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Case Report

Blunt esophageal injury in the setting of multitrauma: A case report[☆]

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ABSTRACT

Blunt esophageal injury is an unusual organ injury that has unclear clinical symptoms due to the overlap of thoracoabdominal trauma in the setting of multiple traumas. The treatment options vary depending on the patient's clinical symptoms, the extent of esophageal damage, and the time from the onset of damage to diagnosis. This article presents a case of a young male patient receiving emergency treatment after a traffic accident. Esophageal perforation was diagnosed through chest computed tomography with contrast injection and oral contrast. The article focuses on imaging characteristics and suggestive signs of blunt esophageal injury in the setting of multitrauma.

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Introduction

The anatomy of the esophagus extends through three body cavities (neck, chest, and abdomen). In each segment, this structure is well-covered by important organs. Esophageal injuries can be classified into the following types: swallowing foreign body, esophageal ulceration, esophageal perforation, and esophageal trauma [1]. Esophageal injuries can occur due to iatrogenic (esophagogastroduodenoscopy ...), swallowing

foreign body, trauma to the chest or abdomen (blunt or penetrating), Boerhaave syndrome [2]. These aforementioned lesions can be fatal due to digestive fluid spreading surrounding structures when there is a puncture in the esophageal wall which causes infection and organ damage [1]. The mortality risks of blunt and penetrating esophageal injuries are equivalent ($P = .65$) [3]. Diagnosing esophageal injuries is still challenging, with high mortality (10%-20%) [1,2]. Symptoms of esophageal injury are nonspecific and include vomiting blood, hemoptysis, hoarseness, painful swallowing, and difficulty

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swallowing [4]. In the process of emergency treatment for blunt chest injuries, chest X-ray has an important role in initial assessment and is easily performed at medical facilities. However, CT has higher sensitivity than X ray, providing more accurate diagnosis [5]. Fluoroscopic esophagography examination with oral contrast are traditionally choice when evaluating the esophagus for perforation. However, false-negative results of fluoroscopy are 10%-38% [2]. In addition, CT is also capable of evaluating other nonesophageal lesions in the setting of multiple trauma [2]. The most crucial factor in treating esophageal injuries is accuracy in a timely fashion which significantly affects the patient outcome [1]. Treatment and prognosis tightly depend on whether an esophageal perforation exists, so it is necessary to accurately diagnose the above case. Esophageal perforation due to blunt chest trauma is a rare thoracic emergency [6]. This article presents a case of a young male patient receiving emergency treatment after a traffic accident. Esophageal perforation was diagnosed through chest computed tomography with contrast injection and oral contrast. We will discuss the mechanism of injury and techniques for diagnosing esophageal perforation in patients with multiple injuries.

Case presentation

A 35-year-old male patient was admitted to the hospital 12 hours after a motorbike-car traffic accident. About 2 hours before the accident, the patient had dinner and drank wine. After the accident, he complained of headaches, chest pain, and right leg pain. He was transferred to our hospital with a diagnosis of multiple injuries. The patient had no previous medical and esophageal-gastric intervention history. He was examined clinically. Initially, the patient was conscious with left chest pain and mild shortness of breath. Examination revealed wounds on both sides of the forehead and cheeks, skin rubbing in the chest area, abdominal stiffness; pain, and limited right leg movement. Vital indicators: 150 beats per minute, blood pressure 130/80 mmHg, SpO2 90%.

The patient received a plain chest X-ray and a right femur X-ray, which revealed left eighth and ninth ribs fracture (Fig. 1-White arrow) and right femur fracture.

Ultrasound showed bilateral pleural effusion, predominance on the left side. The thick of fluid measured in the left pleural cavity is 26 mm and 8 mm in the right. Therefore, the patient was prescribed a chest-abdominal computed tomography scan due to chest pain and abdominal wall stiffness combined with previous preliminary clinical tests.

