Endoscopic repair of spontaneous esophageal rupture during gastroscopy
A CARE compliant case report
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Abstract
Rationale: Most of esophageal rupture is a very serious life-threatening benign gastrointestinal tract disease with high mortality. However, there are a few cases of spontaneous esophageal rupture during gastroscopy.

Patient concerns: A 57-year-old man who underwent a routine diagnostic gastroscopy due to food obstruction was reported. During the gastroscopy, he vomited severely, which was followed by severe left chest pain radiating into the back and upper abdomen. The diagnosis was made by computed tomography (CT) scan without delay. Enhanced CT showed extensive mediastinal emphysema, a small amount of left pleural effusion, and a 6 cm tear was confirmed in the lower esophagus posteriorly.

Diagnoses: The patient was diagnosed with an intrathoracic rupture type of spontaneous esophageal rupture.

Interventions: The patient received endoscopic suturing techniques under endotracheal intubation, titanium clip clamping, and over the scope clip (OTSC) sealing.

Outcomes: The procedure was smooth and the patient recovered well after operation.

Lessons: During gastroscopy, the risk of esophageal rupture should be considered due to sudden pain caused by severe nausea and vomiting. Esophageal rupture can rapidly lead to severe life-threatening infections such as empyema and mediastinitis. Therefore, awareness of this condition is important so that appropriate treatment can rapidly be implemented to increase the likelihood of a good outcome.

Abbreviations: CT = computed tomography, OTSC = over the scope clip.

Keywords: gastroscopy, spontaneous esophageal rupture, Treatment

1. Introduction
Diagnostic gastrointestinal tract endoscopy is well established as a safe procedure. During gastroscopy, little is known about the potential danger of accidental spontaneous rupture of the esophagus, and life is often at risk. Spontaneous rupture of esophagus is a kind of rare rupture of the wall of the esophagus, which is caused by non-traumatic rupture of the total thickness of the wall of the esophagus.

The incidence rate is 1:6000, but the mortality rate is as high as 2.5% to 100%.<sup>1–4</sup> The onset of the disease is sudden and serious. If not treated in time, acute vertical sputum inflammation, esophageal pleural palsy, can lead to death.<sup>5</sup> Due to the low incidence rate, atypical medical history, and high misdiagnosis rate (74.3%),<sup>6</sup> it is easy to delay the timing of surgery. A rare case of spontaneous rupture of esophagus under gastroscopy is reported. The diagnosis is accurate and the endoscopic suture technique is superior to the traditional operation.

2. Case presentation
A 57-year-old man underwent gastroscopy because of eating obstruction. He had history of surgery for gastric cancer. The esophagus computed tomography (CT) scan (Fig. 1) was normal before gastroscopy. Laboratory analysis revealed the following: serum RBC 4.7 cell/L; Hgb 138g/L; HCT 42.8% when just before gastroscopy. The authors have no conflicts of interest to disclose.

Editor: N/A.

FH and MD are co-first author.

Informed patient consent was obtained for publication of this case report. The committee of human research at Wenzhou Medical University approved the study.

This study was financially supported by the public project grant (2015ZA226) from the Science and Technology Department of Zhejiang Province, and (2017RC22) from Science and Technology Department of Lishui, China. The authors have no conflicts of interest to disclose.

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Medicine (2018) 97:48(e13422)

Received: 23 July 2018 / Accepted: 2 November 2018
http://dx.doi.org/10.1097/MD.0000000000013422
back, and felt a compression pain in the neck. A physical examination revealed subcutaneous emphysema in the thoracolumbar segment and face and neck, with a crepitus. An emergency CT scan of the chest and neck showed extensive subcutaneous emphysema in the chest and back, a large amount of emphysema in the mediastinum, a small amount of left pleural effusion, no pneumothorax (Fig. 2). Spontaneous esophageal rupture was diagnosed. Laboratory analysis revealed that serum RBC 3.3 cell/L; Hgb 100 g/L; HCT 28.5% after spontaneous esophageal rupture.

Due to the poor general condition of the patient, the risk of surgery was high, and endoscopic treatment was preferred. A long strip rupture in esophagus which was 28–34 cm away from the incisors was seen by endoscope. A small amount of blood stasis was applied, and a hemostatic clip was placed from the anal side to the mouth side and a large Boston’s clip was stitched. A total of 14 titanium clips were used for suturing the split (Fig. 3). Postoperative fasting and strong anti-infection treatment were performed. Esophageal angiography was performed on the 11th day after operation. No contrast agent leakage or exacerbation of emphysema was observed (Fig. 4).

