Diaphragmatic pedicled flap for treatment of Boerhaave syndrome

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Case Report

General Surgery

OPEN ACCESS

Abstract: Boerhaave syndrome is an uncommon condition comprising spontaneous oesophageal rupture. The annual incidence rate of esophageal perforations is low, approximately 3.1 per 1,000,000 individuals, and 15% of all cases have Boerhaave syndrome.
This is a 50-year-old female with a history of smoking and intense alcoholism, who presented 3 days of nausea and vomiting, with moderate pain in chest and dyspnea. On physical examination, the patient was feverish, hypotensive, sleepy and disoriented, with dehydrated oral mucosa, with tachycardia, decreased vesicular murmur in the bibasal region, rales in the bibasal region, with dullness to percussion in the basal region of both hemithorax, with tachypnea.
A chest radiograph was performed, with evidence of bilateral pleural effusion, laboratories with evidence of leukocytosis, as well as kidney and liver failure. She was admitted to the intensive care unit, a simple chest tomography was performed with the nasogastric tube located to the right of the midline in the chest, with pneumomediastinum.
A left posterolateral thoracotomy is performed in the 6th intercostal space, the necrotic tissue is debrided from the mediastinal fat, from the necrotic muscle tissue and thorough cleaning is performed, a primary closure of the esophagus with a diaphragm flap was performed.
The surgical options are primary closure, reinforced primary closure (intercostal muscle, pleura, diaphragm, stomach, omentum, and lung) and esophageal exclusion or resection.
The mortality rate in esophageal perforation is 10% with early diagnosis and can be as high as 50% if diagnosed late.

Keywords: Boerhaave's syndrome, pneumothorax, esophageal perforation, surgical treatment

Introduction

First described by Dr Herman Boerhaave in 1724, Boerhaave's syndrome is an uncommon condition comprising spontaneous oesophageal rupture. It is caused by forceful emesis against a closed cricopharyngeus, and carries a high mortality and morbidity if not detected and treated proptly.[1] This condition consists of a transmural laceration occurring most frequently at the left posterolateral aspect of the distal esophagus.[2] This disorder is reported in all races. The annual incidence rate of esophageal perforations is low, approximately 3.1 per 1,000,000 individuals, and 15% of all cases have Boerhaave syndrome. Globally, is significantly prevalent in males, with male to female ratio 2:1 to 5:1, is more common in the patients aged between 50 and 79 years.[3]

Case report

This is a 50-year-old female with a history of systemic lupus erythematosus, as well as smoking and intense alcoholism, who went to the emergency department transferred by family members for presenting 3 days of evolution of nausea and vomiting on multiple occasions, with moderate pain in chest and dyspnea, in the last hours prior to admission with altered state of consciousness. On physical examination, the patient was feverish, hypotensive, sleepy and disoriented, with dehydrated oral mucosa, rhythmic precordium with tachycardia, decreased vesicular murmur in the bibasal region, rales in the bibasal region, with dullness to percussion in the basal region of both hemithorax, with tachypnea. The abdomen without evidence of peritoneal irritation.

From the Division of General surgery and Laparoscopy at Hospital General de Ciudad Juarez, Chihuahua, Mexico. Received on November 15, 2020. Accepted on November 20, 2020. Published on November 23, 2020.

