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Primary aorto-esophageal fistula from metallic bristle ingestion

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ABSTRACT

Although many patients are treated for the removal of ingested foreign objects each year, ingestions that perforate the esophagus and lead to intra-abdominal complications are rare. Aorto-esophageal fistulas and aortic pseudoaneurysms are deadly complications of esophageal foreign body impaction. However, the surgical approach to aortic repair from foreign object damage has not been standardized. We have described the diagnostic, open surgical, and therapeutic approach to treating a man who had accidentally ingested a 3-cm metallic bristle that lodged in his aortic wall. The patient recovered after excision of the aortic pseudoaneurysm with CryoGraft (CryoLife, Inc, Kennesaw, Ga) replacement, drainage of abscesses, and antibiotic treatment for multiple infections. (J Vasc Surg Cases Innov Tech 2022;8:77-80.)

Keywords: Aorto-esophageal fistula; Barbeque brush bristle; Foreign body ingestion; Mycotic pseudoaneurysm; Open surgical repair; Thoracic aorta

The esophagus is frequently a site of foreign body impactions that can result in different degrees of injury. However, esophageal perforation with subsequent aorto-esophageal fistula (AEF) and aortic pseudoaneurysm is a very rare and potentially life-threatening complication of foreign body ingestion, with dismal survival rates reported.^{1,2} Many surgical techniques, endovascular and open, have been described for repairing an aortic injury after esophageal perforation. However, the optimal management has remained controversial.³ The reported data are scant on reports of metallic foreign bodies in the esophagus resulting in a pseudoaneurysm of the thoracic aorta. We have presented the case of a 60-year-old man who had ingested a metallic barbecue brush bristle and developed an AEF that later healed and was complicated by erosion into the thoracic aorta causing a mycotic aneurysm. The patient provided written informed consent for the report of his case details imaging studies.

CASE REPORT

A 60-year-old man had presented to the emergency department with abdominal pain, nausea, fatigue, one episode of bright red blood per rectum, and fever for 2 weeks. His medical history was significant for bipolar disorder and smoking. He was hemodynamically stable and had tenderness in the left upper abdominal quadrant and epigastrium. Apart from moderate anemia (hemoglobin, 8.0 g/dL), his hematologic parameters were within normal limits. Computed tomography (CT) angiography of the chest, abdomen, and pelvis revealed a contained pseudoaneurysm in the descending thoracic aorta, with a 3-cm linear foreign body penetrating the anterior wall of the aorta (Fig 1). The foreign body did not extend into the esophagus. In addition, a 9.3-cm gastrohepatic intra-abdominal abscess, perisplenic abscesses (Fig 2, A), and two liver abscesses (Fig 2, B) were noted. Occlusion of the portal and splenic veins and splenic infarcts were visualized. A therapeutic low-intensity heparin infusion and broad-spectrum antibiotics were started, which were later switched to ceftriaxone and metronidazole because of concern for endocarditis because of *Streptococcus intermedius* from blood culture. Esophagogastroduodenoscopy and colonoscopy did not reveal esophageal injury or any other major abnormalities. The transesophageal echocardiography findings were negative for vegetations. A multidisciplinary decision was made 12 days after the patient's admission to excise the pseudoaneurysm via open thoracoabdominal approach and replace it with a CryoGraft (CryoLife, Inc, Kennesaw, Ga).

The patient was preoperatively optimized and was administered an asplenia vaccination and broad-spectrum antibiotics. Through an open left thoracoabdominal incision, splenectomy was performed for his splenic abscesses, and an incision and drainage of intra-abdominal and hepatic abscesses were performed. The patient was administered venoarterial extracorporeal membrane oxygenation using the femoral artery for the cannulation sites and was systemically heparinized. The descending thoracic aorta was clamped above and below the pseudoaneurysm, which was excised and replaced with a

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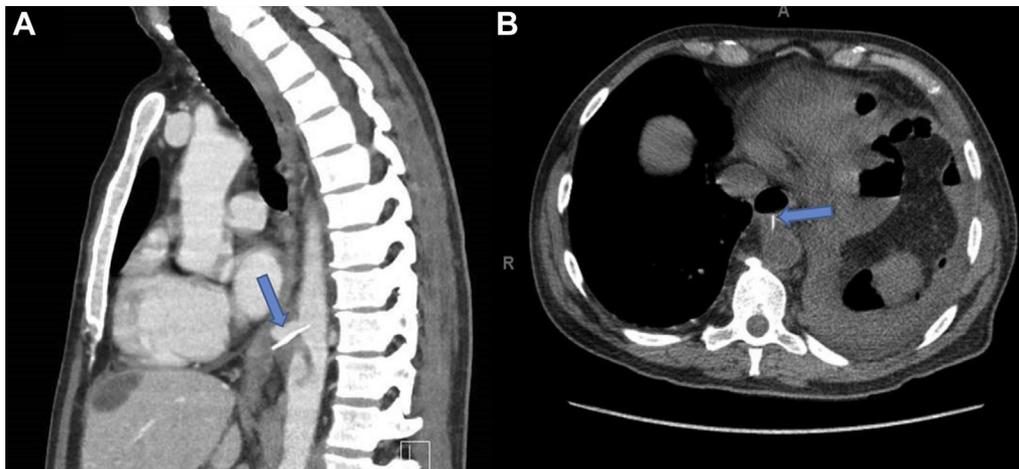


Fig 1. Preoperative computed tomography scan of the chest showing the metallic foreign body on sagittal (A) and axial (B) views.

