Rupture of the esophagus due to carbonate use—a case report

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ABSTRACT

Background: Rupture of the esophagus which is not iatrogenic or due to carcinoma, Mallory Weiss syndrome, or foreign body is called a spontaneous rupture of esophagus or Boerhaave syndrome. Symptoms are not specific and include back or retrosternal chest pain, crepitus on chest wall palpation, or mediastinal crackle. Esophagus rupture could have dyspnea, tachypnea, tachycardia, and dullness in the chest exam due to pleural effusion beside the pain.

Case presentation: In this report, we had two cases with rupture of the esophagus due to soda (bicarbonate) use with no remarkable past medical history. Both patients had stable vitals when they came to the Emergency Department. Diagnosis was confirmed by chest CT scan. One of the patients did not take any invasive treatment and there was no need for operation. The other patient underwent thoracotomy and esophageal repair. Both of them had good general condition after some days.

Conclusion: We recommend not englutting excessive amounts of soda why it can cause rupture of the esophagus in patients with unknown esophageal wall weakness or healthy esophagus.

Keywords: Spontaneous rupture, esophagus, Boerhaave syndrome, bicarbonate, thoracotomy, case report.

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Background

Spontaneous esophagus rupture may be divided into three groups: (a) rupture due to esophagitis with ulceration, (b) rupture due to esophagus intraluminal pressure increase, and (c) truly spontaneous rupture cases which have no obvious cause [1]. Esophagitis or stricture of the esophagus may predispose to rupture, but this event can occur in the healthy esophagus too [2].

Iatrogenic perforation mostly happens in the distal esophagus or the hypopharynx while spontaneous rupture may happen in the posterolateral wall of the esophagus, above its diaphragmatic hiatus [3]. Symptoms of thoracic esophagus rupture consist of retrosternal chest pain and crepitus on chest wall palpation caused by subcutaneous emphysema. The auscultation of mediastinal crackling in patients with mediastinal emphysema. Esophagus rupture could have dyspnea, tachypnea, tachycardia, and dullness in the chest exam due to pleural effusion beside the pain [3–5].

Case Presentation

Case 1

The patient was a 31-year-old female from Iran-Tabriz without any past medical history of the gastrointestinal disease who had severe back pain immediately after excessive non-alcoholic soda use. She consulted with the Emergency Department in Tabriz and was admitted to the Medical Emergency Department. On initial examination she had normal vital signs included blood pressure of 110/70, pulse rate of 83, and oxygen saturation of 94%. The auscultation of lungs had reduced breathing sound in both sides of the thorax especially the right side, she had no tenderness or guarding on abdominal examination. Electrocardiogram (ECG) was normal with no tachycardia and ST-T segment changes. Laboratory evaluation showed no leukocytosis. Hemoglobin was 12.5, blood urea nitrogen was 29, and also she had normal electrolytes. Her blood gas analysis included PH: 7.39, HCO_3:21.9, PCO_2:24.9. She was ill, so she was transferred to the Cardiopulmonary resuscitation (CPR) room in the Emergency Department. A chest CT scan was done that showed the rim of pleural effusion in the left side lung and showed esophagus rupture with extensive pneumomediastinum (Figure 1). Therefore, chest tube was placed that soda was getting out of it.

Treatment

The patient took resuscitation with IV fluid and also pantoprazole was given to her in the Emergency Department then she was taken to the operation room emergently and underwent thoracotomy, esophageal repair, chest tube, and feeding jejunostomy tube placing. After recovery, she

was admitted to intensive care unit (ICU). Feeding was through jejunostomy tube and she took IV broad-spectrum antibiotics included Meropenem and pantoprazole. After a few days, she had no new complications and was stable so she was transferred to the thorax ward. After some days, oral fluid started and was taken well so feeding jejunostomy was exited. She had not any complication and no pain with swallowing after treatment, or side effect so she discharged with good general condition. In the next follow-ups, she had no new complication.

Case 2

The patient was a 20-year-old female from Turkey-Erzurum with no remarkable past medical history who had back pain which happened a few hours after drinking non-alcoholic soda. She had severe pain at back with swallowing every single thing even saliva. She consulted to fast track in the Emergency Department. On initial examination, she had normal vitals included blood pressure of 115/80, pulse rate of 88, and oxygen saturation of 96%.

