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Triple Thoracic Injury Caused by Foreign Body Ingestion: A New Approach for Managing an Unusual Case

Authors' Contribution:

Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
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Conflict of interest: None declared

Patient: Male, 31-year-old
Final Diagnosis: Esophageal perforation
Symptoms: Chest pain
Medication: —
Clinical Procedure: —
Specialty: Surgery

Objective: Unusual clinical course

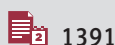
Background: In most cases, esophageal perforation is caused by ingested foreign bodies which can migrate through the esophageal wall, damaging nearby vital organs like the aorta or pericardium, thereby having potentially fatal outcomes. Early diagnosis and intervention are key to decreasing morbidity and mortality. Appropriate treatment involves extracting the foreign body, repairing the esophagus and other injured organs (aorta, trachea, or pericardium), and draining and cleaning the mediastinum.

Case Report: A 31-year-old man presented with a 2-h history of severe chest pain radiating to the back and associated with profuse sweating after eating. The patient had ingested a sharp metal object that injured the thoracic esophageal wall close to the aorta and the left atrium, causing hemopericardium. The presence of pericardial effusion on echocardiogram examination raised a high suspicion of cardiac and/or aortic injury. Left thoracotomy was done because the injury was in the distal third of the esophagus. Therefore, exploration of the pericardium and drainage of the mediastinum was essential, along with the use of resuscitative endovascular balloon occlusion of the aorta (REBOA) to control the proximal aorta while exploring the thoracic aorta.

Conclusions: In cases of esophageal injury when aortic involvement is suspected, we suggest using REBOA in selected cases, when an expert team is available, as a mean of gaining better proximal control over the aorta to safely explore and repair any possible injuries. This is an unusual case management scenario that needs further literature and clinical support.

Keywords: Aorta, Thoracic • Esophageal Perforation • Thoracic Injuries

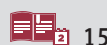
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Background

Esophageal perforation is uncommon but can have potentially life-threatening consequences [1]. This can be attributed to multiple factors such as difficulty in accessing the esophagus, lack of a serosal layer, and the close proximity of the perforation to vital organs such as the thoracic aorta and the heart [1]. One well-identified mechanism of esophageal perforation is iatrogenic injury caused by diagnostic and therapeutic procedures; another is spontaneous perforation caused by increased intra-abdominal pressure with vomiting, which is known as Boerhaave's syndrome. In addition to ingested foreign bodies, infection, irritation by caustic ingestion, and malignancy are rare mechanisms that might be encountered [2].

Impacted esophageal foreign bodies may resolve uneventfully without treatment [3]. However, complications can be serious and include perforation, mediastinitis, esophageal stenosis, and erosions. Timely diagnosis is essential to prompt intervention; however, in the clinical setting, diagnosis can be delayed. Symptoms of a perforated esophagus include vomiting, acute chest or epigastric pain, dysphagia, and dyspnea. This vague presentation most likely results in delay in the diagnosis, which may lead to serious complications. Sharp objects must be identified and dealt with to avoid major complications. Dental prostheses and meat and fish bones are the most commonly involved foreign bodies [4]. The narrow part of the esophagus is the usual location of impaction in the cervical part of the esophagus at the cricopharyngeus constrictor [5]. Perforation can occur with foreign body migration to the trachea or aorta. No guidelines exist in treating esophageal perforations. Conservative and nonsurgical intervention plays a role in the management of some cases. However, surgical intervention might be necessary to avoid or prevent complications [6,7].

Different imaging modalities aid in the diagnosis of esophageal perforation. Plain X-ray images can show complications such as pneumothorax or pneumomediastinum. A computerized tomography (CT) scan assists in the diagnosis and outlines the possible location of perforation [8,9]. Upon confirmation of the diagnosis, endoscopy and surgery are options for extraction of the foreign body and repair of the perforation [6,7,10]. We present a case of esophageal perforation mimicking acute coronary syndrome or aortic dissection, which required a multifaceted treatment approach.