On the chest-abdominal computed tomography scan, there was no abdominal organ injury. However, on the chest computed tomography, there was pleural effusion on both sides, left side predominance (Fig. 2C), causing collapsed lung parenchyma and contusion injuries to the left lung parenchyma (Fig. 2A). Obviously, the undisplaced fractures in the posterior arches of the left eighth, ninth, and 10th ribs (Fig. 2B- white arrow) are not likely to be the cause of bilateral pleural effusion. In addition, there is a gas-fluid levels next to the thoracic esophagus in the left mediastinum (Figs. 2C-E - asterisk). The post-contrast image revealed no active bleed-

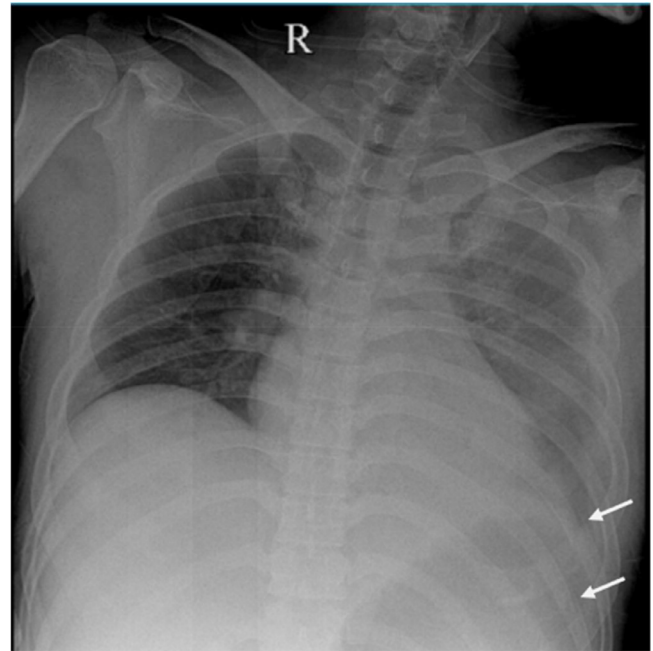


Fig. 1 – Anterior-posterior chest X-ray image taken in the patient's lying position revealed uniform opacification of the left lung field representing left pleural effusion. There was no sign of pneumothorax or subcutaneous emphysema. Free air in the mediastinum could not be observed because the film was taken in the lying position. Fracture of ribs eighth and ninth on the left (White arrow).

ing spots. However, the unclear esophageal boundary heavily raises concerns about rupture. The patient was assigned to have a chest computed tomography scan with an oral contrast agent. This film shows the image of contrast leaking out of the esophagus into the left pleural space (Fig. 3 - asterisk). Therefore, the patient was diagnosed with esophageal injury.

The patient underwent emergency surgery subsequently. During surgery, the esophagus was pulled down below the diaphragm, and a rupture of about 2 cm in size was observed on the left edge of the esophagus close to the pylorus (Fig. 4 - white circle). Digestive fluid flows out from the esophageal perforation. The perforation was repaired by surgical suture, then a gastrostomy for decompression and a feeding jejunostomy was performed.

Discussion

Esophageal injuries are uncommon but can lead to several consequences, especially delayed diagnosis of the thoracic esophagus. In fact, penetrating wound injuries are more common than non-foreign body injuries. At a trauma center in Europe, the incidence of esophageal injuries between 2009 and 2014 was 0.14%. The proportion of people hospitalized with the incidence of blunt trauma was 0.06%, and the rate of people hospitalized with penetrating wounds was 0.6% [4]. Secondary rupture of the chest segment due to blunt trauma is

