

Spontaneous Oesophageal Rupture of The Right Wall After Oral Administration of Sulfate Solution: An Unusual Case Report

Hao Xu

Wannan Medical College

Ning Huang

First Affiliated Hospital of Wannan Medical College

Lin Li

First Affiliated Hospital of Wannan Medical College

Pingchuan Ma

First Affiliated Hospital of Wannan Medical College

Dongping Huang

First Affiliated Hospital of Wannan Medical College

Chiyi He (✉ hechiyi11@163.com)

First Affiliated Hospital of Wannan Medical College

Case report

Keywords: spontaneous oesophageal rupture, oral sulfate solution, endoscopic repair technique, right wall

Posted Date: June 30th, 2020

DOI: <https://doi.org/10.21203/rs.3.rs-37239/v1>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background: Patients with gastrointestinal stenosis, Barrett's oesophagus, and vomiting during endoscopic preconditioning or after general anaesthesia may develop spontaneous oesophageal rupture in the literature. However, we found an unusual case in which oral sulfate solution triggered oesophageal perforation. Additionally, the oesophageal chasm uncommonly presented at the right wall, while most ruptures are located in the left wall of the oesophagus, and the unexplained and rapidly progressive right-sided pleural effusion in this patient could be associated with this entity. To the best of our knowledge, this is the first published case of oesophageal rupture of the right wall after oral administration of sulfate solution in the literature.

Case presentation: For this patient, he suffered from acute onset of unbearable epigastric pain and compression pain in the right chest, with dyspnea, chest tightness and palpitation, after severe nausea and vomiting following oral administration of sulfate solution, and findings from imaging and gastroscopy eventually confirmed oesophageal rupture. Anti-infective treatments, pleural drainage, rehydration and total parenteral nutrition were administered immediately; subsequently, we used a total of seven titanium clips to close the oesophageal rupture under gastroscopic guidance. Eventually, he demonstrated good evolution after the operation and was discharged after recovery.

Conclusions: This case emphasizes the importance of considering BS when dealing with patients with severe vomiting, acute chest pain, or dyspnea, especially after administration of sulfate solution for bowel cleansing.

Background

Adequate bowel cleansing is one of the most important prerequisites for effective and safe colonoscopy. Studies have found that oral sulfate solution (OSS), an osmotic laxative, has been indicated to be safe and effective for colonoscopy cleansing [1]. To the best of our knowledge, the most common adverse events following OSS administration include discomfort, abdominal bloating, nausea, abdominal pain, and vomiting [2], but it has never been reported that OSS can cause severe vomiting, and even lead to oesophageal rupture. Herein, we described this unusual case and our experiences in its management.

Case Presentation

A 63-year-old male took magnesium sulfate for bowel cleansing before colonoscopy; however, he suffered from acute onset of unbearable epigastric pain and compression pain in the right chest, with dyspnea, chest tightness and palpitation, after severe nausea and vomiting following taking magnesium sulfate. Subsequently, the pain radiated to the right neck and lower back and increased with any movement. His vital signs were a temperature of 37.8 °C and a heart rate of 109 beats/minute, and the remaining signs were unremarkable. Physical examination revealed subcutaneous emphysema in the neck, with crepitus, and diminished breathing sounds on the right side of the chest. Laboratory

analysis revealed leukocytosis, a WBC count of $18.4 \times 10^9/L$, a mild inflammatory response (CRP 8.02 mg/dL), and normal levels of myocardial enzymes and troponin. Chest X-ray was suggestive of subcutaneous emphysema in the neck and of right-sided pleural effusion (Figure 1A). A thoracic computed tomography (CT) scan showed air around the neck and trachea (Figure 1B-C), a large degree of mediastinal emphysema, right-sided pleural effusion, pneumothorax and pneumonia (Figure 1D-E). Next, he was treated with emergent pleural drainage, pain management, anti-infective treatments, acid-suppression, fasting and total parenteral nutrition. We highly suspected a diagnosis of oesophageal rupture, and endoscopy was performed immediately. During the process, a mucosal tear located in the right wall of the oesophagus that was 35cm away from the incisors was seen (Figure 1F), which confirmed the diagnosis. As his general condition was poor and the risk of surgery was high, endoscopic repair technique under endotracheal intubation was preferred. During the procedure, the edges of the oesophageal perforation were cleaned, and a total of 7 titanium clips were used for suturing the split (Figure 2A). The first and second clips were applied to both sides of the opening, and the others were used for fastening between the parts of the open ends. Then, a drainage tube was placed near the perforation, and endoscopic jejunal tube placement was performed to gain postoperative nutritional support. Next, he was transferred to the Intensive Care Unit where he was started on anti-infective treatment, maintained water, electrolyte and acid-base balance and jejunostomy feeding. On postoperative day 62, recheck chest CT scan showed that air around the neck and trachea had disappeared (Figure 2B-C), and mediastinal emphysema, pneumothorax, pleural effusion and pneumonia had resolved significantly (Figure 2D-E). Esophageal angiography was performed on the 155th day after operation, and no contrast agent leakage was observed (Figure 2F). Finally, postoperative recovery was satisfactory, and he was discharged after recovery.

