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CASE REPORT

Perforation of the esophagus by a fish bone leading to an infected pseudoaneurysm of the thoracic aorta

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Abstract A 79-year-old woman was urgently referred to a district hospital with dull central chest pain after swallowing a fish bone. The bone was removed by esophagoscopy. Eleven days later she presented because of hematemesis. Computed tomography and aortic arch angiography confirmed a diagnosis of esophageal perforation leading to mediastinitis and the presence of an infected pseudoaneurysm. The infected pseudoaneurysm was completely resected, followed by direct aorto-aorta anastomosis and omental coverage in a one-stage operation. She improved and was discharged 2 months later.

Key words Esophageal perforation · Fish bone · Infected pseudoaneurysm · Omental coverage

Introduction

There are several causes of esophageal perforation: iatrogenic, traumatic, spontaneous, foreign body ingestion, and tumor-related.[1] Perforation of a great vessel is rare. When it occurs, the patient may experience serious hemorrhage at the time of perforation or at a later time during the formation of an aortic pseudoaneurysm. We describe the successful repair of an infected aortic pseudoaneurysm following ingestion of a fish bone, with omental coverage in a one-stage operation.

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Case

A 79-year-old woman was urgently referred to a district hospital with dull central chest pain after swallowing a fish bone. The bone, about 4 cm long, was removed by esophagoscopy at the thoracic esophagus at the level of the aortic arch. The patient's symptoms subsided, and she was sent home. Eleven days later she presented to another hospital because of hematemesis. The hemorrhage of the esophageal perforation was treated by endoscopic hemostasis using a hemoclip. A few days later her body temperature was 38.0°C, and the white blood cell (WBC) count was 18 300/μl. Esophageal perforation leading to mediastinitis was diagnosed. The patient was initially managed with intravenous broad-spectrum antibiotics. The initial chest roentgenogram was normal, and a Gastrografin (Squibb, Princeton, NJ, USA) swallow showed no leakage into surrounding tissues. Magnetic resonance imaging (MRI) demonstrated pooling of contrast in a cavity closely adjacent to the aortic arch. It was assumed that there was an aortic pseudoaneurysm.

She was transferred to our hospital for further investigation. On admission, her physical examination was unremarkable except for cough, hoarseness, and a low-grade temperature. Blood tests showed a normal WBC count (6950/μl) but elevated C-reactive protein (CRP) concentration (2.64 mg/dl). Three-dimensional computed tomography (CT) and aortic arch angiography confirmed the presence of an 18 × 20 mm pseudoaneurysm of the aortic arch but did not demonstrate a fistulous connection with esophagus (Fig. 1). Because the patient became ill, with persistence of intermittent episodes of odynophagia and spiking temperatures probably due to an infected pseudoaneurysm, an urgent operation was performed 6 days after admission.

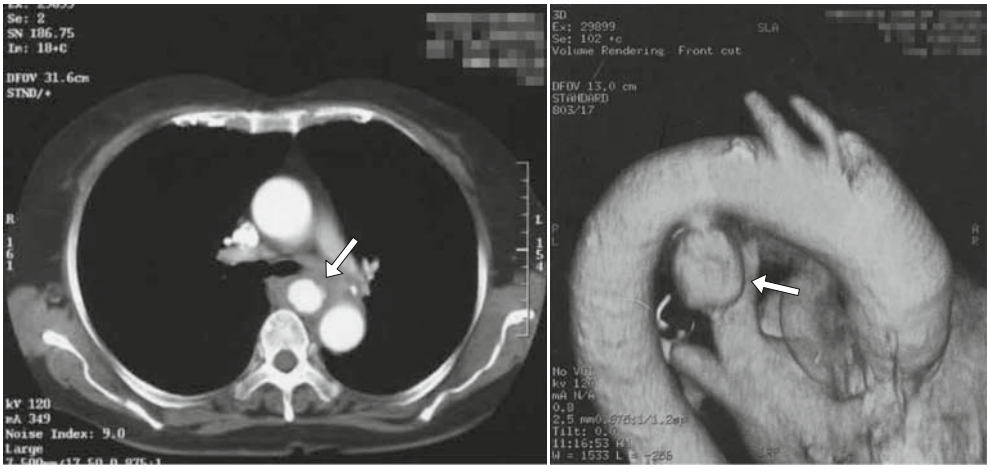

Fig. 1 Preoperative computed tomography (CT) demonstrated a pseudoaneurysm protruding toward the esophagus (*arrows*)