Case Report

A 31-year-old man presented to the Emergency Department with a 2-h history of severe chest pain radiating to the back and associated with profuse sweating. The pain started after

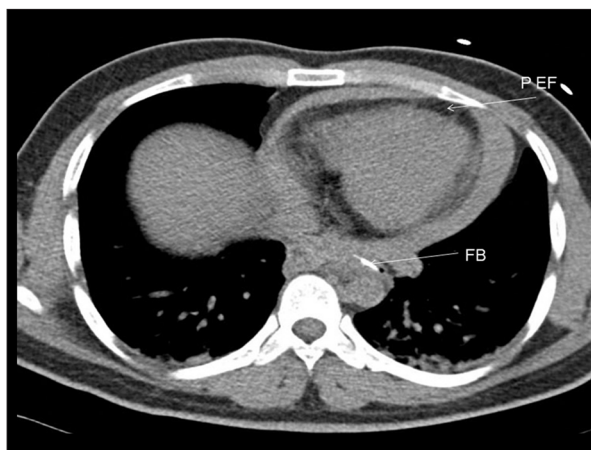


Figure 1. Computed tomography scan with arrows pointing to the foreign body (FB) and pericardial effusion (PEF).

food intake. On examination, the patient was experiencing diaphoresis and tachycardia with a pulse rate of 162 beats per min. He was alert to time and place, and the results of his chest and abdominal examination were unremarkable. The bedside echocardiography test showed mild pericardial effusion. Shortly after admission, he became hypotensive, with a blood pressure of 80/63 mmHg. Owing to these constellations of symptoms, there was a suspicion of cardiac or aortic injury. An urgent CT angiography revealed a linear metallic foreign body stuck near the thoracic part of the esophagus; there was also significant pericardial effusion and small air pockets along the esophagus, raising concern for esophageal perforation. The linear foreign body was also close to the thoracic aorta, but there was no leakage of contrast (**Figure 1**).

Our initial approach involved an urgent esophagoscopy in the operating room. Erosion was found in the thoracic esophagus, which was the suspected site of perforation, and no foreign body was visualized. The area of erosion was clipped. This was followed by a thoracoscopy that revealed a mediastinal hematoma near the descending aorta, with frank blood in the thorax (**Figure 2**). We inserted a chest tube and consulted with the vascular surgeons.

A fluoroscopic aortogram that was done before surgical exploration showed no contrast extravasation from the aorta (**Figure 3**). Resuscitative endovascular balloon occlusion of the aorta (REBOA) was inserted through the right femoral artery.

Left anterior lateral thoracotomy was performed, and exploration of the periaortic hematoma showed no injury to the aorta. During exploration, inflation of the REBOA was done to achieve proximal control without the need for proximal dissection of the descending aorta to gain control. Pericardial exploration revealed hemopericardium and left atrial injury, which was repaired using pledgeted sutures (**Figure 4**). The foreign body

