



Contents lists available at ScienceDirect

## International Journal of Surgery Case Reports

journal homepage: [www.casereports.com](http://www.casereports.com)

## Boerhaave's syndrome in a patient with an upside down stomach: A case report



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### ARTICLE INFO

#### Article history:

Received 8 December 2015

Received in revised form

11 December 2015

Accepted 14 December 2015

Available online 17 December 2015

#### Keywords:

Upside down stomach

Boerhaave's syndrome

Gastronomy

### ABSTRACT

**INTRODUCTION:** Spontaneous esophageal perforation, or Boerhaave's syndrome, is a life-threatening condition which usually requires emergent surgery. An upside down stomach is defined as a gastric volvulus in a huge supradiaphragmatic sac. In general, this condition can result in ischemia and perforation of the stomach. This is the first report of a patient with Boerhaave's syndrome and an upside down stomach.

**CASE PRESENTATION:** A 79-year-old woman presented with sudden epigastric pain following hematemesis. Evaluation of the patient showed both an esophageal perforation and an upside down stomach. Surgical drainage and irrigation of the mediastinum and pleural cavities were undertaken emergently. Due to the concurrent gastric volvulus, a gastrostomy was placed to fix and decompress the stomach. The patient had an uneventful hospital course and was discharged.

**DISCUSSION AND CONCLUSION:** Boerhaave's syndrome is a rare but severe complication caused by excessive vomiting, due to a sudden elevation in intraluminal esophageal pressure resulting in esophageal perforation. Acute gastric volvulus can result in ischemia and perforation of the stomach, but has not previously been reported with esophageal perforation. The most likely mechanism associating an upside down stomach with Boerhaave's syndrome is acute gastric outlet obstruction resulting in vomiting, and subsequent esophageal perforation. Perforation of the esophagus as well as perforation of the stomach must be considered in patients with an upside down stomach although both upside down stomach and Boerhaave's syndrome are rare clinical entities.

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## 1. Background

Spontaneous esophageal perforation, or Boerhaave's syndrome, is a life-threatening condition that usually requires early diagnosis and surgical treatment. Boerhaave's syndrome has a reported mortality rate of 14–40% [1,2]. It is a form of transmural esophageal rupture caused by a rapid rise in intraluminal pressure [3] and most often occurs in the distal posterolateral aspect of the esophagus [4]. The successful treatment of patients with Boerhaave's syndrome remains very challenging [5]. The upside down stomach is defined as a gastric volvulus in a huge supradiaphragmatic sac [6] and is the rarest type of hiatal hernia [7]. This condition can result in acute gastric outlet obstruction as well as ischemia and perforation of the stomach [7]. We report a patient with an esophageal perforation in

the presence of an upside down stomach. This is the first report of a patient with Boerhaave's syndrome and an upside down stomach.

