Surg Today (2009) 39:1068–1072
DOI 10.1007/s00595-008-3983-4

SURGERY TODAY
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Successful Treatment of Acute Esophageal Necrosis Caused by Intrathoracic Gastric Volvulus: Report of a Case

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Abstract
Gastric volvulus is a potentially lethal condition. We report a case of esophageal hiatal hernia with strangulation of the esophagus and stomach caused by gastric volvulus. A 79-year-old woman was admitted to our hospital in a state of shock, and investigations showed necrotic changes in most of her distal esophagus and gastric body. Thus, we performed an emergency total gastrectomy and transhiatal esophagectomy, followed 3 months later by successful reconstruction of the esophagus using the jejunum. Occasionally, a large hiatal hernia accompanies gastric volvulus; however, the extent of esophageal necrosis observed in this patient is very unusual. Although a large hiatal hernia is usually a chronic disorder, surgical treatment is recommended, considering the risk of serious complications.

Key words Esophageal hiatal hernia · Gastric volvulus · Necrotic change

Introduction

Hiatal hernia is the most common type of diaphragmatic hernia. Esophageal hiatal hernia most commonly affects infants and elderly adults. In infancy, congenital defects trigger this disease, whereas in adults, weakening of the supportive tissue of the lower esophagus or high abdominal pressure associated with a humpback and obesity may cause this event. Gastric volvulus is common in infancy, but uncommon in adults.[1–4] This anomaly is classified as either organoaxial or mesentericoaxial. The organoaxial type is more common and usually associated with diaphragmatic defects. Strangulation and necrosis occasionally occur with this type of gastric volvulus. An esophageal hiatal hernia incarcerated with an intrathoracic gastric volvulus is rare,[5–8] as is an esophageal hiatal hernia with necrosis of the stomach and esophagus.[8] Moreover, this type of lesion is extremely difficult to treat. We describe how we successfully treated esophageal hiatal hernia incarceration with an intrathoracic gastric volvulus, causing necrosis of a large portion of the esophagus and stomach.

Reprint requests to: E. Oki
Received: November 29, 2007 / Accepted: July 6, 2008

Case Report

A 79-year-old woman was admitted to our hospital with epigastralgia and vomiting. She was in shock, with a systolic blood pressure of 70 mm/Hg, tachycardia of >140 beats/min, and blood oxygen saturation <88% at the time of mask oxygenation. Her abdomen was flat, with tenderness in the left upper quadrant; however, there were no signs of peritoneal irritation. Laboratory studies showed marked elevation of her white blood cell count (20000/mm^2) and C-reactive protein (22.0 pg/dl). Computed tomography (CT) showed an aberration of the stomach body in the posterior mediastinum (Fig. 1A) and increased fat tissue density, indicating peritonitis (Fig. 1B). She underwent emergency surgery for the peritonitis and shock, although the cause of the peritonitis was not established.

Laparotomy revealed a moderate amount of bloody ascites. An area covering about 10 cm of the middle body of the stomach was found to have been incarcerated by an esophageal hiatal hernia (Fig 2A,B). The hernia orifice was about 5 cm in diameter. A large area of the anterior wall of the stomach and the lower part of the esophagus was necrotic (Fig 3A,B). We performed a transhiatal esophagectomy via a cervical approach as well as total gastrectomy. Hernia orifice closure and reconstruction was not performed, but an esophagostomy was done since the patient was in a severe state of shock.

