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Case Report

A Case of Upside-down Stomach Successfully Treated with Minimally Invasive Laparoscopic Surgery

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ABSTRACT

A 56-year-old woman who had been treated for depression at our hospital was urgently admitted to our hospital for vomiting of sudden onset and weight loss, which had been managed as symptoms of worsening depression. Because the symptoms did not improve despite drug therapy, she was referred to our department 5 days after hospitalization. An upper gastrointestinal (GI) radiographic series was performed to evaluate an abnormal shadow in the mediastinum seen on chest radiography. The series indicated a diagnosis of upside-down stomach, and laparoscopic surgery was performed. Upside-down stomach is an extreme form of hiatal hernia which requires immediate treatment. The differential diagnosis of vomiting of sudden onset in a patient with hiatal hernia should include concomitant upside-down stomach. The laparoscopic surgery for upside-down stomach is technically challenging. We report a case of upside-down stomach which was successfully treated, with complete resolution of symptoms, by means laparoscopic surgery.

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Key words : upside-down stomach, intra-thoracic stomach, paraesophageal hiatal hernia, diagnosis, laparoscopic surgery

INTRODUCTION

Upside-down stomach is a special, extremely rare form of gastric volvulus in a supradiaphragmatic hernia sac. In Japan, only 43 cases of upside-down stomach have been reported. Moreover, gastric volvulus can be difficult to recognize clinically because its symptoms are nonspecific. Therefore, correct diagnosis and immediate management are difficult.

Herein we present a case of upside-down stomach which was initially misdiagnosed but was successfully treated with laparoscopic surgery.

CASE REPORT

A 56-year-old woman had been treated for depression by a psychoneurologist at our hospital. She had experienced vomiting of sudden onset, difficulty of oral intake, and weight loss. She was admitted to our hospital because her psychoneurologist had judged the symptoms to be due to worsening depression. Gastrointestinal (GI) endoscopy after hospitalization revealed only a mixed hiatal hernia. As the symptoms had not improved after conservative treatment, the patient was referred to our department. Because radiography of the chest on admission had

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shown an abnormal shadow with an air–fluid level in the mediastinum (Fig. 1), we immediately performed an upper GI radiographic series, which demonstrated a so-called upside-down stomach that had herniated into the thoracic cavity (Fig. 2). The diagnosis was reconfirmed with computed tomography (Fig. 3). Fortunately, the incarcerated stomach had not caused such symptoms as pyrexia and severe chest pain. Two weeks were required to reach a definitive diagnosis of upside-down stomach after the onset appetite loss. Therefore, we planned to perform laparoscopic hiatal hernia repair and fundoplication after the stomach had been decompressed.

The operation was performed with 4 trocars. First,

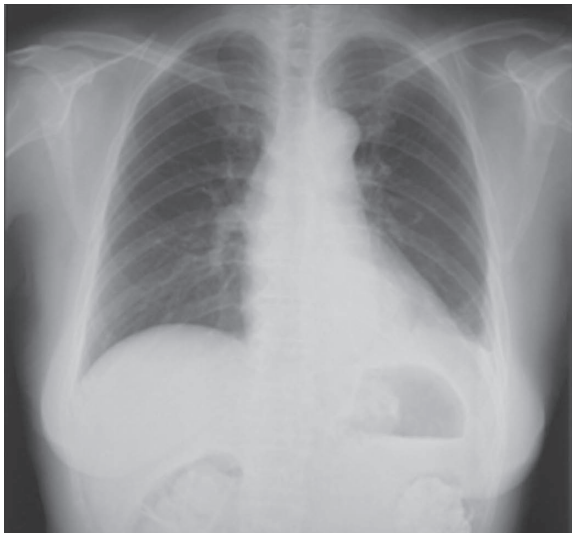


Fig. 1. Chest radiograph revealed an abnormal shadow with an air-fluid level in the lower mediastinum.

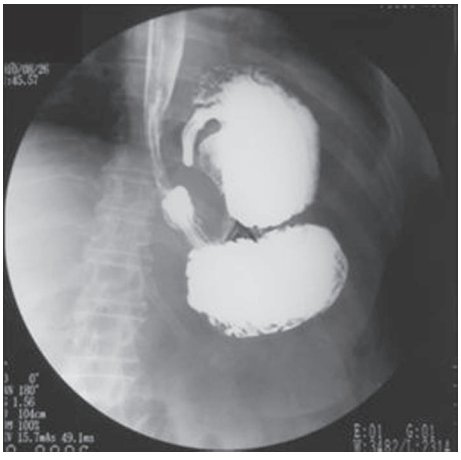


Fig. 2. An upper GI radiographic series demonstrated herniation of most of the stomach into the lower mediastinum.