DOI 10.17605/OSF.IO/NDK3H

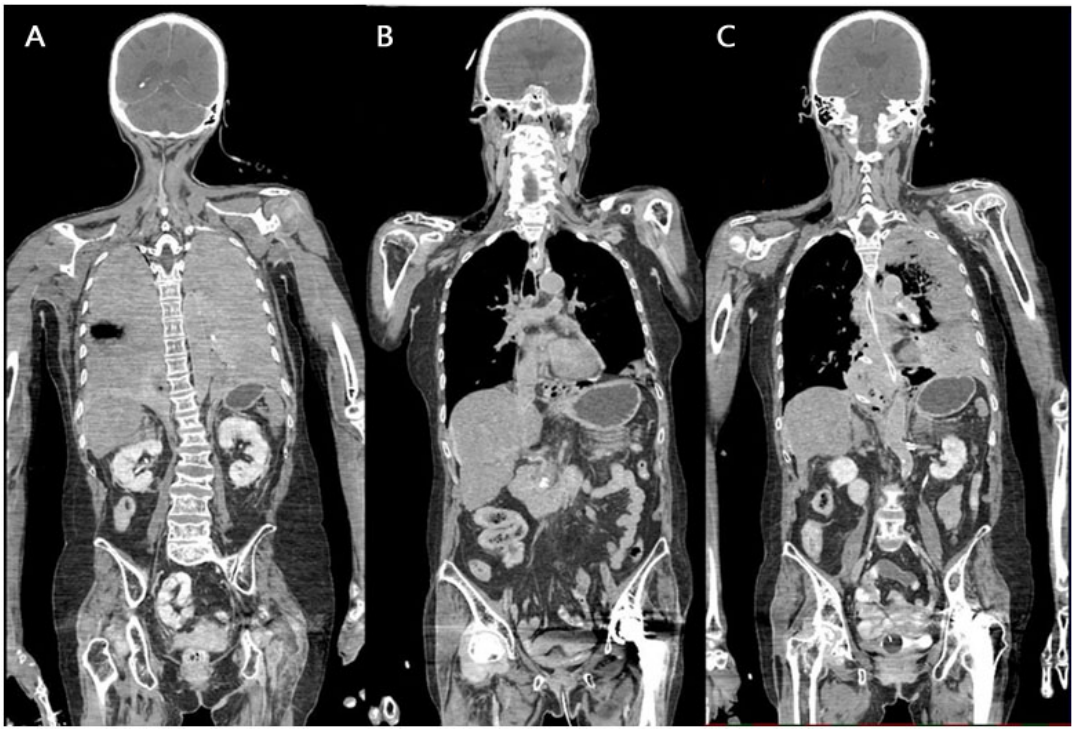

Figure 1. CT scan of the head, chest and abdomen in coronal section with the following findings: Extense bilateral pleural effusion, pneumomediastinum with subcutaneous emphysema in the right side of the neck. Left pleural effusion, pneumomediastinum with subcutaneous emphysema in the right side of the neck, and nasogastric tube advocated to the right of the midline.

A diagnostic protocol was started based on a chest radiograph, with evidence of bilateral pleural effusion, laboratories with evidence of leukocytosis, at the expense of neutrophilia, with bandemia, as well as kidney and liver failure. She was admitted to the intensive care unit where fluid therapy was started requiring the use of amines, broad-spectrum antibiotic therapy was started; a central venous catheter, nasogastric tube, and bladder catheter were placed. A simple chest tomography was performed with evidence of bilateral pleural effusion, as well as a nasogastric tube located to the right of the midline in the chest, (**Figures 1, 2 and 3**) with pneumomediastinum, a bilateral pleural tube was placed and the patient was evaluated by the chest surgeon, who awaits improvement of clinical condition for 24 hours before going to the operating room. (**Figure 4**).

Surgical technique

Previous surgical protocol, under general anesthesia in the right lateral decubitus position, a left posterolateral thoracotomy is performed in the 6th intercostal space, it is dissected by planes until it enters the cavity, the lung is retracted anteriorly, automatic retractors are placed, and the necrotic tissue is debrided from the mediastinal fat, from the necrotic muscle tissue and thorough cleaning is performed, the esophagus is dissected in its lower portion, a 4-cm perforation is identified in the right posterolateral face of the esophagus (**Figure 5A**), the esophagus is retracted and primary closure is performed with 2-0 vycril. A rotation of the diaphragm flap is performed, which is fixed to the primary closure site with separate stitches with 2-0 vycril, closed by planes, and the procedure is concluded (**Figure 5B**).

Discussion

Boerhaave's syndrome is a full thickness spontaneous esophageal rupture induced by forceful retching. This esophageal emergency condition results in a significant morbidity and mortality because the mediastinal and pleural contamination with consequent sepsis and multi organ failure if not diagnosed and promptly treated.[4]

The perforation results from a barotrauma related to a sudden rise in intraesophageal pressure associated with vomiting, the estimated intraesophageal pressure may be as high as 200 mmHg. The rupture is a longitudinal and transmural

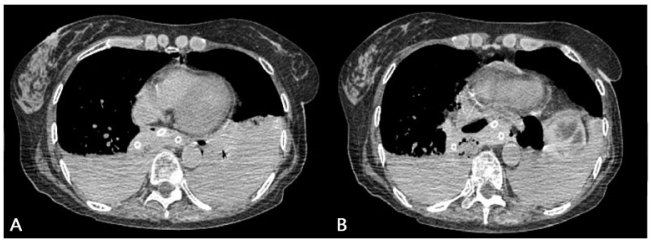

Figure 2. Computerized tomography of the chest in axial section, with bilateral pleural effusion, pneumomediastinum and nasogastric tube advocated to the right of the midline.