Recheck chest CT was performed after the operation. 17 days later, emphysema and subcutaneous emphysema disappeared (Fig. 5). Laboratory analysis revealed serum RBC 3.98 cell/L; Hgb 113 g/L; HCT 33.6% 20 days later after the operation. Recovery was complicated by renal failure, leading to death 61 days after admission.
3. Discussion

Spontaneous esophageal rupture, also known as Boerhaave syndrome[7], is a rare but severe gastrointestinal disease, its early symptoms are similar to chest and abdomen emergencies, diagnosis and treatment are often delayed, in some cases will lead to adverse results.[8] The rupture of the esophagus most commonly results from a full-thickness transmural rupture of the normal esophageal wall due to a sudden increase in intrAESophageal pressure caused by nausea or vomiting.[9] Spontaneous esophageal rupture has been reported, including patients with gastrointestinal stenosis, Barrett's esophagus, vomiting during pre-treatment for an endoscopic examination, and vomiting after general anesthesia.[10] In most cases of spontaneous esophageal rupture, the tearing along the fiber is mostly longitudinal slit, generally 0.6–8.9 cm, can also reach 10–12 cm, 90% occurs in the left chest, mostly in the lower left of the esophagus, and also into the right side and the abdominal cavity.[11] Most of the clinical manifestations are atypical. Early manifestations include sudden chest pain or upper abdominal pain, radiation to the shoulders and back, accompanied by
immediate treatment was needed. Delayed diagnosis and perforation of the gastrointestinal tract, once diagnosed, spontaneous esophageal rupture. Nutritional status, thin lower esophagus muscle layer, leading to hypoesophageal pressure. In addition, the patient had poor evident during gastroscopy, leading to a significant increase in hypoesophageal pressure. In addition, the patient had poor nutritional status, thin lower esophagus muscle layer, leading to spontaneous esophageal rupture.

Esophageal rupture is the most serious and rapidly lethal perforation of the gastrointestinal tract, once diagnosed, immediate treatment was needed. Delayed diagnosis and treatment can rapidly lead to severe life-threatening infections such as empyema and mediastinitis, and multiple organ failure. The treatment strives to be carried out within 24h of diagnosis, and the mortality rate of patients exceeding 24h is extremely high. The principle of treatment is to remove the source of infection, close the breach, restore the integrity of the esophagus, and the mortality rate of patients exceeding 24h is extremely high. The principle of treatment is to remove the source of infection, close the breach, restore the integrity of the esophagus, and postoperative recovery was satisfactory. For patients with severe malnutrition after gastric cancer surgery, there is a risk of spontaneous esophageal rupture during gastroscopy. Therefore, it is important to recognize this emergency so that appropriate treatment can be tried quickly to increase good results.

Author contributions
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References
[1] Jagminas L, Silverman RA. Boerhaaves syndrome presenting with abdominal pain and right hydropneumothorax. Am J Emer Med 1996;14:53–6.
[2] Dayen C, Mishellany H, Hellmuth D, et al. Spontaneous rapture of the esophagus or boerhaave syndrome. Report of 3 cases and Review of the literature. Rev Mal Respir 2001;18:537–40.
[3] Lucendo AJ, Frigual-Ruiz RR, Rodrigues B. Boerhaaves syndrome as the primary manifestation of adult eosinophilic esophagitis. Two case reports and a review of the literature. Dis Esophagus 2011;24: E11–5.
[4] Wang Q. Esophageal surgery. 2005; People’s Medical Publishing House, Beijing:686–692.
[5] White RK, Morris DM. Diagnosis and management of esophageal perforations. Am Surg 1992;58:112–9.
[6] Zhao T, Wang F, Sun Y. Early diagnosis and treatment of spontaneous esophageal rupture. Chin J Thorac Cardiovasc Surg 1998;3:171.
[7] Ng CS, Mui WL, Yim AP. Barogenic esophageal rupture: Boerhaave syndrome. Can J Surg 2006;49:438–9.
[8] Curci JJ, Horman MJ. Boerhaaves syndrome: the importance of early diagnosis and treatment. Ann Surg 1976;183:401–8.
[9] Paluszkiewicz P, Bartosinski J, Rajewska-Durda K, et al. Cardiac arrest caused by tension pneumomediastinum in a Boerhaave syndrome patient. Ann Thorac Surg 2009;87:1257–8.
[10] Oguma J, Ozawa S. Idiopathic and iatrogenic esophageal rupture. Kyobu Geka 2015;68:701–5.
[11] Lu Q. Treatment of 34 cases of spontaneous esophageal rupture. Mod Diagn Treat 2013;1573–4.
[12] Bykov VP, Fedoseev VF, Sobinin OV, et al. Mechanical damage and spontaneous esophageal perforation. Vestn Khir Im I I Grek 2015;174:36–9.
[13] Pope AJ, Adair HM. Spontaneous perforation of the esophagus during gastroscopy. Gastrointest Endosc 1988;34:75.
[14] Dawson J, Cockel R. Oesophageal perforation at fibreoptic gastroscopy. Br Med J 1981;283:583.
[15] Tanaka H, Uemura N, Nishikawa D, et al. Boerhaave syndrome due to hypopharyngeal stenosis associated with chemoradiotherapy for hypopharyngeal cancer: a case report. Surg Case Rep 2018;4:54.
[16] Chino O, Makuuchi H, Ozawa S, et al. Clinical study on the treatment and strategy for spontaneous esophageal rupture. J Abdom Emerg Med 2015;35:831–40.
[17] Di Leo M, Maselli R, Ferrara EC, et al. Endoscopic management of benign esophageal ruptures and leaks. Curr Treat Options Gastroenterol 2017;15:268–84.