On physical exam, she had no tenderness or guarding in the abdominal examination. Also, auscultation of lungs and mediastinum were clear with no abnormality. ECG had no pathologic finding. A chest X-ray was performed to rule out any probable reasons. At first sight, there was no significant finding on chest X-ray (Figure 2), but because of high suspicion of mediastinal event, the Chest CT scan was run. A chest CT scan was shown free air around the esophagus thus rupture of the esophagus was confirmed (Figure 3). Hence, she transferred to the medical Emergency Department.

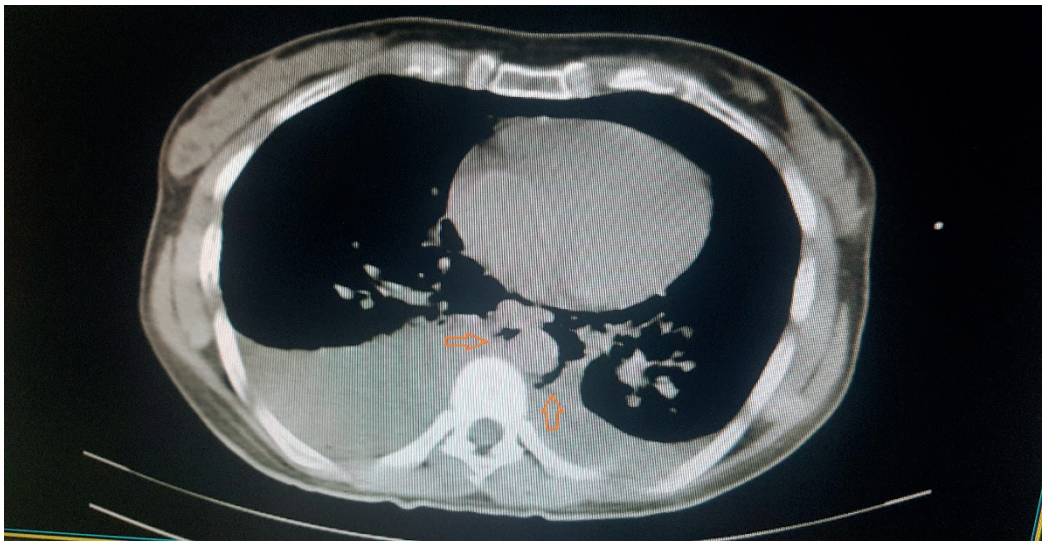

Figure 1. *Free air around trachea and pericardia.*

Figure 2. *Free air around the right side of trachea.*

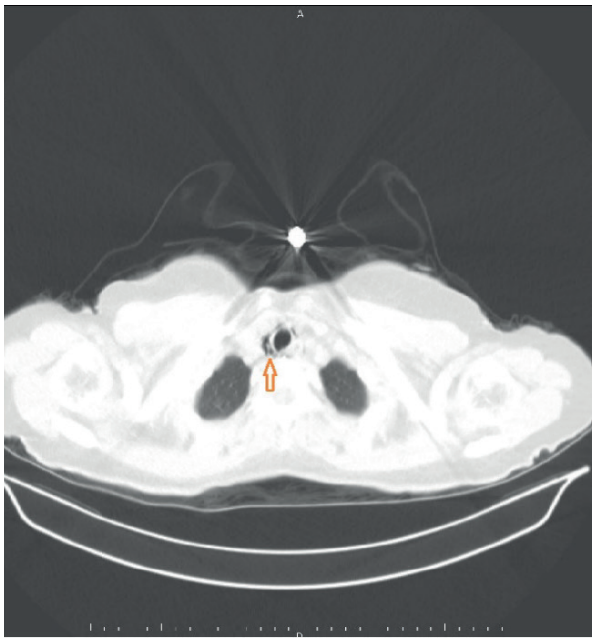

Figure 3. *Free air in the posterolateral side of the trachea.*

IV fluid and pantoprazole were given to the patient in the Emergency Department but before doing any other therapeutic action or laboratory evaluation, she left the hospital with her own decision and refused hospitalization. In the follow up with a call, she was well and without any problem in swallowing.

In both cases, the differential diagnosis included acute coronary syndrome, rupture of aortic aneurysm, pulmonary embolism, and pneumothorax.