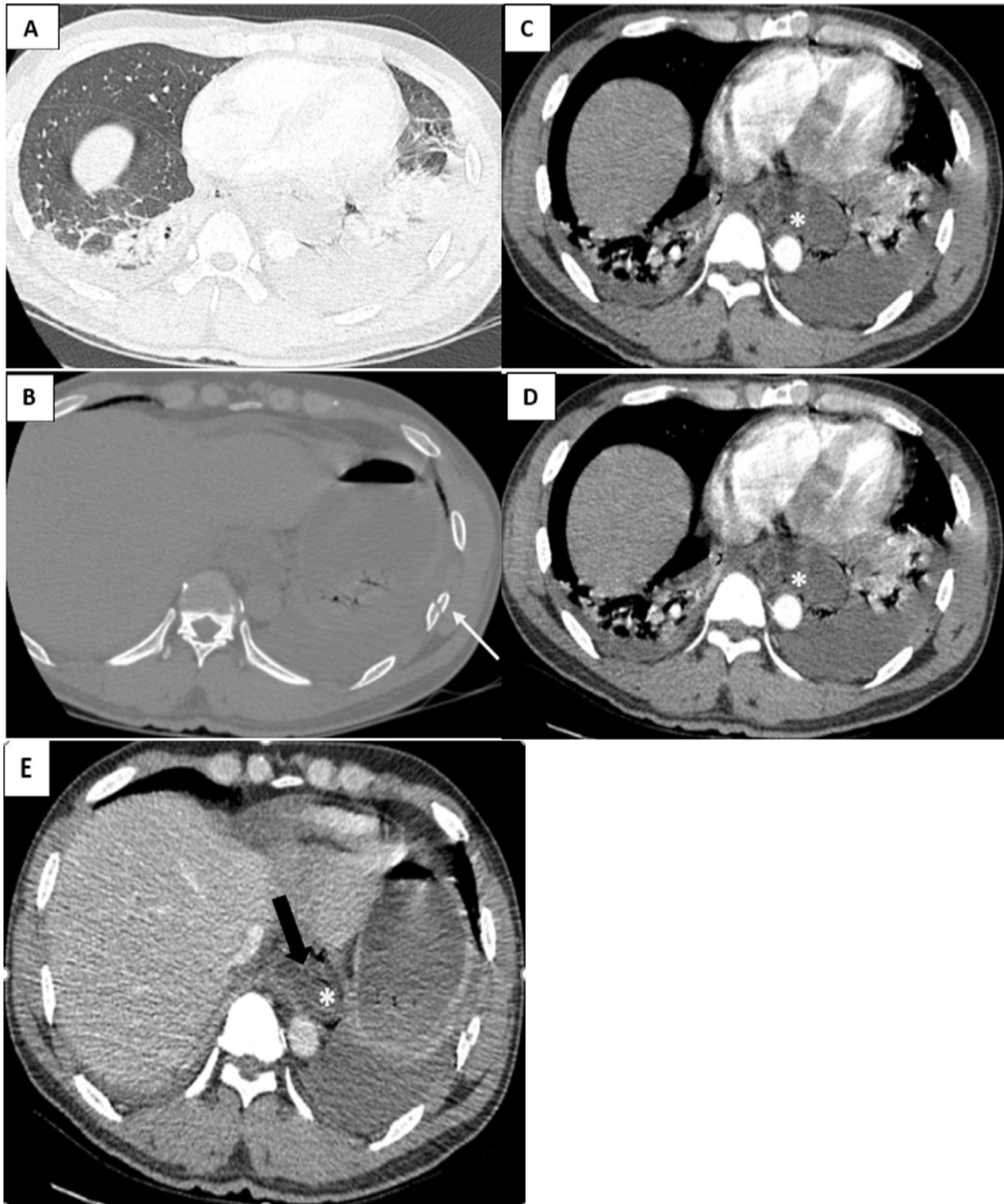


Fig. 2 – Chest CT scan of the patient. Precontrast image (A, B) showed contusion of lung parenchyma, bilateral pleural effusion predominately on the left side (A), and undisplaced fractures of the 8th, 9th, and 10th ribs on the left (B, white arrow). The contrast-enhanced chest computed tomography image (C-E) showed a gas-fluid levels located next to the left esophagus (asterisk) and a segment suspected of having a discontinuity of the esophagus wall (black arrow).

an extremely rare injury. In a meta-analysis conducted in 1988, Beal and colleagues identified 96 cases between 1900 and 1988. The most common mechanism of injury is due to rapid acceleration/deceleration injury [7]. Another mechanism mentioned was abdominal compression when the glottis closes due to increased pressure [8]. The overall mortality rate in the group of patients with esophageal injury is about 20%-30%, mainly due to injuries of other levels. Furthermore, delays in diagnosis can increase morbidity and mortality [9,10].