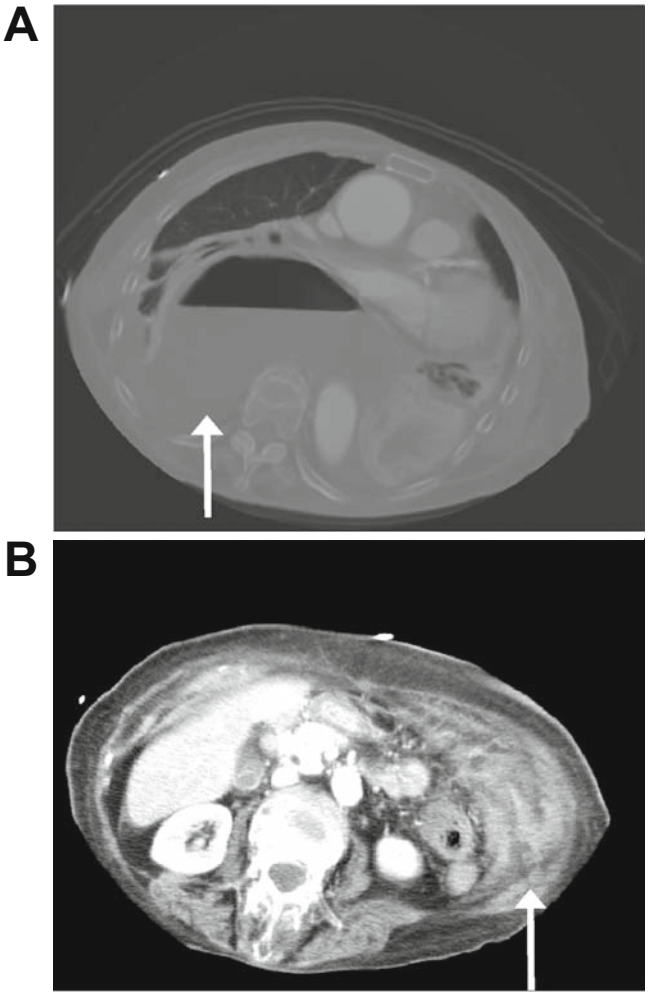

Fig. 1. Computed tomography (CT) images of **A** chest and **B** abdomen. **A** Chest CT showed aberration of the stomach body in the posterior mediastinum (*arrow*). **B** Abdominal CT showed increased fat tissue density, indicative of peritonitis (*arrow*)

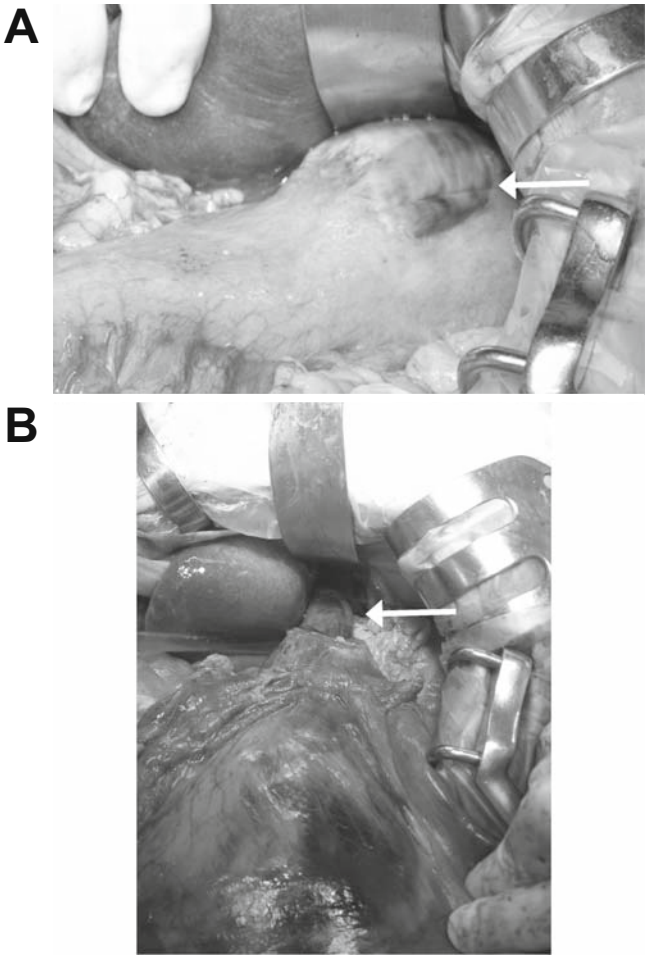

Fig. 2. **A** Necrosis of the stomach body (*arrow*). **B** Necrosis of the lower esophagus (*arrow*)