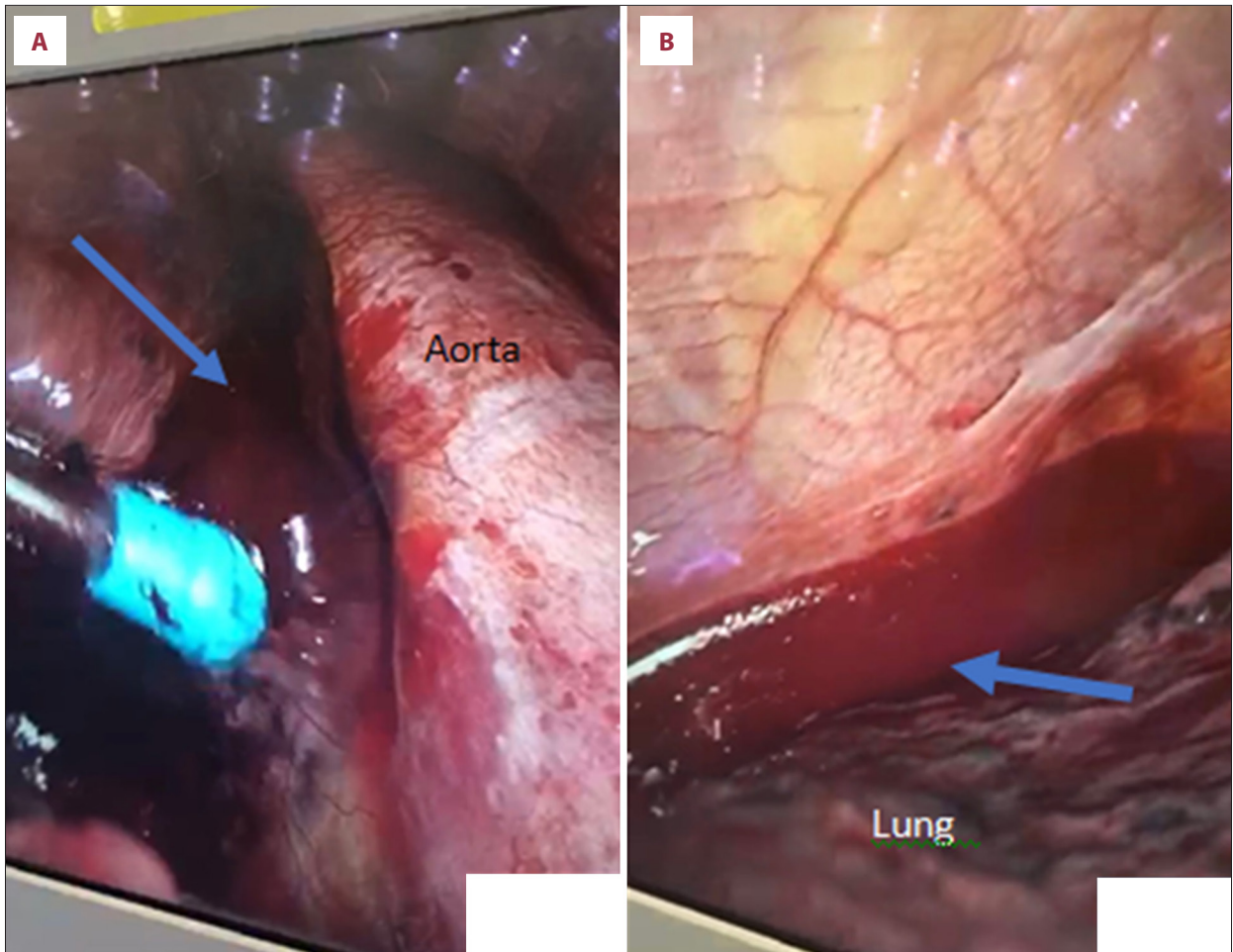


Figure 2. The intraoperative image. Arrows points to (A) hematoma near aorta and (B) frank blood in the thorax.