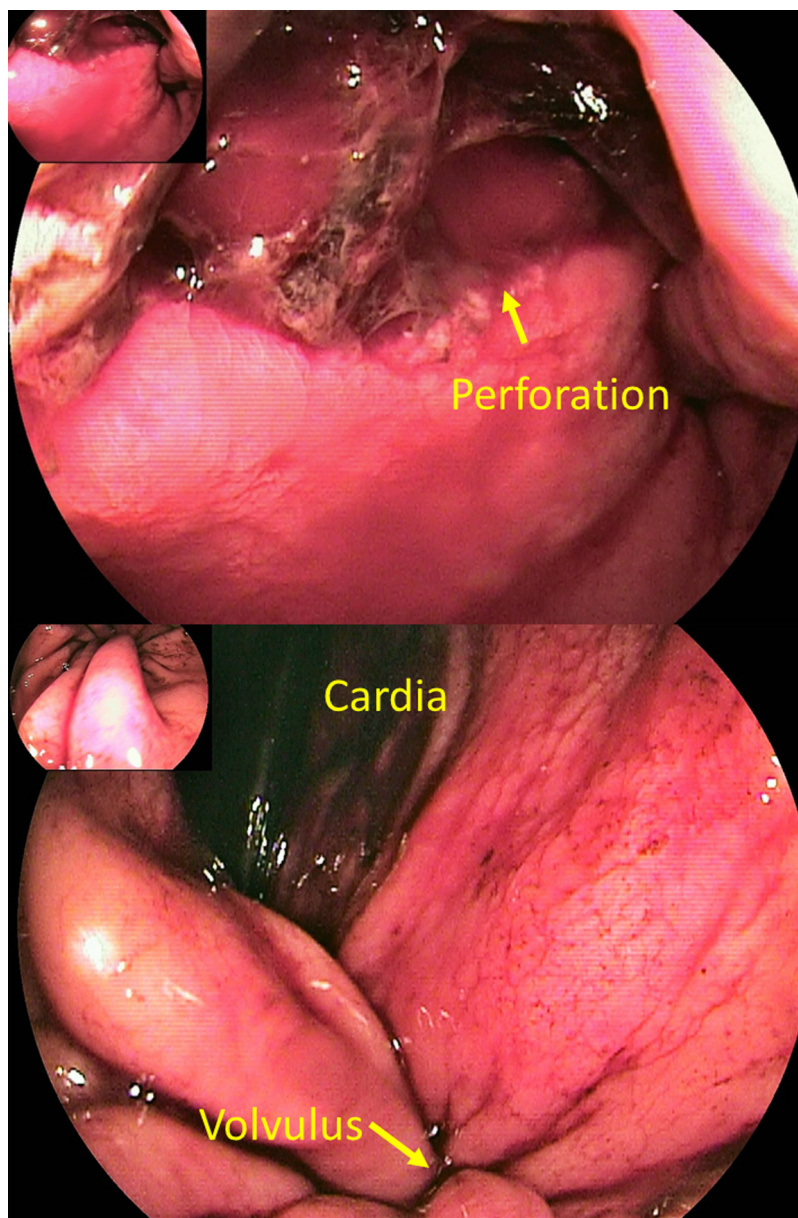
## 2. Case presentation

A 79-year-old woman with a previous medical history of cerebral infarction and hypertension developed sudden-onset epigastric pain radiating to the back following hematemesis and presented to the emergency department. She appeared in severe distress. Her peripheral blood pressure was 119/71 mmHg, pulse 110/min, and percutaneous oxygen saturation 93% on room air. Her temperature was 38.0 °C and the serum C-reactive protein was elevated (4.27 mg/dL) although the white blood cell count was normal.

Initially, we suspected a diagnosis of peptic ulcer with hematemesis, and upper gastrointestinal endoscopy was performed. This revealed a deep ulcerated lesion on the left side of the distal esophagus and the endoscope could not pass through to the distal stomach because the stomach was twisted toward the proximal portion (Fig. 1). A computed tomography (CT) scan showed frank pneumomediastinum and a left pleural effusion, suggesting Boerhaave's syndrome. In addition, coronal views on the CT scan revealed an upside down appearance of the stomach with a

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**Fig. 1.** Preoperative endoscopic findings.

Upper gastrointestinal endoscopy revealed the site of perforation in the left wall of the distal esophagus (upper) and a twisted gastric body toward the head resulting in outlet obstruction (lower).

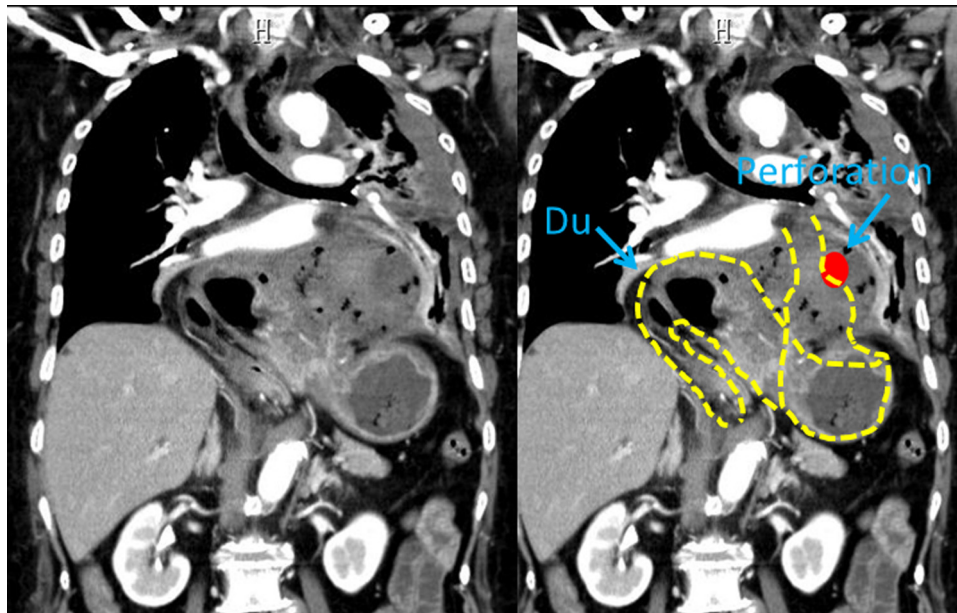
mesentero-axial volvulus (Fig. 2). A gastrografen swallow showed extravasation of contrast in the left chest, confirming the diagnosis of Boerhaave's syndrome (Fig. 3).