Clinically, general symptoms of esophageal injury are non-specific and include vomiting blood, hemoptysis, hoarseness, painful swallowing, and difficulty swallowing [4]. In our clinical case, the patient was hospitalized with multiple traumatic conditions, the clinical symptoms can be nonspecific and easily missed. Especially when the patient is under a traumatic brain condition, unconsciousness obstructs the ability to exploit the patient's medical history, injury mechanism, and symptoms. Other suggestive symptoms include pneumotho-



Fig. 3 – CT scan of the patient’s chest after taking contrast agent shows contrast leakage into the left pleural cavity (asterisk) and discontinuity of the thoracic esophageal wall close to the pylorus (black arrow).

rax, neck hematoma, and neck pain. Thoracic esophageal injuries may show a crunching sound in the mediastinum when heard, called Hamman’s sign [4]. In addition, the presence of gas in subcutaneous soft tissue along with the neck and chest wall is a sign that requires a thorough clinical examination. Signs of clinical subcutaneous emphysema may suggest perforation of the esophagus, causing puffiness in both the pleural space and mediastinum or chest wall. However, in traumatic, subcutaneous emphysema may also be seen in cases where patients have pulmonary contusion and rib fractures. Therefore, paraclinical examinations should be involved to help differentiate the diagnosis of these cases in a multi-traumatic condition. In this patient’s case, the only manifestation suggestive of esophageal perforation is chest pain, which easily overlaps due to traumatic conditions of the lung parenchyma and fractures. That can explain why perforation of the esophagus can be easily avoided if there is trauma to other organs in the chest.

In clinical practice, chest X-rays and unprepared abdominal X-rays are basic and standard paraclinical methods for traumatic assessment [11]. X-ray images of patients may show signs of gas in the soft tissues of the base of the neck, chest wall, mediastinal pneumothorax, or free gas in the abdomen. These signs are manifested by multiple radiolucent zones in the soft tissues of the above areas. On a chest X-ray, a massive pneumothorax without a rib fracture drives us toward the injury of the esophagus, which enhances our careful search on computed tomography to rule out this emergency. When there is free gas in the abdomen, the manifestation on an unprepared abdominal X-ray may be subdiaphragmatic free gas or an increase in the total abdominal radiolucent in the presence of a large amount of free air. The patient does not have an unprepared abdominal X-ray in this clinical case. Only the

left pleural cavity effusion is observed on an anterior-posterior cardiopulmonary X-ray. No pneumothorax or subcutaneous emphysema of the chest wall or base of the neck can be seen. Therefore, missing an esophageal injury in this clinical case is straightforward.

When a rupture of the esophagus is suspected, the diagnosis is usually confirmed by esophageal contrast swallow imaging, computed tomography of the chest, or endoscopy of the upper digestive system. However, because patients with multiple injuries are often monitored and taken in the supine position in the early stages, diagnostic methods such as esophagus contrast swallow scans and unprepared abdominal X-rays in a standing position are impossible. Chest X-ray has high sensitivity but low specificity with limited esophageal rupture in diagnosis. Endoscopy of the upper digestive system is usually not the preferred option in emergencies. In addition, endoscopy is contraindicated in patients who are suffering from injuries to the cervical spine with a cervical collar on their neck [6]. In our case, the patient was under multiple traumatic conditions, so it was impossible to perform examinations in a standing position. The patient was given a definitive diagnosis by oral contrast and chest computed tomography. Imaging the contrast leaking outside the esophagus confirmed the patient’s esophageal perforation. In addition, we can rely on other indirect suggestive signs such as effusion-pneumothorax of the pleural cavity pneumothorax, particularly the gas-fluid levels in the mediastinum located next to the esophagus.