Discussion And Conclusion

Spontaneous oesophageal rupture, also known as Boerhaave syndrome (BS), is a life-threatening benign disease of the gastrointestinal tract [3] that typically results from a sudden increase in intraoesophageal pressure such as forceful retching or severe vomiting [4] and most frequently occurs in the left wall of the lower third of the oesophagus, a site that is anatomically vulnerable [5]. BS, to our knowledge, has been demonstrated in various patients, including those with gastrointestinal stenosis, Barrett's oesophagus, ileus, and frequent vomiting during continued chemotherapy or gastroscopy and after general anaesthesia [3]. However, in our case, the patient's esophageal wall tear was unusually secondary to oral magnesium sulfate administration, and second, most unique to our case, his rupture was located in the right wall of the distal oesophagus, which was in disagreement with the most frequent site of perforation reported [5]. To our knowledge, this is the first published case worldwide demonstrating esophageal rupture located in the right wall after taking magnesium sulfate. A study revealed that the incidence of spontaneous oesophageal perforation was 3.1/1,000,000 per year, which is an extremely rare entity [6], and the common presentations of BS, including chest or epigastric pain, vomiting, dyspnea and shock, are vulnerable to misdiagnosis as other entities, such as entities cardiogenic in origin, gastrointestinal perforation, acute pancreatitis and abdominal aortic aneurysms [7]. Due to the low incidence rate and

high misdiagnosis rate of BS, the diagnosis and therapy of BS are often delayed, resulting in a high mortality and significant complication rate. Hence, prompt diagnosis and immediate therapeutic interventions are extremely necessary.

Studies have found that early manifestations in most cases of BS commonly include sudden upper abdominal pain or chest pain after severe vomiting, which then rapidly radiates to the substernal area, shoulders or back, accompanied by dyspnea, chest tightness, fever or other symptoms. This characteristic history is of great significance for the diagnosis of BS [3]. In addition, images including plain chest roentgenograms, oesophagograms, and CT scans also contribute to diagnosing BS [8]. Previous studies have shown that the oesophagogram is a feasible and effective examination for diagnosing oesophageal perforation [5]; however, due to the high false-negative rate of the oesophagogram (15-25%) and tenuous nature of oesophageal rupture, chest CT is considered a more appropriate modality [5, 7]. The typical findings of chest radiography and CT are subcutaneous emphysema, pneumomediastinum, pleural effusion, pneumothorax, and so on [9]. Recent studies have revealed that gastroscopy can help definitively confirm the diagnosis and offer timely interventional treatment [10]. For this patient, his characteristic history, physical examination and findings from imaging were sufficiently consistent with BS, which vastly raised our suspicion of BS, and gastroscopy eventually confirmed this diagnosis. Since the establishment of our hospital, this is the first patient with oesophageal rupture after administration of OSS, even worldwide.

Data from the literature indicate that the golden period for primary repair is the first 24 hours of the event for oesophageal perforation when it can be associated with a 90% success rate [4]. The principles of treatment include removing the source of pollution, closing the breach, restoring the integrity of the oesophagus, full drainage, controlling the infection, strengthening nutritional support, improving the body and promoting wound healing [3, 8]. The traditional management of BS has been prompt surgery [8]. Recently, new primary repair methods with interventional endoscopy have been performed widely. One of these is the endoscopic clip device. Endoscopic repair with clips has evolved as an effective, easy, cheap and minimally invasive alternative to primary surgery [10]. In our case, we used endoscopic clips to close the oesophageal defect. The procedure was smooth, he recovered well after the operation and was discharged successfully.

Conclusion

We recommend that all physicians raise their index of suspicion for BS when dealing with patients with severe vomiting, acute chest pain, dyspnea, confirmed pneumothorax, or newly developed pleural effusion, especially following administration of OSS for bowel cleansing. Once diagnosed, endoscopic repair with clips can provide valid treatment and achieve a satisfactory outcome.

Abbreviations

BS: Boerhaave syndrome; CT: Computed tomography; OSS: Oral sulfate solution

Declarations

Authors' contributions

Hao Xu conducted the literature review and wrote the manuscript, Chiyi He conceived the idea of the case report, Ning Huang, Lin Li and Dongping Huang revised the manuscript, Pingchuan Ma analyzed and interpreted data. All authors read and approved the final version of the manuscript.

Acknowledgements

We are very grateful to Xuefeng Zhang in the imaging department of the First Affiliated Hospital of Wannan Medical College for his assistance; we thank American Journal Experts (<https://www.aje.cn>) to editing this manuscript.

Funding Information

This study was supported by project of Anhui Province's key research and development (201904a07020028).

Availability of data and materials

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

Ethics approval and consent to participate

Not applicable.

Consent for publication

Informed consent was obtained for publication of the case details.

Competing interests: None.