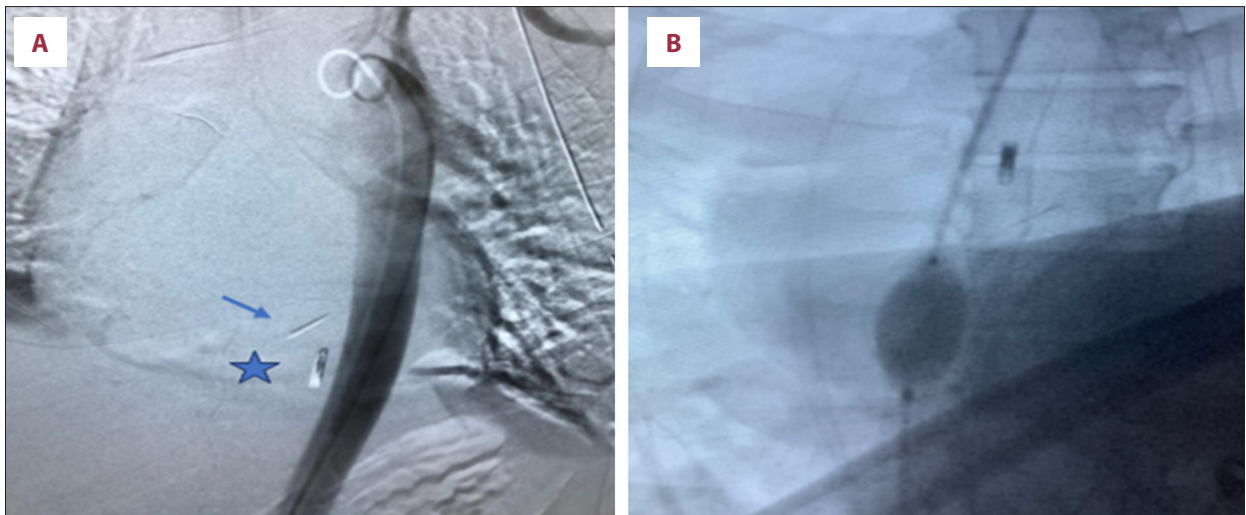


Figure 3. (A) The aortogram showing the intact aorta, foreign body (arrow), and clip (asterisk) placed by esophago-gastro-duodenoscopy. (B) Inflated balloon of resuscitative endovascular balloon occlusion of the aorta (REBOA).

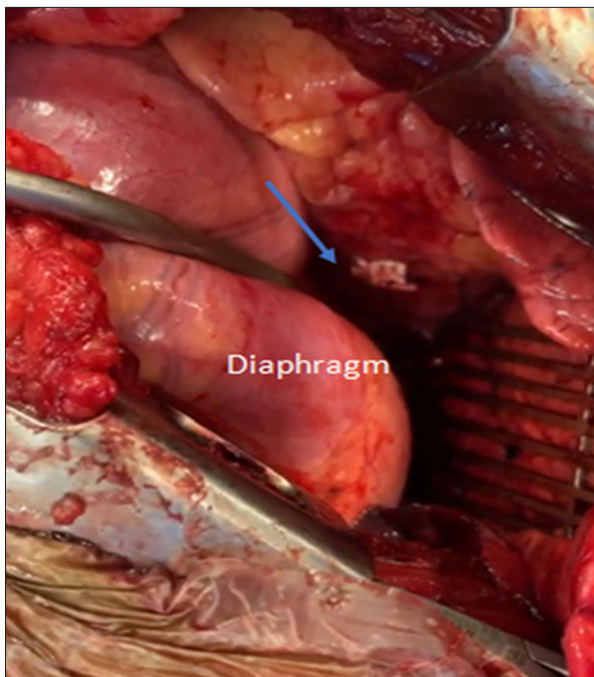


Figure 4. The left thoracotomy. Pledgeted sutures with arrow indicate area of repair with pledgeted sutures over the left atrium.

was identified in the wall of the esophagus and was extracted (Figure 5). The esophageal perforation was then repaired.

Postoperatively, the patient was transferred to the Surgical Intensive Care Unit, where he was closely monitored for 4 days. He began total parenteral nutrition and was kept nil per os. On postoperative day 7, a follow-up barium swallow showed no leakage of contrast, after which he started the intake of clear fluids (Figure 6). The patient had an uneventful recovery and was discharged on postoperative day 11. He returned to his normal daily activities and had a follow-up appointment 2 months later.