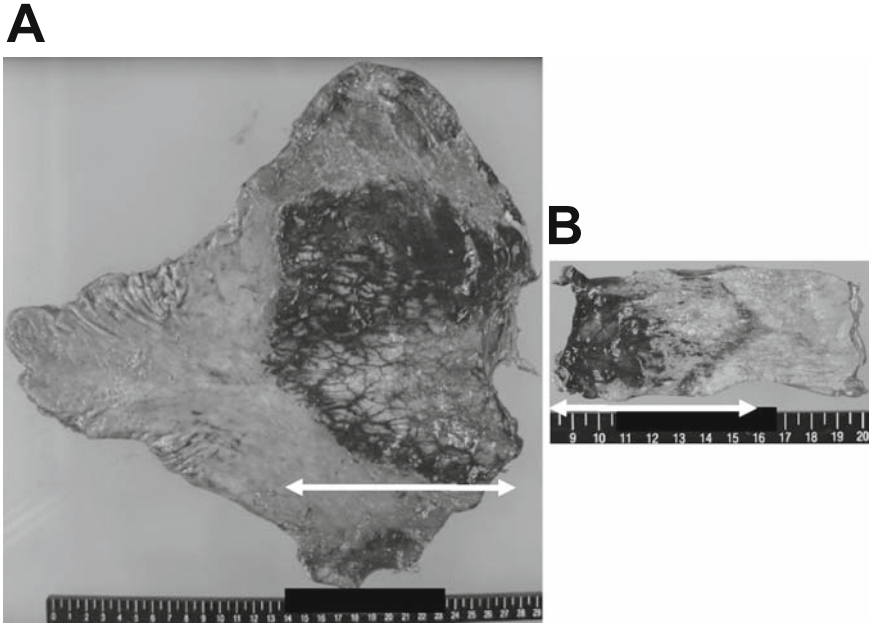

Fig. 3. Resected specimen of **A** stomach and **B** esophagus. **A** A large area of gastric body (*between arrowheads*) showed necrotic damage. **B** The lower esophagus (*between arrowheads*) showed necrotic damage

The patient was managed in the intensive care unit for 10 days postoperatively, since she was still shocked and had severe pneumonia. The esophagus could not be reconstructed until her lung function improved and her nutritional status recovered with enteral nutrition. By postoperative day (POD) 125, the bilateral pleural effusion and atelectasis were no longer evident on chest CT, and her nutritional status had dramatically improved. Thus, on POD 139 we performed esophageal reconstruction using the jejunum, obtained through an antesternal route. The patient had an uneventful postoperative course and was discharged on POD 160.

Discussion

This report describes a case of hiatal hernia with incarceration and strangulation of the esophagus and stomach, resulting from a volvulus. Hiatal hernias are morphologically categorized into three types: sliding, paraesophageal, and mixed. The sliding hernia is the most common type, whereas the paraesophageal and mixed types are rare. Passage disorder, heartburn, epigastric discomfort, and dysphasia are the major symptoms of sliding type hernia. An associated respiratory or circulatory disorder is relatively rare.[9] The main reasons for emergency operations are hernia incarceration and strangulation, gastric volvulus, respiratory disorder, and arrhythmias occurring in association with the paraesophageal type of hernia.[10,11] It is therefore important to have a cautious therapeutic strategy for hiatal hernias. There have been several reports of hiatal hernias associated with a gastric volvulus.[2,5–7] There are two types of gastric volvulus: mesentericoaxial, which is very rare, and organoaxial. The organoaxial type is usually associated with defects of the diaphragm, and can be associated with strangulation and necrosis. In the Kanai classification,[3] the causes of gastric volvulus are categorized as idiopathic and secondary. The idiopathic type includes relaxation of the gastric ligaments, gastroptosis, active gastric peristalsis, and colonic distension. The secondary type includes disorders of gastric origin, such as gastric ulcer and gastric tumor, and diaphragmatic defects, such as hernia and relaxation. The secondary type is more common, and it is frequently accompanied by defects of the diaphragm (43%) and idiopathic relaxation of the gastric ligaments (32%). Gastric volvulus can result in an acute abdominal emergency or a chronic intermittent problem. The acute symptoms include the sudden onset of severe epigastralgia or left upper quadrant pain, and sharp chest pain mimicking cardiopulmonary events.[2,9,10] The chronic symptoms are intermittent epigastric pain, a feeling of abdominal fullness, chest discomfort, dyspnea, and dysphagia.

Sporadic cases of esophageal hiatal hernia with a gastric volvulus have been reported in Europe and the United States, but it is very rare in Japan.[7] Table 1 summarizes the cases of esophageal hiatal hernia with gastric volvulus reported in Japan from 1998 to 2006, including our case.[7,13–25] We found only one other report of an esophageal hiatal hernia with a gastric volvulus and strangulation of the esophagus and stomach.[8] Because our patient was shocked, an upper gastrointestinal series could not be performed, so we had to base our decisions on CT evaluation. This case appeared to be a paraesophageal type esophageal hiatal hernia with incarceration, and an organoaxial type gastric volvulus with gastric and esophageal necrosis. There are two possible explanations for the necrosis of the lower esophagus: increased pressure on the mediastinal area by the incarcerated stomach could have caused esophageal congestion, resulting in necrosis; or blood flow to the lower esophagus via the vessels of the lesser gastric curvature may have been stopped by the complete necrosis of stomach.