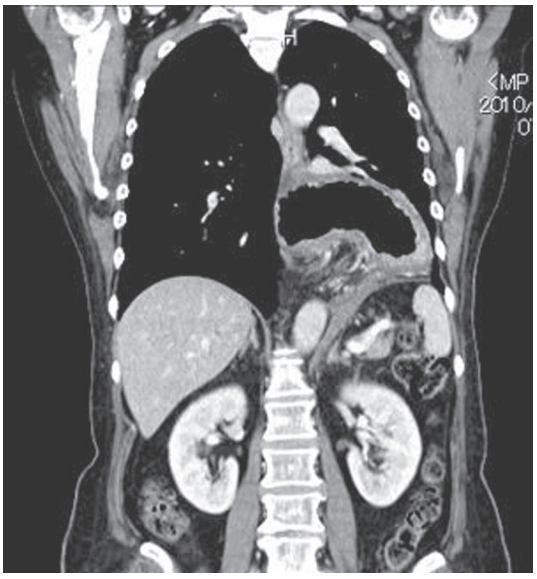


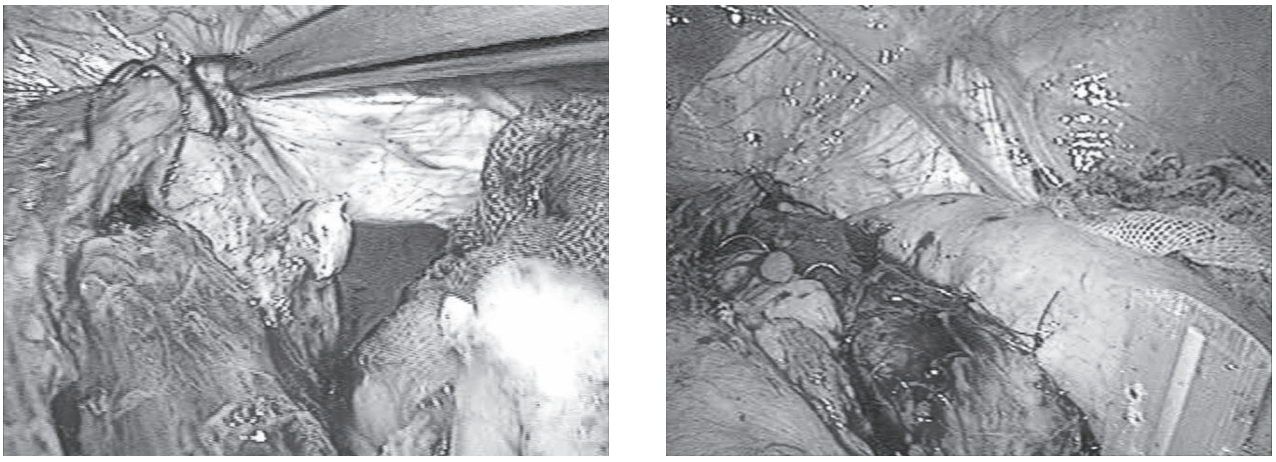
Fig. 3. Computed tomography confirmed herniation of most of the stomach into the mediastinum.

the left lobe of the liver was elevated with a Nathanson liver retractor (Cook Medical Inc., Bloomington, IN, USA) to secure a favorable surgical view around the esophageal hiatus. Next, the esophagus was detached from the hernia sac with a left-sided approach. After the abdominal esophagus was exposed circumferentially, a Penrose drain was placed around the esophagus to allow safe retraction. A few short gastric vessels were divided to relieve tension from the fundic wrap, and the redundant hernia sac was removed. After the entire stomach was returned to its proper position in the abdominal cavity, the overstretched esophageal hiatus was sutured in 4 places (Fig. 4a). Fundoplication was then performed with the Toupet method (involving 240 degrees of the posterior wall) (Fig. 4b). Finally, to prevent recurrent prolapse, a fundic wrap was fixed to the diaphragmatic crura bilaterally.