Discussion

Esophageal perforations are mostly due to foreign body impaction and are usually encountered in children [7]. Most esophageal perforations are iatrogenic and, in the adult population, are usually associated with intoxication or cognitive impairment [6,7]. Foreign bodies in the esophagus need to be removed urgently to avoid further complications. However, there is diversity in the clinical presentation and a lack of clear guidelines for the management of esophageal perforation. This could invariably lead to a delay in clinicians requesting the correct diagnostic workup and providing timely and necessary management [11]. There are a few cases in the literature reporting esophageal perforation presenting with cardiac

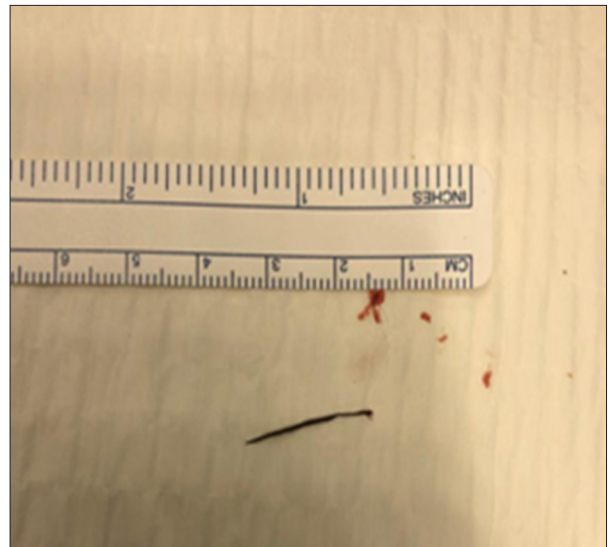


Figure 5. The extracted metallic foreign body.

tamponade or mimicking acute coronary syndrome or aortic dissection. Erdal et al presented a case of a 73-year-old patient who had severe chest pain and palpitations and underwent coronary angiography, which revealed patent coronary vessels [12]. Our patient presented with similar symptoms; therefore, an urgent CT angiogram was performed. In addition, our patient had pericardial effusion, which raised the suspicion of cardiac or aortic injury. The main reason for the chest pain in our patient was injury to the pericardium and left atrium by the sharp ingested foreign body. In cases of esophageal perforation, the decision for right or left thoracotomy depends on the site of the perforation in the esophagus, which can be sometimes determined with preoperative endoscopy, if the patient is stable enough, or from a CT scan [13]. An ingested piece of bone during a meal is dense enough to be picked up on CT scanning. Therefore, a CT scan of the thorax and abdomen is the most sensitive diagnostic test available to diagnose esophageal perforation, with a sensitivity of 100% and specificity of 91% [4]. In our patient, as the injury was suspected in the distal third of the esophagus, we decided to perform a left thoracotomy. A previous report suggested the benefit of a pleural, pericardial, or intercostal muscle flap in addition to primary closure [13]. In our present case, we opted for a primary repair only because the injury was caused by a sharp object. After the repair, the mediastinal pleural space was irrigated and a drainage system by chest tube was inserted. There has been a recent interest in REBOA uses and indications because it is a bridge to bleeding control for seriously injured patients [14]. Singh et al reported a novel strategy incorporating REBOA in the management of delayed post-pancreatectomy hemorrhage in 2 patients [15]. We are recommending the use of REBOA, whenever an expert team is available, in cases of esophageal injuries with suspected aortic injury, which is a rare devastating complication of a foreign body resulting in an

