

A Case of Laparoscopic Hiatal Hernia Surgery for Intrathoracic Omental Herniation Diagnosed by Preoperative CT Scan

Nobue Futawatari Yusuke Akimoto Junji Maehara
Sayaka Nagao Toshiyuki Enomoto Koji Asai
Manabu Watanabe and Yoshihisa Saida*

Department of Surgery, Toho University Ohashi Medical Center, Tokyo, Japan

ABSTRACT: Intrathoracic omental herniation is a very rare condition, and only a few reports have demonstrated a laparoscopic approach. The patient, a 53-year-old woman, visited her local doctor because of heartburn and reflux. She underwent chest X-ray and computed tomography (CT) and was diagnosed with intrathoracic omental herniation through the esophageal hiatus. She was referred to our hospital for further examination and treatment. Chest X-ray revealed a well-defined mass in the midline, whereas CT revealed fatty tissue in the posterior mediastinum. No herniation of the stomach into the thorax was observed. Laparoscopic surgery was performed. The greater omentum had entered the right side of the esophageal hiatus. The diameter of the hernial orifice was 5 cm. Direct suturing was performed to close the esophageal hiatus. A preoperative diagnosis of intrathoracic omental herniation was considered important, as it allowed for a safe and effective treatment *via* laparoscopic surgery.

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KEYWORDS: intrathoracic omental hernia, esophageal hiatal hernia, laparoscopic surgery

Introduction

Intrathoracic omental herniation (ITOH) through the esophageal hiatus without stomach involvement is extremely rare.^{1,2)} To the best of our knowledge, only 17 cases have been reported in English, and only 6 cases that have undergone laparoscopic surgery have been reported. In the past, it was difficult to distinguish ITOH from lipoma, but in recent years, with improvements in diagnostic imaging, preoperative diagnosis has been reported. Here, we report a case of ITOH that was diagnosed preoperatively *via* computed tomography (CT) and improved by

minimally invasive laparoscopic surgery.

Case Report

The patient was a 53-year-old woman who visited her local doctor because of heartburn and reflux. She was diagnosed with ITOH through the esophageal hiatus by chest X-ray and CT and was referred to our hospital for further examination and treatment. She has a history of hypertension, and her body mass index was 27.2 kg/m². Her physical examination and laboratory data were unremarkable. Chest X-ray revealed a well-defined mass in the midline (Fig. 1). Contrast-enhanced CT revealed fatty tissue in the

*Corresponding Author: Yoshihisa Saida, 2-22-36 Ohashi, Meguro-ku, Tokyo 153-8515, Japan, tel: +81-3-3468-1251
e-mail: yoshisaida@nifty.com
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posterior mediastinum (Fig. 2a). The coronal view of the contrast-enhanced CT scan revealed gastroepiploic vessels flowing into the fatty tissue of the posterior mediastinum (Fig. 2b). There was no evidence of herniation of the stomach into the thorax. Upper gastrointestinal endoscopy revealed that the lower esophagus was narrowed because of extramural extravasation (Fig. 3a). No evidence of reflux esophagitis was observed (Fig. 3b). We suspected ITOH through the esophageal hiatus.

Laparoscopic surgery was performed under general an-

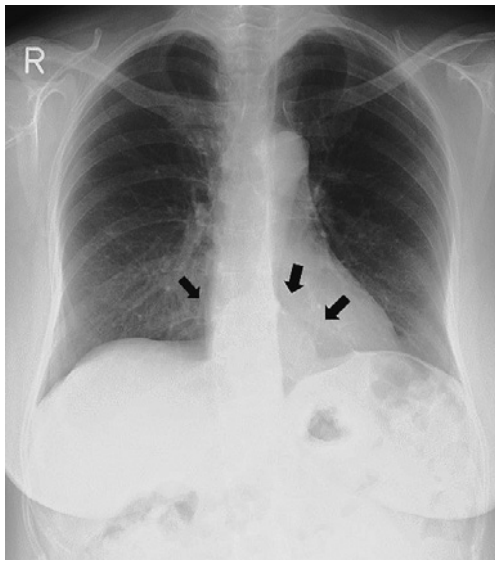


Fig. 1 Chest X-ray revealed a retrocardiac mass (arrows).