A left thoracotomy was performed with drainage and irrigation of the mediastinum and pleural space. A 2 cm diameter perforation was found just above the cardia on the left side of the esophagus. The site of perforation had normal appearing edges, and primary repair was performed with a two-layer closure of the mucosa and muscularis. Since there was an upside down stomach, a gastrotomy was placed to fix and decompress the stomach. The stomach was reduced into the abdominal cavity. In addition, the lower mediastinal space was covered with an omental patch to maintain the correct orientation of the stomach. Postoperatively, her fever resolved and clinical and biochemical parameters progressively normalized. A postoperative gastrografen swallow showed normal passage of contrast without leakage and normal position

of the stomach. Her post-operative course was uneventful and she recovered completely.

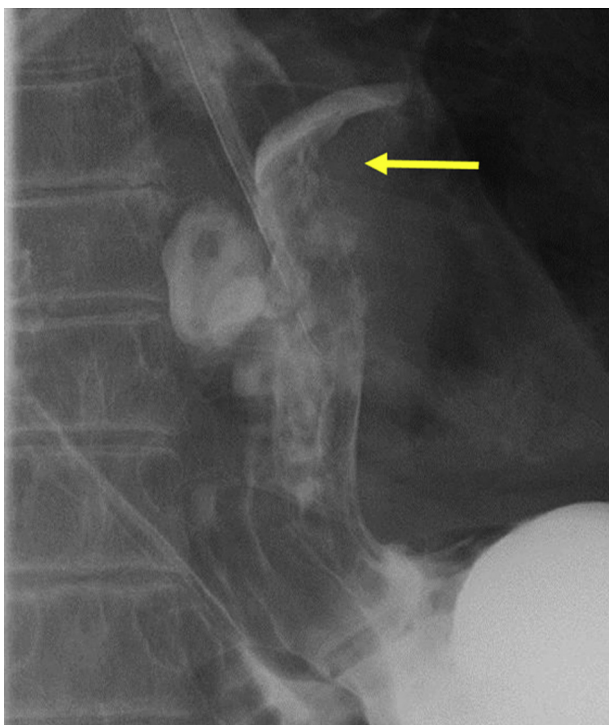
### 3. Discussion

The pathophysiology of Boerhaave's syndrome involves a sudden elevation in intraluminal esophageal pressure, with transmural perforation [3]. Repeated bouts of vomiting often precede the perforation, commonly occurring after ingestion of alcohol. Many patients with Boerhaave's syndrome present with vague symptoms [8], and diagnostic delays are common. The most common misdiagnosis is perforated ulcer, followed by myocardial infarction, pulmonary embolism, dissecting aneurysm and pancreatitis [9,10]. The present patient was initially considered to have a peptic ulcer. Earlier evaluation of the chest X-ray may have suggested alternative diagnoses since over 90% of patients with Boerhaave's syndrome have abnormalities on chest X-ray [11]. Previous reports describe



**Fig. 2.** Preoperative Computed Tomography scan findings.

A computed tomography scan showed frank pneumomediastinum and a left pleural effusion. Coronal view of the computed tomography scan showed an upside down stomach with mesenterico-axial volvulus. Du: duodenum.



**Fig. 3.** Preoperative gastrograffin swallow.

A preoperative gastrograffin swallow showed extravasation of contrast in the left chest.

that the perforation is located most often (80%) on the left side of the lower third of the thoracic esophagus measuring 3–6 cm on average [12]. The present patient presented with just such a lesion. Another report described that the presence of a pre-existing stricture or large perforation (>5 cm) is associated with the need for urgent esophagectomy [13]. Fortunately, esophageal resection was not needed in this patient.

The present patient also had a gastric volvulus, referred to as an upside down stomach, and we suggest that this was the cause of

the esophageal perforation. Gastric volvulus is classified into three types according to the axis of rotation, including organo-axial (rotation around the long axis connecting the cardia and the pylorus), mesenterico-axial (rotation around the short axis connecting the lesser and greater curvatures) and combined (rotation around both the short and long axes) [14,15].

In general, an upside down stomach can result in acute gastric outlet obstruction as well as ischemia and perforation of the stomach [7]. This is the first report of a patient with Boerhaave's syndrome resulting from an upside down stomach. We performed not only primary closure of the esophageal perforation but also fixation of the stomach by placing a gastrostomy tube to prevent recurrence of the volvulus. Fixation of the stomach by a placement of a percutaneous endoscopic gastrostomy has been described in a patient with gastric volvulus in poor condition [16]. Postoperative gastrograffin swallow showed passage of contrast through the stomach, maintained in its normal location.