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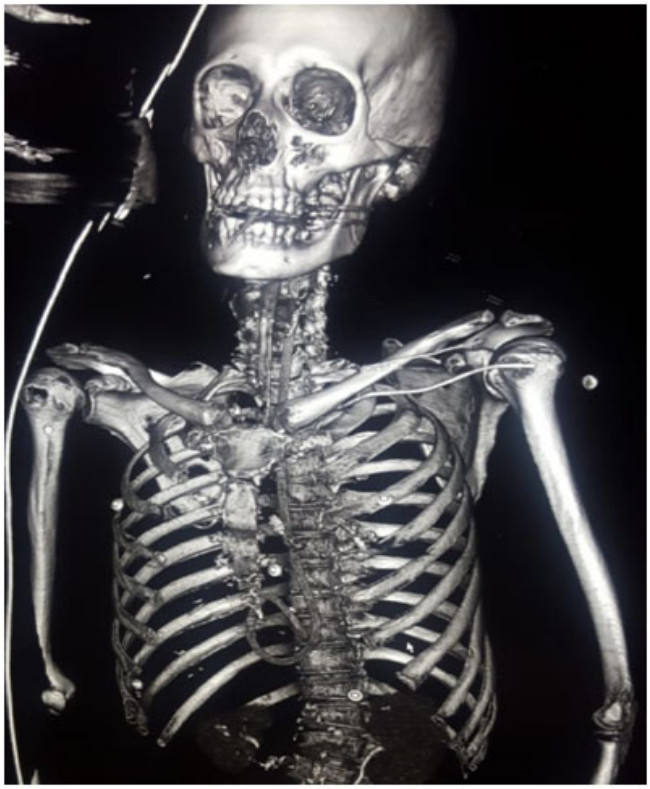

Figure 3. Computerized tomography of the chest with bone reconstruction with nasogastric tube adjoining the basal region of the right hemi thorax.

tear that usually involves the distal part of the thoracic esophagus and more frequently the left wall on his postero-lateral aspect. This feature is observed in about 90% of the cases.[5] The predominance of levolateral locations of the primary lesions is explained by its relative weakening due to the esophagus being angled in that location and its wall being penetrated by vessels and nerves.[6]

A report was published suggesting that besides alcohol abuse, asymptomatic gastroesophageal reflux disease, or hiatal hernia, antiphospholipid antibody syndrome may be another risk factor.[6]

The clinical manifestation of Boerhaave syndrome depends on the location of the rupture and the time between its development and examination.[7]

The majority of patients have Mackler's triad of symptoms and signs: vomiting, lower thoracic pain and subcutaneous emphysema, this triad is rare which may delay the diagnosis. The symptoms can be nonspecific.[7] Symptoms (pain, vomiting, hematemesis, dysphagia or tachypnea) and signs (tachycardia, fever, subcutaneous emphysema, cardiac crunch, chest hypersonarity or dullness. Pain is the most common symptom, present in 70 to 90% of patients. Tachycardia and tachypnea are documented in most patients with perforation. Hypotension and shock are present when sepsis or significant inflammatory third spacing has occurred.[8]

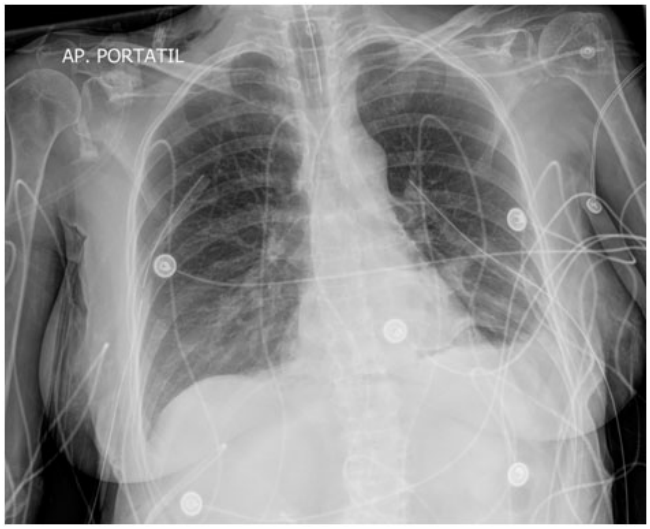

Figure 4. Anteroposterior chest x-ray with bilateral endopleural tube, with persistent image of left pleural effusion.