References

1. Park JB, Lee YK, Yang CH. The evolution of bowel preparation and new developments. *Korean J Gastroenterol.* 2014;63:268-275.
2. Kim J, Kim HG, Kim KO, et al. Clinical comparison of low-volume agents (oral sulfate solution and sodium picosulfate with magnesium citrate) for bowel preparation: the EASE study. *Intest Res.* 2019;17:413-418.
3. He F, Dai M, Zhou J, He J, Ye B. Endoscopic repair of spontaneous esophageal rupture during gastroscopy: A CARE compliant case report. *Medicine.* 2018;97:e13422.

Figure 1

imaging data after oral administration of magnesium sulfate Chest X-ray was suggestive of extensive subcutaneous emphysema in the neck and of right-sided pleural effusion (A). CT scan showed air around the neck and trachea, right-sided pneumothorax, pneumonia, pleural effusion and mediastinal emphysema (B-E). Furthermore, a chasm located in the right wall of the esophagus was seen under gastroscopy (F).

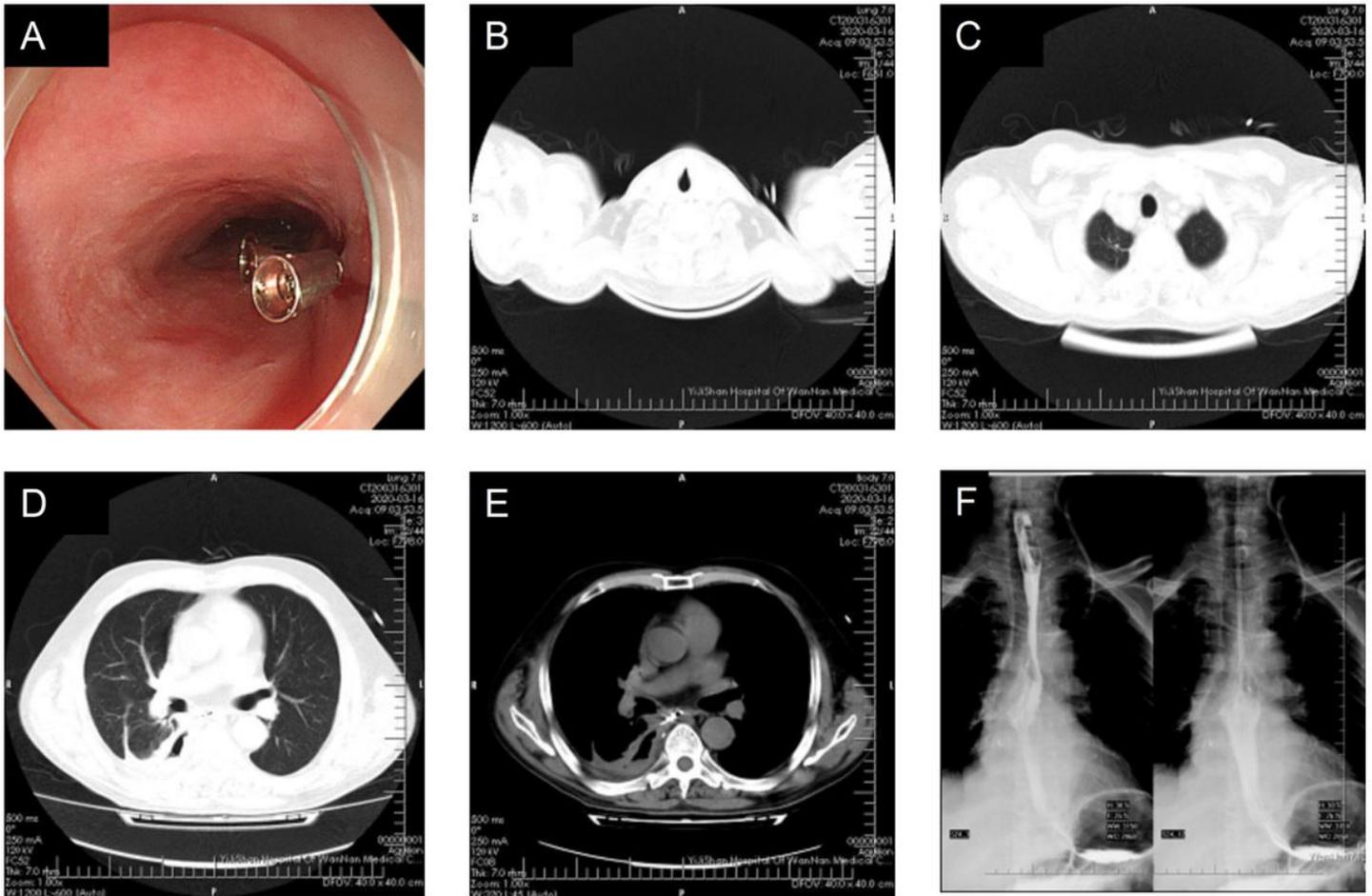


Figure 2

imaging data after endoscopic treatment After clamping the esophageal chasm with Endoscopic titanium clips (A). Air around the neck and trachea disappeared (B-C). Pneumomediastinum, pneumothorax, pneumonia, and pleural effusion resolved significantly (D-E). Besides, oesophagogram indicated the esophagus without the tracer leakage (F).