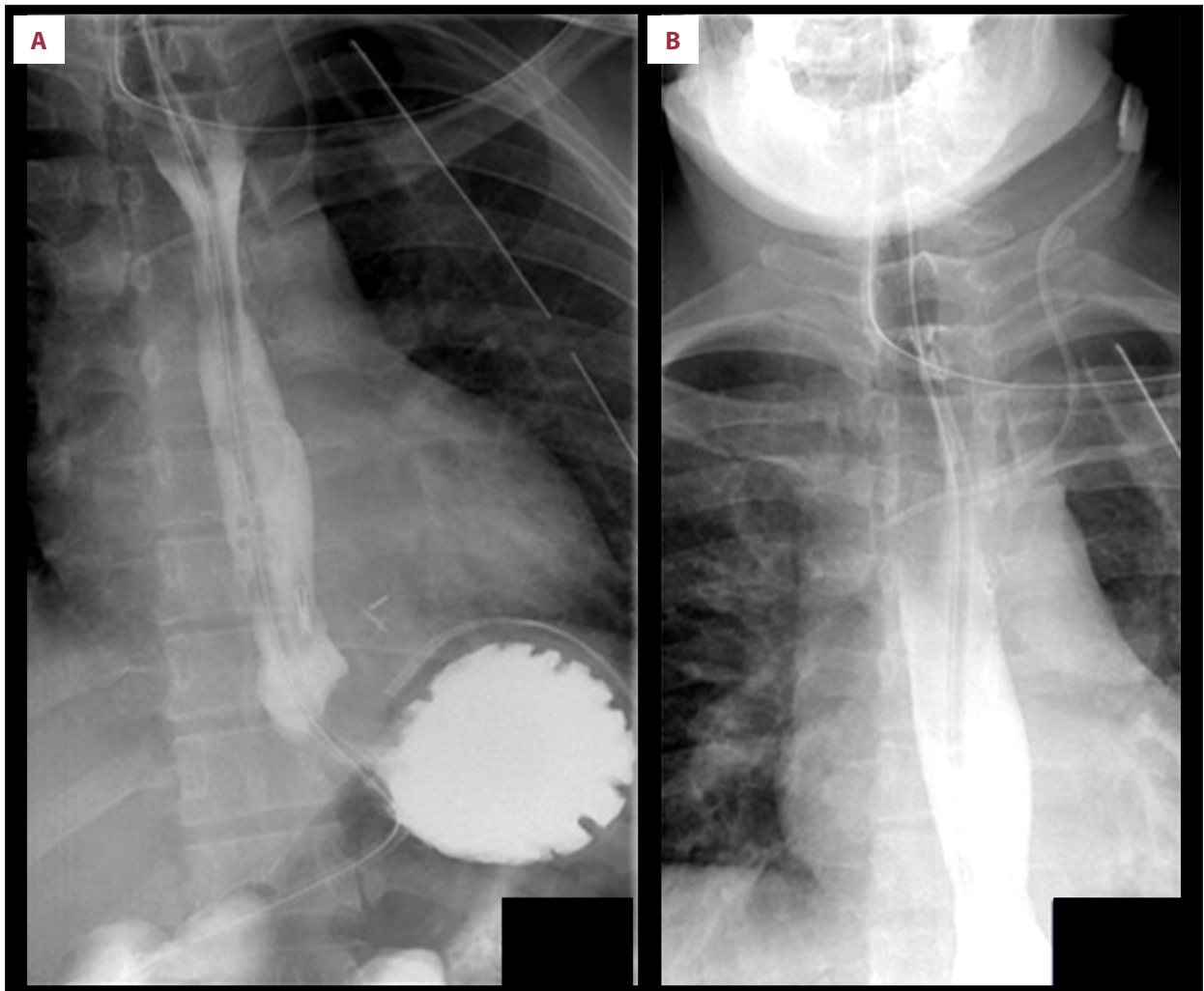


Figure 6. (A, B) The patient's barium swallow showing no contrast leak.

esophageal perforation. We elected to use REBOA for the following reasons: First, it offers access to the aorta to perform an intraoperative aortogram. Second, it minimizes dissection around the aorta. Third, it permits hemorrhage control prior to exploring the descending thoracic aorta hematoma until direct hemostasis can be achieved. Fourth, it allows quick access to the vascular system by exchanging the 7 French introducer sheath (7Fr Cordis AVANTI®+ Introducer used for REBOA) to a larger sheath for the delivery of an end graft, if needed, to manage the suspected aortic injury.

Conclusions

In cases of esophageal injury such as we have presented, when aortic involvement is suspected, we suggest using REBOA in selected cases, whenever an expert team available, as a means of gaining better proximal control over the aorta to safely explore and repair any possible injuries. This is an unusual case management scenario, which requires additional research and clinical support.

Acknowledgement

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Conflicts of Interest

None.

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