esthesia. A 12-mm port was inserted into the umbilicus, and carbon dioxide was insufflated at 10 mmHg. A 12-mm port was placed in the upper-left abdomen, a 5-mm port in the upper-right abdomen, and a 5-mm port in the left abdomen. A Nathanson liver retractor was inserted from the epigastric region to exclude the liver. The greater omentum had entered the right side of the esophageal hiatus (Fig. 4a). The herniated omentum was pulled into the abdominal cavity, and the lesser omentum was dissected to expose the esophageal hiatal hernia rims (Fig. 4b-d). There were no adhesions between the hernia sac and the herniated omentum. The hernia sac was dissected to expose the right crus. After the esophagus and posterior vagus nerve were identified in the esophageal hiatus, the left crus was exposed. After the dissection, the hiatal hernial orifice measured 5 cm in diameter (Fig. 5a). Direct suturing with six stitches was performed using 2-0 Prolene suture (Johnson & Johnson, Ethicon, Inc., USA) to close the esophageal hiatus (Fig. 5b). Subsequently, the esophageal wall and the left crus were sutured with one stitch of 3-0 Prolene suture (Johnson & Johnson, Ethicon, Inc., USA). The duration of the surgery was 136 min, and blood loss was minimal. The patient was discharged on postoperative day 6 and had an uneventful postoperative course.

Discussion

ITOH through the esophageal hiatus is a very rare condition in which only the omental tissue, and not the intesti-

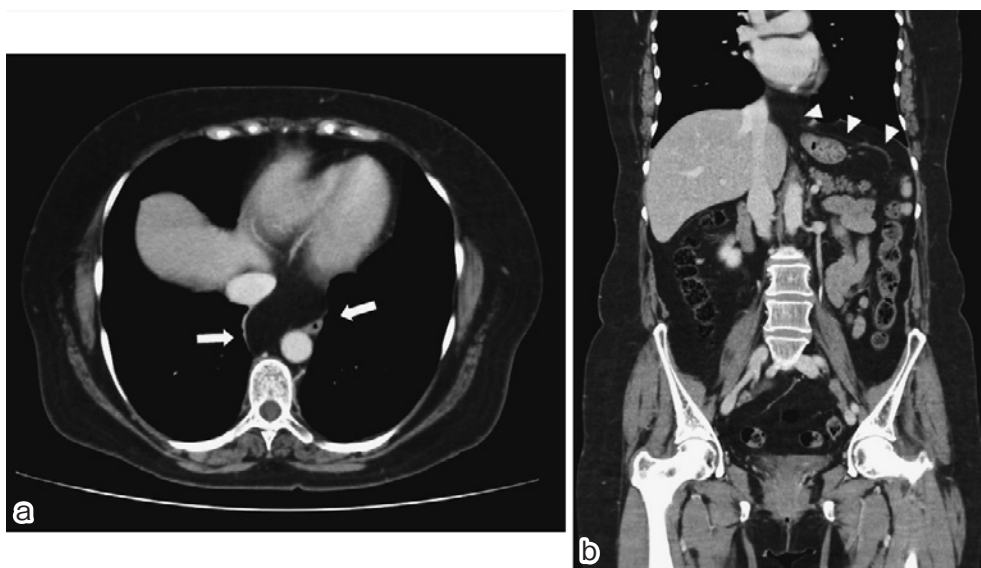


Fig. 2 a: CT revealed an encapsulated retrocardiac low-density mass (arrows). b: Coronal CT revealed gastroepiploic vessels flowing into the fatty tissue of the posterior mediastinum (arrowhead).