The operation time was 183 minutes, and intraoperative blood loss was minimal. The postoperative course was uneventful, and the patient has remained free of symptoms. As of 3 months after the operation, the entire stomach remains in the correct position, as shown with an upper GI radiographic series (Fig. 5), and GI endoscopy has demonstrated an efficacious fundic wrap without the recurrence of hernia.

DISCUSSION

Gastroesophageal reflux disease is associated with ana-



a b

Fig. 4. After the entire stomach had been returned to the abdominal cavity, the overstretched esophageal hiatus was tightened with sutures (a). Then, fundoplication was performed with the Toupet method as an antireflux procedure (b).

Fig. 5. An upper GI radiographic series performed 3 months after surgery showed the entire stomach to be in the correct position.

tomical abnormalities, such as hiatal hernia. These hernias are categorized by their shape. Type 1 hernias are sliding hernias and are the most common. Type 2 hernias are paraesophageal hernias characterized by paraesophageal herniation of the gastric fundus but with the gastroesophageal junction (GEJ) remaining in its normal abdominal position. Type 3 hernias are mixed hernias in which both the GEJ and the gastric fundus migrate into the posterior mediastinum. Type 4 hernias are rare and are also known as upside-down stomach or intrathoracic stomach[1]. The upside-down stomach is defined as gastric volvulus in a huge supradiaphragmatic hernia sac. The present patient was relatively young and did not have scoliosis or obesity, which are common risk factors for hiatal hernia. The hiatal hernia is this patient might have been present for several decades and gradually become more severe. The mechanism of upside-down stomach remains unknown because the condition is extremely rare. A search of the Ichushi Web database shows that only 43 patients with upside-down stomach have been described in Japan. Upside-down stomach is believed to be an advanced form of paraesophageal hernia[2,3]. Although the position of the GEJ is normal, most of the stomach is incarcerated in the thoracic cavity. Therefore, these patients usually experience mechanical symptoms rather than symptoms of reflux[4].

For the management of upside-down stomach, elective surgery is the treatment of first choice. A patient with upside-down stomach is at high risk for life-threatening complications, such as strangulation and perforation. Skinner and colleagues have found that conservative management of upside-down stomach is associated with a high mortality rate of up to 27%[5], whereas elective repair is associated with a significantly lower mortality rate[6].

Laparoscopic fundoplication is a well-established, widely performed treatment for patients with reflux symptoms. However, Hashemi and colleagues have reported that in patients with large type 3 hernias the recurrence rate is higher after minimally invasive surgery than after conventional surgery[7]. Indeed, laparoscopic surgery for upside-down stomach is technically challenging because of

anatomical abnormalities. Most patients with upside-down stomach have pseudoshortening of the esophagus, as a result of cephalad migration of the EGJ[4], and severe adhesions of the abdominal esophagus and upper part of the stomach with the hernia sac. Additionally, an extremely large anatomical defect is created in the lower mediastinum after the reduction of the stomach into the abdominal cavity. In the present case, the esophagus was detached from the hernia with a left-sided approach to expose the abdominal esophagus without injury. After abdominal esophagus was sufficiently exposed, the overstretched esophageal hiatus was sutured to the esophagus both anteriorly and posteriorly. Furthermore, a fundic wrap was fixed to each diaphragmatic crus to avoid recurrent prolapse.

Morino and colleagues have reported that long-term outcomes after tension-free mesh repair of the hiatus are superior to those after simple closure[8]. However, some investigators have reported that use of a mesh can lead to life-treating complications, such as esophageal erosion, penetration, and mesh contamination. Moreover, strangulation of a re-herniated stomach through a narrowed hiatus can occur after mesh reconstruction[9]. In view of such reports, we did not use a mesh to reinforce the hiatus in our patient. Fortunately, the diaphragmatic crura were sufficiently strong, and we were able to successfully close the hiatus both anteriorly and posteriorly.

Because upside-down stomach causes nonspecific symptoms[10], a definitive diagnosis can be difficult to make quickly. Additionally, the patient had depression, which misled her psychoneurologist as to the cause of the symptoms.

In conclusion, we have reported a case of upside-down stomach that was initially misdiagnosed but was successfully treated with laparoscopic surgery. Upside-down stomach is the most extreme form of hiatal hernia, whose management requires a suitable understanding of its pathophysiology. For patients with hiatal hernia who experience vomiting and dysphagia of sudden onset, upside-down stomach should be included in the differential diagnosis. In addition, treatment, if necessary, should be performed immediately.

Authors have no conflict of interest.

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