Discussion

Spontaneous rupture of esophagus or Boerhaave syndrome is a rupture of the esophagus with reasons but iatrogenic perforation and perforations due to foreign body, carcinoma, Mallory–Weiss syndrome, caustic ingestion, or even external missile [6]. Rupture of the esophagus is life-threatening and has the worst prognosis between GI tract perforation [7,8]. A sharp increase of pressure in esophagus lumen against close cricopharyngeus, abnormal esophageal mucosa, and lack of muscular mucosa can cause a rupture of the esophagus wall [8,9]. This happens in men more frequently and mostly affects men aged 40–60 years who overuse alcohol and food [10].

Diagnostic methods include:

Plain radiography to see escaped air from the ruptured esophagus and subcutaneous emphysema [3] and although "V" sign of Nacrelio can be seen in chest radiography [11]. CT scan is usually diagnostic [11] and can show collections of peri-esophageal fluid and pneumomediastinum [3]. To confirm the diagnosis, contrast esophagography is required that can also show the level of rupture or perforation [3,11] although it has been explained that GI tract contrast CT is more sensitive than the upper GI tract study [10]. An esophageal study by endoscopy is 100% sensitive but insufflation may cause enlargement of the rupture [7,10].

Treatment and management

Initial management includes ICU care if the patient is unstable, hemodynamic monitoring and volume resuscitation, intravenous broad-spectrum antibiotics, antifungals, and PPI, keeping NPO, percutaneous drainage of any fluid collection [3,6,10]. In patients with esophageal rupture, especially when they have minimal symptoms and there is no communication between the esophageal lumen and mediastinal or pleural space, non-operative conservative therapy has been suggested [6]. As before said surgery has been a certain treatment, although other newer methods like therapeutic endoscopy (endoscopic stenting, endoscopic gluing and …) have shown [10-11]. Several past studies have expressed thoracoscopic repair of esophagus, however, thoracotomy is often used [11]. Patients who have fluid leakage extensively or tissue necrosis should undergo emergent "surgical" stenting and debridement [3].

Christian et al. [12] represented that the treatment methods must be chosen based on every individual patient. Their study showed that surgical methods and conservative treatment both can be effective and successful [12].

In the existing articles, spontaneous rupture of the esophagus "usually" [but not always] caused after forceful vomiting or itching. Pate et al. [6] had a study on 34 patients with spontaneous rupture of the esophagus during 30 years that only patients with truly spontaneous rupture were included. In this study, in 8 patients, pain happened before or without nausea and vomiting [6]. Both of our cases in this case-report article had rupture of the esophagus or Boerhaave syndrome due to carbonate (excessive amount of soda) use. Our team visited the patients in the Emergency Department and started the management. The first case was taken to the operation room and emergent thoracotomy was done for her; however, the second patient did not accept to be hospitalized and take antibiotics or other therapeutic actions but both of them had good general conditions after some days.

This shows that both surgical treatment and conservative therapy can be successful in such patients but surgical treatment is the most used treatment and has fewer rates of mortality and morbidity according to past studies.

Conclusion

According to our findings in this study, we recommend not to englut excessive amount of soda why it can cause rupture of the esophagus in patients with any unknown esophageal wall weakness or healthy esophagus.

What is new?

Boarhaave syndrome or spontaneous rupture of esophagus is one of the uncommon reasons of esophagus rupture. In the existing articles, spontaneous rupture of esophagus "usually" (but not always) causes after a forceful vomiting or itching. In recent studies, we found no article about direct relationship between bicarbonate use and rupture of esophagus.

List of Abbreviations

CPR	Cardiopulmonary resuscitation
PPI	Proton Pump Inhibitor
NPO	Nil per os (nothing by mouth)

Consent for publication

Written informed consent was obtained from all the patients.

Ethical approval

Ethical approval is not required at our institution to publish an anonymous case report.

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Summary of the case

Summary of the case 1

1	**Patient (gender, age)**	Female , 31
2	**Final diagnosis**	Rupture of the esophagus
3	**Symptoms**	severe back pain, rim of pleural effusion in the left side lung
4	**Medications**	IV fluid therapy, PPI, board spectrum antibiotics
5	**Clinical procedure**	ICU care, Thoracotomy and feeding jejunostomy
6	**Specialty**	surgical, gastroenterology

Summary of the case 2

1	**Patient (gender, age)**	Female, 20
2	**Final diagnosis**	Rupture of the esophagus
3	**Symptoms**	severe back pain with swallowing, free air around the esophagus
4	**Medications**	IV fluid therapy, PPI
5	**Clinical procedure**	No procedure
6	**Specialty**	surgical, gastroenterology