Radiograph chest poster anterior view is the most useful in early diagnosis, as most of the patients will reveal an abnormal chest finding after the perforation. The most common finding is a one-sided pleural effusion or hydro pneumothorax, other features such as pneumomediastinum or surgical emphysema may also be seen. Any suspected patient of an esophageal perforation a contrast esophagogram should be done. Contrast enhanced computerized tomography chest with oral water-soluble iodinated contrast will help in localizing the site of esophageal perforation. If it does not identify the site of tear, it will reveal indirect evidence of esophageal perforation such as mediastinal air or fluid, pleural effusion, and hydropneumothorax.[9]

There is no defined or established therapeutic decision for Boerhaave's syndrome. The choice between surgery and conservative treatment depends on many factors. Conservative treatment is indicated in hemodynamically stable patients with contained perforations that do not show any signs of sepsis or have the placement of a stent, thoracic tube, or feeding gastrostomy or jejunostomy.[10]

All patients should be nil by mouth and receive urgent respiratory and cardiovascular support plus opiate based analgesia. Intravenous fluids, urinary catheter and close fluid monitoring should be given. In addition, broad-spectrum antibiotics and antifungal plus intravenous proton pump inhibitors to lower the acid exposure are strongly recommended. Part of the management includes placement of intercostal chest drains and nasogastric tube, which should only be done under image guidance. Early enteral feeding is advised in all cases.[11]

The surgical options are primary closure, reinforced primary closure (intercostal muscle, pleura, diaphragm, stomach, omentum, and lung) and esophageal exclusion or resection. Reinforced primary

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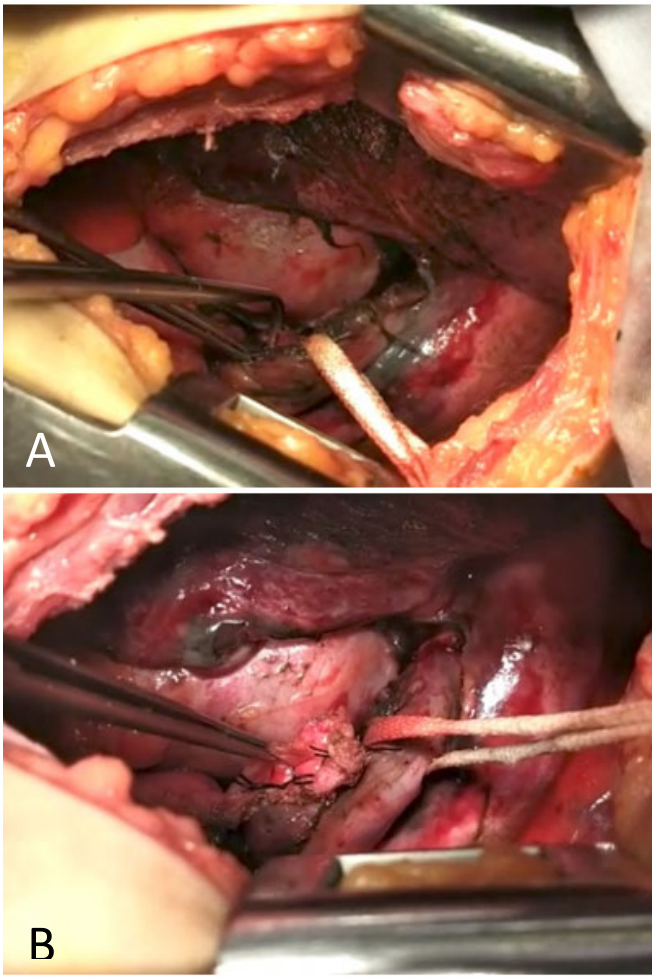

Figure 5. **A.** Left thoracotomy with evidence of mediastinal fat and muscle tissue necrosis. Esophagus dissected and pulled in its lower portion with perforation in the right posterolateral aspect (angle clamp indicating the perforation). **B.** Left thoracotomy with esophagus dissected and pulled in its lower portion with primary closure and a diaphragm flap.

closure is the treatment of choice when progression is less than 24 hours. More aggressive procedures, such as esophageal exclusion or resection, are indicated in cases of long perforations, extensive contamination, associated esophageal disease, primary closure failure, or persistent sepsis.[10]

The mortality rate in esophageal perforation is 10% with early diagnosis and can be as high as 50% if diagnosed late. The cause of late mortality is the associated complications such as mediastinal, pericardial and lung infection leading to sepsis.[9]

Conclusion

Nowadays despite technological advancement in diagnostic and therapeutic methods, spontaneous esophageal perforation remains a diagnostic as well as a therapeutic challenge. Boerhaave syndrome still has a high mortality rate, which is inherently related to diagnostic delay, and although surgical principles such as drainage of collections, wide debridement and esophageal repair are well established, we can't put aside the follow-up and medical management of these patients in the intensive care unit for the management of sepsis.

Conflicts of interests

The authors have no conflicts of interest to declare.

Acknowledgements

We thank the staff of the "Centro Medico de Especialidades" for their support and constant drive to learn.

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DOI 10.17605/OSF.IO/NDK3H

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