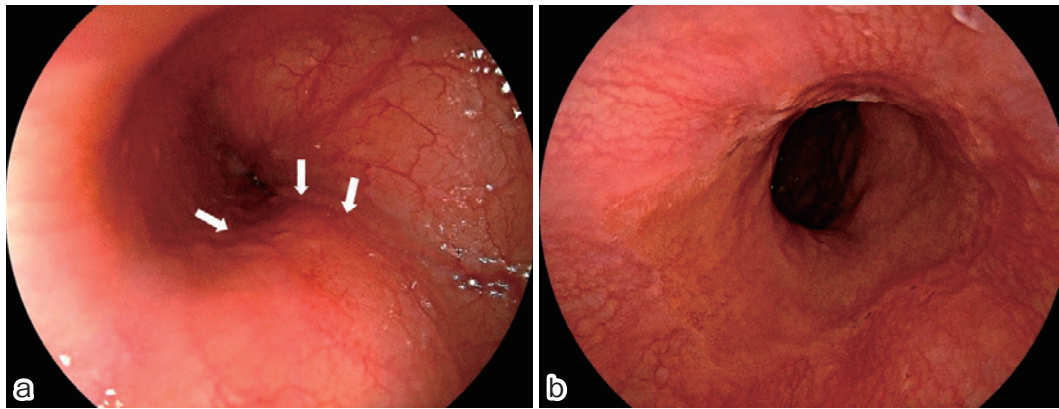


Fig. 3 Gastrointestinal endoscopy of the esophagus.

a: The lower esophagus was narrowed due to extramural extravasation (arrows). b: No evidence of reflux esophagitis was observed.

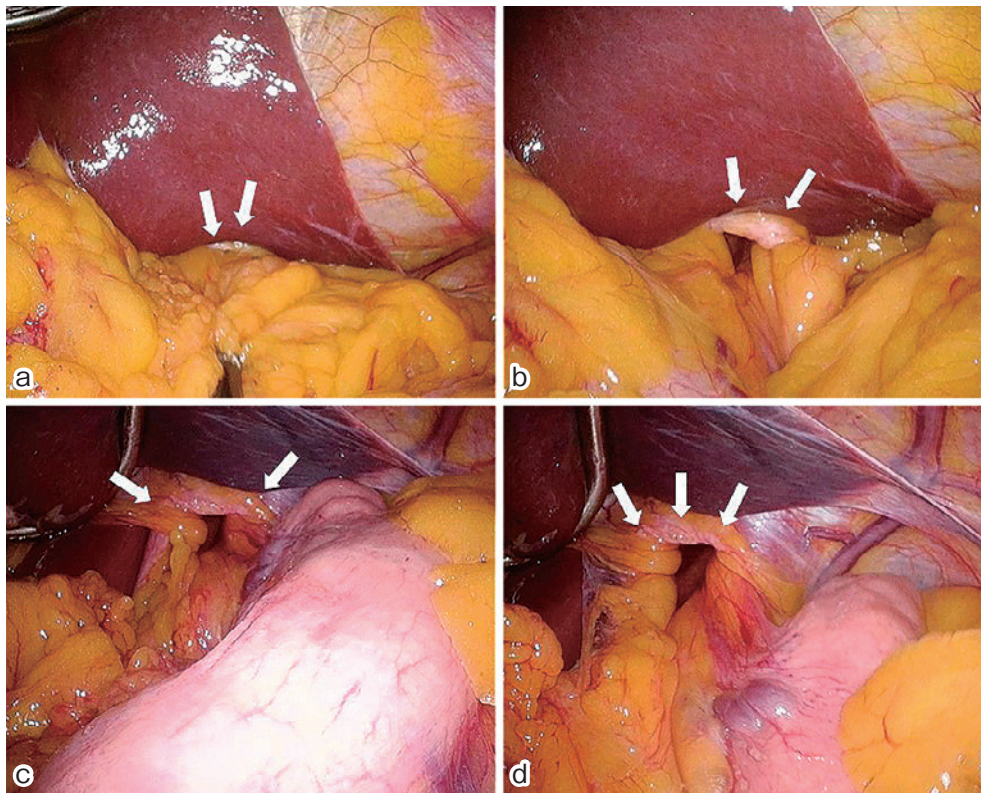


Fig. 4 a: The greater omentum had entered the right side of the esophagus, forming a hiatal hernia. b, c, d: The herniated omentum was pulled into the abdominal cavity.

nal tract, is involved in the hernia.¹⁾ Historically, this condition has been difficult to distinguish from lipoma, but in recent years, with the development of diagnostic imaging, preoperative diagnosis has become possible. CT, magnetic resonance imaging,^{2,3)} and three-dimensional construction and vascular reconstruction with contrast-enhanced CT are particularly useful for diagnosis.^{4,5)} In this case, the three-dimensional construction of contrast-enhanced CT

scan allowed us to diagnose ITOH preoperatively, which was useful in determining the surgical procedure.