#### 4. Conclusion

Perforation of the esophagus as well as perforation of the stomach must be considered in patients with an upside down stomach.

#### Conflict of interest

The authors declare no conflicts of interests regarding the publication of this paper.

#### Funding

This study was supported in part by the Ministry of Education, Culture, Sports, Science and Technology of Japan. The sponsor had no specific involvement such as analysis and interpretation of data.

#### Ethical approval

This paper is not research study, so I assume we do not need the ethical approval.

## Consent

The authors have obtained written and signed consent from the patient and her family.

## Author contribution

All authors in this manuscript contributed to the interpretation of data, and drafting and writing of this manuscript. SS, YH, KK, SM, TU, HH and RK were engaged in patient's care in her hospital course including surgery under the supervision of AL, JK and NS. All authors have read and approved this manuscript for publication.

## Guarantor

Dr. Sata, who is the president of Jichi Medical University Hospital, is the Guarantor.

## References

- [1] J.D. Richardson, Management of esophageal perforations: the value of aggressive surgical treatment, *Am. J. Surg.* 190 (2005) 161–165.
- [2] M. Chirica, A. Champault, X. Dray, L. Sulpice, N. Munoz-Bongrand, E. Sarfati, et al., Esophageal perforations, *J. Visc. Surg.* 147 (2010) e117–e128.
- [3] J.P. de Schipper, A.F. Pull ter Gunne, H.J. Oostvogel, C.J. van Laarhoven, Spontaneous rupture of the oesophagus: Boerhaave's syndrome in 2008. Literature review and treatment algorithm, *Dig. Surg.* 26 (2009) 1–6.
- [4] J.W. Pate, W.A. Walker, F.H. Cole Jr., E.W. Owen, W.H. Johnson, Spontaneous rupture of the esophagus: a 30-year experience, *Ann. Thorac. Surg.* 47 (1989) 689–692.
- [5] G. Shen, Y. Chai, G.F. Zhang, Successful surgical strategy in a late case of Boerhaave's syndrome, *World J. Gastroenterol.* 20 (2014) 12696–12700.
- [6] L. Krahenbuhl, M. Schafer, J. Farhadi, P. Renzulli, C.A. Seiler, M.W. Buchler, Laparoscopic treatment of large paraesophageal hernia with totally intrathoracic stomach, *J. Am. Coll. Surg.* 187 (1998) 231–237.
- [7] T.S. Schiergens, M.N. Thomas, T.P. Huttli, W.E. Thasler, Management of acute upside-down stomach, *BMC Surg.* 13 (2013) 55.
- [8] C.L. Connelly, P.J. Lamb, S. Paterson-Brown, Outcomes following Boerhaave's syndrome, *Ann. R. Coll. Surg. Engl.* 95 (2013) 557–560.
- [9] P.N. Symbas, C.R. Hatcher Jr., N. Harlaftis, Spontaneous rupture of the esophagus, *Ann. Surg.* 187 (1978) 634–639.
- [10] J.J. Curci, M.J. Horman, Boerhaave's syndrome: the importance of early diagnosis and treatment, *Ann. Surg.* 183 (1976) 401–408.
- [11] G. van der Weg, M. Wikkeling, M. van Leeuwen, E. Ter Avest, A rare case of oesophageal rupture: Boerhaave's syndrome, *Int. J. Emerg. Med.* 7 (2014) 27.
- [12] O. Korn, J.C. Onate, R. Lopez, Anatomy of the Boerhaave syndrome, *Surgery* 141 (2007) 222–228.
- [13] S. Abu-Daff, F. Shamji, J. Ivanovic, P.J. Villeneuve, S. Gilbert, D.E. Maziak, et al., Esophagectomy in esophageal perforations: an analysis, *Dis. Esophagus* (2014), <http://dx.doi.org/10.1111/dote.12294>, PMID: 25327568.
- [14] S.L. Siow, S.C. Tee, C.M. Wong, Successful laparoscopic management of paraesophageal hiatal hernia with upside-down intrathoracic stomach: a case report, *J. Med. Case Rep.* 9 (2015) 49.
- [15] D. Light, D. Links, M. Griffin, The threatened stomach: management of the acute gastric volvulus, *Surg. Endosc.* (2015), <http://dx.doi.org/10.1007/s00464-015-4425-1>, PMID: 26275540.
- [16] T. Tabo, H. Hayashi, S. Umeyama, M. Yoshida, H. Onodera, Balloon repositioning of intrathoracic upside-down stomach and fixation by percutaneous endoscopic gastrostomy, *J. Am. Coll. Surg.* 197 (2003) 868–871.

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