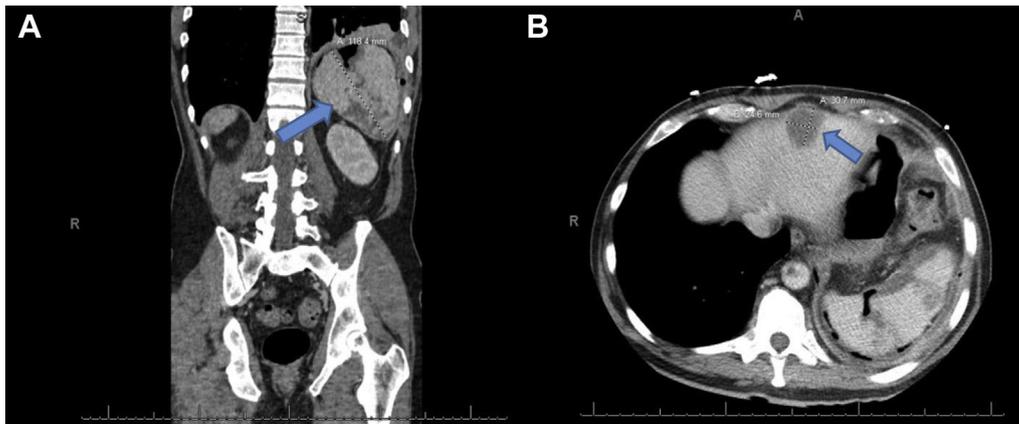


Fig 2. Preoperative computed tomography scans showing large splenic (A) and intrahepatic (B) abscesses.

CryoGraft (CryoLife, Inc; Fig 3). A muscle flap using the left intercostal was created to cover the CryoGraft anastomosis (Fig 3). At the excision, the foreign body was found and identified as a metal bristle from a barbecue brush (Fig 4). Intraoperative esophagogastroduodenoscopy was performed to ensure the absence of esophageal abnormalities, and no esophageal repair was performed intraoperatively. A follow-up CT scan of the chest and abdomen at 7 days postoperatively revealed the presence of intra-abdominal abscesses, which were subsequently drained. The patient was discharged with anticoagulation therapy (20 mg rivaroxaban daily) for portal venous thrombosis. He also completed a 6-week course of antibiotic therapy (2 g of intravenous ceftriaxone daily, 420 mg of intravenous daptomycin daily, and 400 mg of oral fluconazole daily). Intraoperative cultures were positive for *Streptococcus*, *Enterococcus faecium*, and *Candida glabrata*. His 6-month follow-up visit was uneventful, and his long-term blood cultures remained clear.

DISCUSSION

We have described the comprehensive diagnosis and surgical treatment for the removal of a rare

pseudoaneurysm caused by the accidental ingestion of a metallic foreign body. Accidental ingestion of foreign bodies is frequent and often uncomplicated. However, owing to its passive and unadaptable properties, the esophagus has a greater likelihood of object retention with subsequent perforation secondary to either direct penetration or pressure necrosis, resulting in a high risk of infection and other serious complications.^{2,4} AEF is a rare and disastrous complication of foreign body retention through the esophagus. Lai et al⁵ examined a consecutive series of 1338 patients who had had foreign body ingestions with no subsequent AEF. Another single-center review reported 3209 cases of esophageal foreign bodies that had occurred during a 47-year period. Of the 3209 cases, 32 (1%) were complicated by an AEF, with only 3 of the 32 patients (9%) surviving after treatment.⁶

The different mechanisms that can explain the pathogenesis of AEF have been described. First, a sharp object can directly penetrate the aortic wall. Second, inflammation around an ingested foreign body can cause gradual