Even though ultrasound is not a valuable tool in diagnosing esophageal injury, it can help evaluate bilateral pleural effusions as well as intra-abdominal fluid, which suggest a traumatic condition of other parts of the abdomen or rule out intra-abdominal organ trauma.

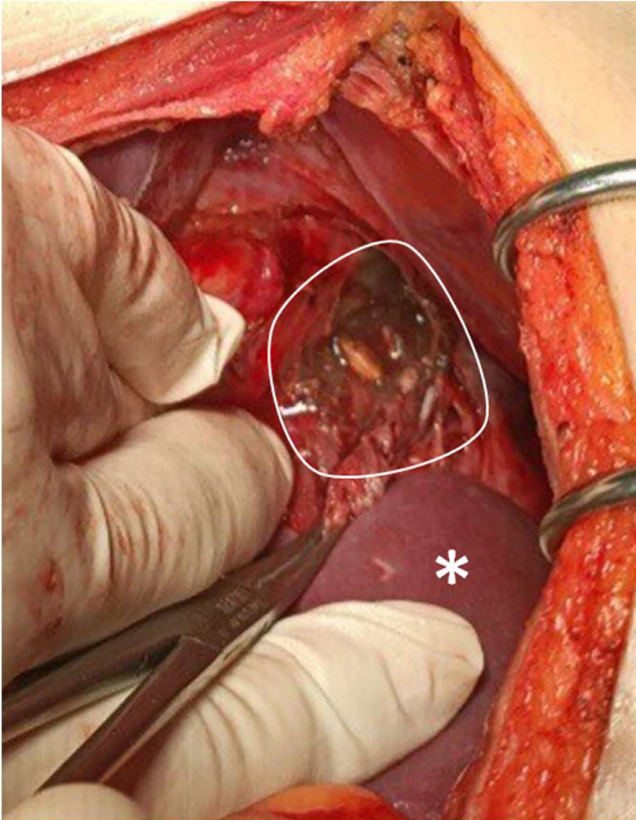


Fig. 4 – Intraoperative images. The esophagus was pulled down under the diaphragm, and an approximately 2cm rupture (white circle) was observed at the left border of the esophagus near the pylorus and liver (*).

Successful treatment of esophageal perforation depends on the perforation's size, diagnosis duration, and underlying conditions [12,13]. Patients must be given broad-spectrum antibiotics. Primary emergency surgery was previously recommended as the gold standard. Usually, initial surgery can be performed by suturing and closing the hole in the esophagus. Other principles include drainage around the puncture site, reduced pressure on the esophagus and stomach (via nasogastric or gastric catheter), and distal enteral nutrition (jejunal catheter feeding) [11]. However, in recent years, conservative treatment has been recommended for certain patients [13,14]. Therefore, perforation of the esophagus should be included in the list of differential diagnoses in trauma patients hospitalized with thoracic-abdominal injuries. In patients with multiple lesions, contrast-enhanced chest computed tomography is a high-value diagnostic method with typical images such as contrast leaking from the esophagus and discontinuity of the esophageal wall.

Conclusion

Perforation of the esophagus is a rare injury but can lead to severe consequences if not diagnosed and treated in time.

Patients are often admitted to the hospital with multiple injuries and neglecting initial symptoms, which can have serious consequences, even fatal. Therefore, perforation of the esophagus should be included in the list of differential diagnoses in trauma patients hospitalized with thoracic-abdominal injuries. In patients with multiple accompanying lesions, contrast-enhanced chest computed tomography is a high-value diagnostic method with typical images such as contrast leaking from the esophagus and discontinuity of the esophageal wall.

Author's contributions

Nguyen NT and Nguyen MD: Case file retrieval and case summary preparation. Nguyen NT and Nguyen MD: preparation of manuscript and editing. All authors read and approved the final manuscript.

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Availability of data and materials

Data and materials used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Patient consent

Informed consent for patient information to be published in this article was obtained.

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