It is generally assumed that the main causes of ITOH are aging and obesity.^{2,6)} The pathophysiology of esophageal hiatal hernia has been reported as follows: (1) increased intraabdominal pressure forces the gastroesophageal junction (GEJ) into the thorax; (2) the esophagus is shortened by fibrosis and excessive vagus nerve stimu-

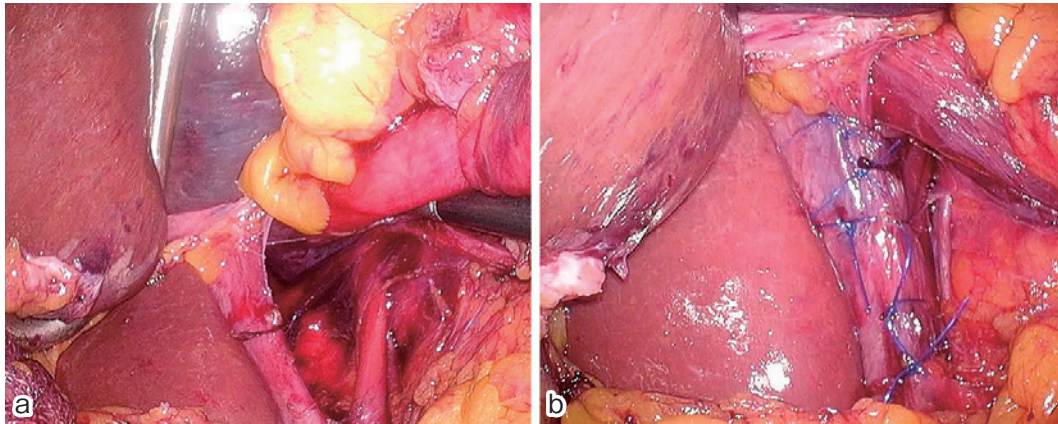


Fig. 5 a: The hiatal hernial orifice measured 5 cm in diameter. b: Direct suture of the hiatal hernia orifice.

lation, which causes the GEJ to move upward to the thorax; and (3) aging and congenital changes in the muscle and connective tissue widen the diaphragmatic hiatus, which promotes migration of the GEJ to the thoracic cavity. However, no single theory has identified the definitive cause of esophageal hiatal hernia formation, and its etiology is believed to be multifactorial.⁷⁾ Furthermore, at age 50 years or older, the number of elastic fibers decreases, the esophagus becomes more mobile within the esophageal hiatus, and the abundance of fat in the esophageal hiatus significantly increases the mobility of the esophagus, which results in the development of esophageal hiatal hernia.^{3,6)} However, it is unclear why only the greater omentum herniated the esophageal hiatus. The patient in this case was also aged over 50 years and obese, with a body mass index of 27.2 kg/m², and it is highly likely that muscle loss due to aging and fat in the esophageal hiatus due to obesity contributed to the development of the hernia.

Surgery is recommended for patients with symptoms, whereas conservative follow-up is recommended for asymptomatic patients.^{8,9)} However, some reports of cases in which the condition worsened during follow-up have been published,⁸⁾ and some reports recommend surgery at the time of diagnosis.^{4,8-10)} Previously, the preoperative diagnosis was lipoma in many cases, and surgery was often performed using the thoracic approach. In recent years, however, the accuracy of preoperative diagnosis has improved, and most patients diagnosed with ITOH were reported to have undergone surgery using the abdominal approach. Laparoscopic surgery is specifically recommended as it is minimally invasive and can easily repair esophageal hiatuses.^{1,4,8)} In this case, surgery was chosen because the pa-

tient had preoperative symptoms of heartburn and reflux, and for the diagnosis of ITOH preoperatively, we opted for a minimally invasive laparoscopic esophageal hiatal hernia repair.