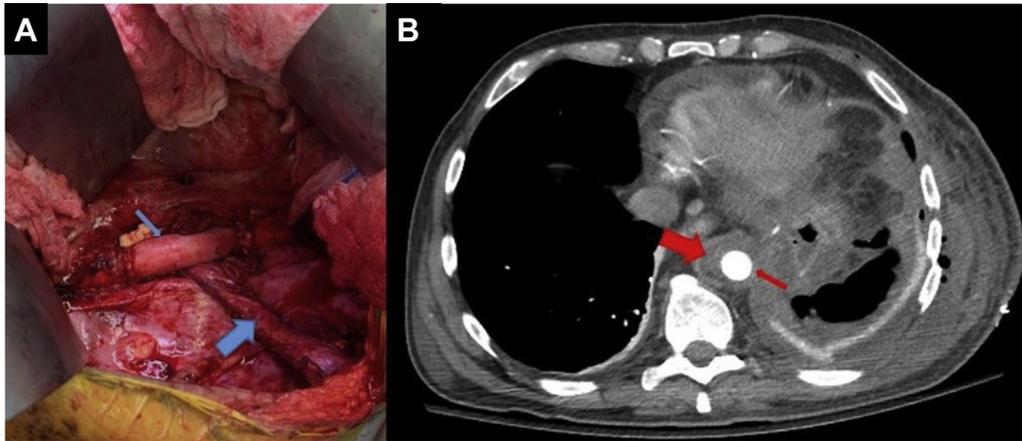


Fig 3. A, Sagittal view showing aortic CryoGraft (small arrow; CryoLife, Inc) and intercostal flap (large arrow). B, Postoperative computed tomography scan showing aortic CryoGraft (small arrow) and intercostal flap (large arrow).

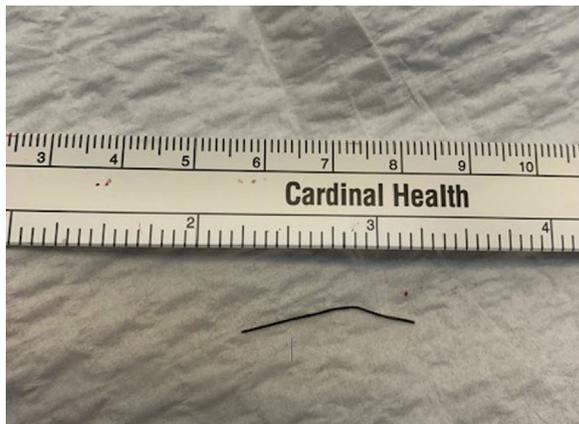


Fig 4. Photograph of a barbecue bristle brush.

erosion of the aortic wall. Third, infection secondary to foreign body impaction can induce the development of a pseudoaneurysm and the spreading of necrotic tissue, subsequently eroding the aortic wall.⁶ In our patient, a barbecue brush bristle was ingested and retained, subsequently causing a slow pressure-induced necrosis of the esophagus that later healed. It had then likely penetrated the aortic wall, causing a mycotic pseudoaneurysm. The mediastinal infection likely spread through the bloodstream, resulting in downstream intraperitoneal, hepatic, and splenic abscesses and was further complicated by thrombosis of the visceral vessels.

Symptomatically, a triad of retrosternal pain and sentinel hemorrhage, followed by fatal exsanguination after a symptom-free interval, described as the Chiari triad, has been considered the classic presentation of AEF and will be present in 45% to 80% of patients.⁷⁻⁹ However, as occurred with our patient, some individuals can present with nonspecific symptoms or can even be asymptomatic, often leading to a missed diagnosis.⁶

Because of the possibility for high mortality, physicians must diagnosis AEFs early. CT imaging is a simple and effective method that has high sensitivity and specificity for diagnosing AEFs early and visualizing the pseudoaneurysm with its adjuvant structures.¹⁰

Timely intervention with a multidisciplinary approach of medical optimization and definite surgical management is critical. Broad-spectrum antibiotic therapy should be instituted early to prevent infection and protect against mediastinitis. The antibiotics can be titrated and adjusted according to the findings from intraoperative cultures. Surgical repair has been considered the only definitive treatment of AEFs. None of the reported cases had been successfully treated with nonsurgical management. In their review of 21 AEF cases, Zhang et al⁶ noted that 2 of the 19 surgically treated patients had recovered but that all 13 nonsurgically treated patients had died.

To the best of our knowledge, no standard surgical guidelines for AEF repair exist, and most patients will be treated according to local clinical experience, making outcome comparisons difficult.¹ Although left thoracotomy with aortic replacement using a prosthesis or CryoGraft (CryoLife Inc) has been the traditionally described approach for AEF repair, extra-anatomic bypass will sometimes be necessary, and successful endovascular repair has recently been described.¹¹ In a systematic review of 72 cases of thoracic endovascular aortic repair of AEFs, a mortality rate of 40.2% at 7.4 months of follow-up was noted.¹² However, endovascular repair carries a risk of recurrent infection and delayed death,¹³ especially with the presence of a contaminated field and the lack of management of the esophageal lesion. Moreover, prolonged antibiotic treatment has been advocated after endovascular AEF repair or recurrent aortic prosthetic graft infections.^{12,14} Although promising treatment modalities have been evolving, they should be

considered on an individual basis and used more often as temporizing treatment measures until definitive open surgical repair is possible or as palliative therapy for critically ill patients. Close postoperative follow-up and monitoring for signs of infection or sepsis are necessary.

CONCLUSIONS

We have presented the case of a patient who survived after surgical treatment with a cryopreserved graft and intercostal muscle flap for a healed AEF caused by ingestion of a metallic object. An AEF is an uncommon complication of esophageal foreign body retention that is best diagnosed using a CT scan, and surgical intervention offers the only treatment for survival.

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