Various therapeutic strategies for esophageal hiatal hernia have been reported.[12] According to Harrington[11] no symptomatic case should be simply observed. He stated that a moderately symptomatic case should be treated by internal therapy, but if that is not effective surgery should be considered, whereas emergency surgery should always be performed for severe complications such as incarceration or a bleeding ulcer. The paraesophageal type of hiatal hernia often occurs with acute hernia incarceration, therefore this type of hernia should be treated surgically, unless the symptoms are severe.[7] Geha et al.[26] concluded that a huge esophageal hiatal hernia should be operated on as early as possible, with hernia sac resection, stomach fixation, hernia orifice closure, and fundoplication. Haas et al.[10] reported finding a gastric volvulus in 21 of 138 patients diagnosed with an esophageal hiatal hernia. Eleven of these patients underwent elective surgery, but the remaining 10 required an emergency operation for incarceration and perforation, and 4 of those patients died. Our patient had no symptoms, although a huge esophageal hiatal hernia had been pointed out more than 10 years earlier. Moreover, no treatments had been considered until the patient was transferred to our hospital.

We performed emergency surgery because CT showed peritonitis, and because of the patient's shock. Surgery revealed necrosis of a large area of the esophagus and the stomach, so those organs were resected and the patient survived. A two-stage operation was the only option; although this patient was successfully treated, a huge paraesophageal type of esophageal hiatal hernia should be treated surgically as soon as it is diagnosed, to avoid the esophagectomy and gastrectomy required in the present case.

Table 1. Reported cases of esophageal hernia with a gastric volvulus ($n = 15$)

Age (years)/Sex	Type of hiatal hernia	Type of gastric volvulus	Combined incarcerated organs	Therapy	Size of hernia orifice (cm)	Complications	First author[Ref.]
88/F	Mixed	Mesentericoaxial	Transverse colon	Closure, fixation hemicolectomy	—	Colon cancer	Morinaga[13]
78/F	Sliding	Organoaxial	No	Distal gastrectomy closure, fixation	7 × 7	Gastric cancer	Seshimo[14]
84/F	Mixed	Organoaxial	No	Laparoscopic Nissen	—	No	Idani[15]
70/F	Mixed	Mesentericoaxial	Transverse colon	Closure, Nissen	9 × 7	No	Umezawa[7]
76/F	Paraesophageal	Organoaxial	No	Closure, fixation	—	No	Kawachi[16]
85/F	Paraesophageal	Organoaxial	Transverse colon	Distal gastrectomy closure	8 × 8	Gastric cancer	Kawai[17]
84/F	Mixed	Mesentericoaxial	No	Laparoscopic closure, Nissen	—	No	Ishihara[18]
87/F	Paraesophageal	Mesentericoaxial	Transverse colon, spleen	Closure, fixation	—	No	Kono[19]
51/F	Paraesophageal	Mesentericoaxial	Transverse colon	Closure, Nissen	6 × 4.5	No	Tsuji[20]
84/F	Mixed	Organoaxial	Transverse colon	Emergency colectomy, closure	—	Strangulated, necrosis, death	Tanaka[21]
73/F	Paraesophageal	Organoaxial	No	Proximal gastrectomy closure	6 × 6	Gastric cancer	Tsutani[22]
82/F	Mixed	Mesentericoaxial	No	Laparoscopic Nissen	7 × 7	No	Yoshioka[23]
79/F	Mixed	Mesentericoaxial	No	Closure, Nissen	5 × 5	Heart failure, cholecyst perforation	Okabe[24]
80/F	Paraesophageal	Organoaxial	No	Fixation (Hill)	5 × 4	No	Kubo[25]
79/F	Paraesophageal	Organoaxial	No	Emergency esophagectomy, total gastrectomy	5 × 5	Strangulated, necrosis	Present case

We have not yet established the precise criteria for a "huge" esophageal hiatal hernia and its optimal surgical treatment. However, prolapse of at least one-third of the gastric body should be considered a definite indication for surgery.

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