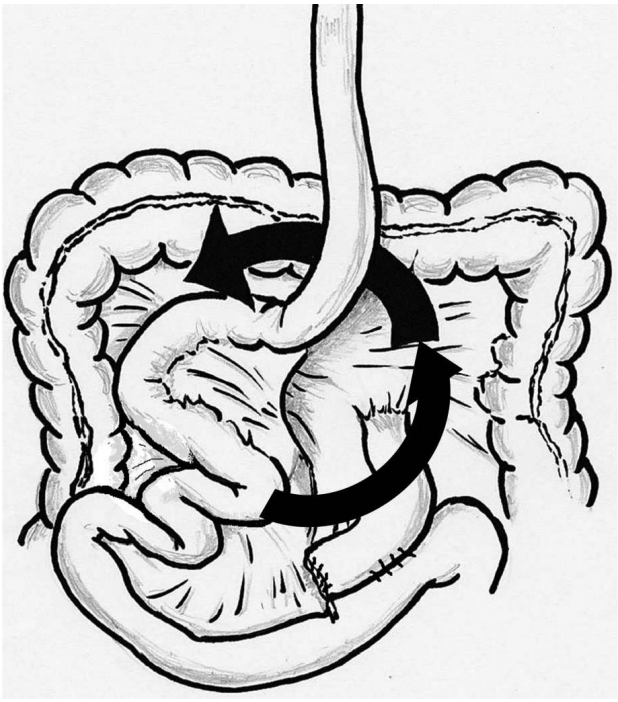

Fig. 2 Petersen's defect. The defect (arrow) exists between the mesentery of the Roux limb and the transverse mesocolon.

To minimize the occurrence of internal hernia, closure of the jejunojejunal mesenteric defect and Petersen's defect with continuous nonabsorbable sutures is recommended when performing laparoscopic distal gastrectomy and R-Y reconstruction, which is consistent with the recommendations for laparoscopic RYGBP with antecolic R-Y reconstruction.[9]

Our patient had already undergone 2 open surgical procedures before esophagectomy (in 2006, the patient underwent distal gastrectomy for a gastric ulcer at another hospital, and a cholecystectomy was performed in 2008), so we used a biodegradable membrane composed of sodium hyaluronate and carboxymethylcellulose (Seprafilm, Genzyme, Cambridge, Massachusetts) at the time of esophagectomy and jejunal reconstruction to reduce the risk of postoperative adhesive small bowel obstruction. Weight loss after esophagectomy was 9.3% of preoperative body weight. It is possible that the intra-abdominal pressure was increased by the upper gastrointestinal endoscopy on the day before this patient presented with an internal hernia.

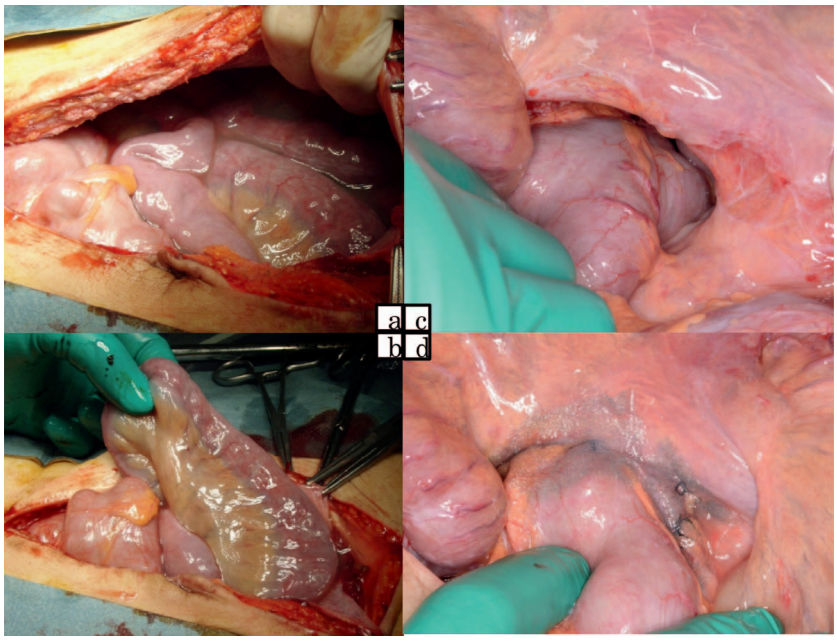

Fig. 3 Operative photographs. (a and b) There is chyle-like ascites, and almost the entire small intestine shows pallor due to impaired circulation. (c) Defect between the mesentery of the Roux limb and the transverse colon. (d) Closure of the jejunojejunal mesenteric defect and Petersen's defect under direct vision using 3-0 nonabsorbable sutures.

Petersen's hernia might be caused by the same mechanism after esophagectomy with jejunal reconstruction, laparoscopic gastrectomy, and laparoscopic RYGBP.

When the emergency surgery was performed in our patient, there was no adhesive small bowel obstruction, suggesting the efficacy of the Seprafilm. We routinely use Seprafilm for esophagectomy, and we never encountered either adhesive small bowel obstruction or Petersen's hernia after esophagectomy with jejunal reconstruction.

In conclusion, Petersen's hernia after esophagectomy is quite rare. Petersen's hernia after esophagectomy is caused by same mechanism with jlaparoscopic gastrectomy and laparoscopic RYGBP. To prevent this kind of internal hernia, the jejunojejunal mesenteric defect and Petersen's defect should be closed using nonabsorbable sutures. Also, reducing insufflation or using carbon dioxide when performing endoscopy might lessen the risk of the incidence of internal hernia in patients like this.

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