When we examined the cases reported in English, 17 have been reported to date (Table 1). The average age of the patients was 55.9 years, and 15 were male and 2 were female. Nine cases were asymptomatic, whereas epigastric pain was observed in four cases, and epigastric discomfort, heartburn, dysphagia, and respiratory distress were each observed in one patient. Preoperative ITOH was diagnosed in 11 cases, lipoma was diagnosed in 5 cases, and 1 case was unknown; of the 9 cases after 2013, ITOH was diagnosed in all except 1. In terms of the site of fat prolapse, the center was the most common site with 10 cases (58.8%), the right side with 6 cases (35.3%), and the left side with 1 case (5.9%), whereas the left side was less common. Surgery was performed in 15 cases and laparoscopic in 7 cases since 2013. Repair of the esophageal hiatal hernia was primarily reported to be by direct suturing of the crus, whereas mesh was added only in the case reported by Rassam et al.⁵⁾ Although few detailed descriptions of the surgery have been provided, no reports of the addition of fundoplication due to the absence of gastric malposition have been published. In this case too, only suturing of the esophageal hiatus was performed because upper gastrointestinal endoscopy revealed minor reflux esophagitis, and the GEJ was in its normal position.

In conclusion, we experienced a very rare case of ITOH, which was diagnosed preoperatively *via* three-dimensional construction of the contrast-enhanced CT scan. The patient was able to safely undergo laparoscopic surgery,

Table 1 Reported cases of ITOH

Case	Author, year	Age	Gender	Symptom	Preoperative diagnosis	Hernia orifice size (mm)	Intrathoracic sac position	Treatment	Crural repair
1	Rohfing BM, 1977	50	M	Epigastralgia	NA	NA	Middle	Surgery	NA
2	Lee MJ, 1990	76	M	None	ITOH	NA	Middle	Conservative	NA
3	Rockoff SD, 1993	67	M	None	ITOH	NA	Right	Surgery	NA
4	Kato N, 1999	54	F	Nobe	LT	NA	Right	Thoracotomy	NA
5	Anderson TM, 1999	43	M	Difficulty in swallowing	LT	NA	Right	Thoracotomy	NA
6	Kubota K, 2001	74	M	None	ITOH	NA	Right	Conservative	NA
7	Yunoki J, 2004	61	M	None	LT	NA	Left	Thoracotomy	NA
8	Maruyama R, 2005	21	M	None	LT	NA	Middle	Thoracotomy	NA
9	Yu CY, 2013	59	M	None	ITOH	NA	Middle	Thoracotomy	NA
10	Stephens M, 2013	61	M	Epigastralgia	ITOH	NA	Middle	Laparoscopy	NA
11	Zhu Z, 2017	47	M	Chest congestion	LT	NA	Middle	Thoracoscopy → laparoscopy	NA
12	Sueyoshi K, 2017	46	M	Epigastralgia, vomiting	ITOH	NA	Middle	Laparoscopy	Direct suture
13	Wang IJ, 2019	47	M	Dyspnea, chest pain	ITOH	NA	Middle	Laparoscopy → laparotomy	NA
14	Tanaka Y, 2020	60s	M	Epigastralgia, vomiting	ITOH	5 cm	Right	Laparotomy	NA
15	Nakashima Y, 2021	72	M	None	ITOH	NA	Middle	Laparoscopy	Direct suture
16	Rassam S, 2021	63	M	None	ITOH	3 cm	Middle	Laparoscopy	Direct suture + Mesh
17	Present case	53	F	Heartburn, reflux	ITOH	5 cm	Right	Laparoscopy	Direct suture

M male, F female, NA not available, ITOH intrathoracic omental herniation, LT lipomatous tumor

which improved the symptoms.

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Authors' contribution: NF drafted the manuscript, and YS supervised the writing of the manuscript. NF, YA, and JM were responsible for the perioperative management of the patient. AK, MW, and YS gave advice on preoperative surgical procedures. NF, YA, and JM performed the surgery. All authors read and approved the final manuscript.

Conflicts of interest: None declared.

Consent for publication: Informed consent was obtained from the patient for the publication of this case report and accompanying images.

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