The operation was conducted under general anesthesia, and monitoring catheters and a double-lumen endotracheal tube were placed. The descending thoracic aorta was exposed by left posterolateral thoracotomy through the fifth rib. The incision was extended obliquely across the costal margin toward the midline of the abdomen below the umbilicus. Simultaneously, the left common femoral artery and vein were exposed through an oblique incision in the groin crease. Heparin sodium (3 mg/kg) was administered, and a 24F long cannula was inserted into the femoral vein over a guidewire system and positioned in the center of the right atrium. The femoral artery was cannulated with an 18F cannula. The aorta was proximally clamped between the left carotid and subclavian artery. The descending aorta was distally clamped, and cardiopulmonary bypass (CPB) was established immediately. The left lung was collapsed, and the descending aorta was transected at the level of the pseudoaneurysm. The aneurysm was strongly adherent to surrounding tissue. The aorta was opened longitudinally close to the aneurysm, where there was an entry to the pseudoaneurysm, an area with a lack of intima of about 7×7 mm and filled with a thrombus. There was no frank pus. After resecting the diseased segment and trimming the suture line, a direct aortoaorta anastomosis was performed. Treatment for the infection included débridement and mobilization of the greater omentum from the stomach and colon, with circulation maintained through the right gastroepiploic artery and vein. The omental pedicle was transferred into the chest to fill the dead space and to cover the repaired descending aorta (Fig. 2). The CPB time was 198 min and the aortic cross-clamp time 193 min. The patient was admitted to the intensive care unit.

A follow-up Gastrografin swallow on day 4 showed minor leakage into the surrounding tissues filled with omentum, so she was given intravenous hyperalimentation until no leakage was evident (day 52). She tolerated a normal diet from that time on. Her postoperative recovery was free of infection but complicated by persistent hoarseness and dysphagia, probably due to left recurrent nerve paralysis. She gradually improved and was discharged 2 months later.

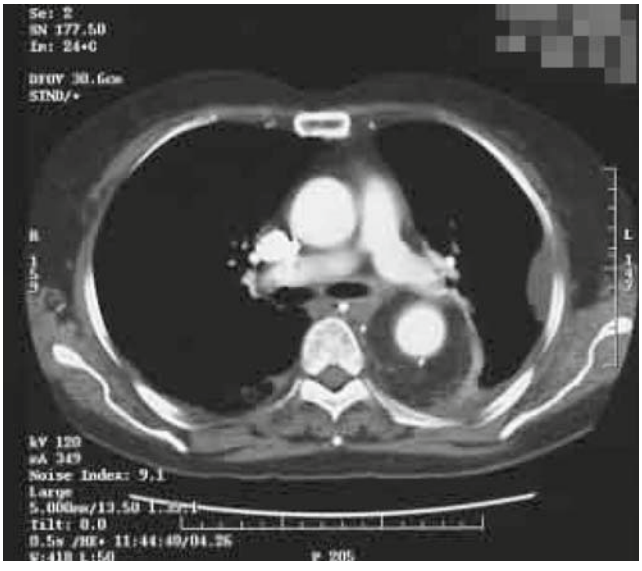

Fig. 2 Postoperative CT shows transfer of omentum to cover the repaired descending aorta

Discussion

Esophageal perforation remains a life-threatening condition. In a review of 511 cases from the literature, Jones and Ginsberg[1] stated that the overall mortality remained substantial, at 22%. Brinster and collegues[2] reported that the overall mortality associated with esophageal perforation can approach 20%, and delay in treatment of more

than 24 h after perforation can result in a doubling of the mortality. Most esophageal foreign bodies are ingested by children <5 years old and include coins, safety pins, and buttons. Older children are more likely to have problems with meat and bones as foreign bodies. Detailed reports of bony foreign bodies in the literature are few, but there have been several reports of chicken bone ingestion leading to perforation as well as other articles in which the term "bone" is used as described by Henry and colleagues.[3]

Fish bone as an esophageal foreign body is common in the Asian community.[4] Acute symptoms occur in 90% of these patients and include dysphagia, odynophagia, ptyalism, and refusal to eat. The diagnosis is most commonly dependent on the history and roentgenographic findings, as no signs are produced by the foreign body itself unless complications occur. The clinical presentation of an aortoesophageal fistula includes chest pain, swallowing pain, sentinel hematemesis, and massive upper gastrointestinal hemorrhage.

Commonly, aortic pseudoaneurysms can be diagnosed by roentgenography, CT scans, or digital subtraction angiography. Three-dimensional CT is especially effective for diagnosing and defining the lesion in preparation for operation.

Bladergroen and colleagues[5] suggested selective criteria for nonoperative management of esophageal perforation: The patient, within 24 h of the onset of symptoms should, if possible, undergo primary closure. Nonoperative treatment may be appropriate in selected patients with no signs of active infection, minimal symptoms, and well-drained perforations, particularly if seen late. In our case, the initial clinical presentation of the patient's symptom was hematemesis 11 days after swallowing a fish bone and treatment by endoscopic removal. The chest roentgenogram was normal, and Gastrografin swallow did not show a leak. The diagnosis of pseudoaneurysm was dependent on her history and due to short neck morphology, shown by CT scan. We thought that the aortic perforation was secondary to erosion by the bone in conjunction with the infection and inflammatory response; the fistulous tract from the esophagus might be occluded by clot formation, blockage or closure to stop bleeding by the hematoma, followed by the development of a pseudoaneurysm. Eventually, fatal hemorrhage will occur, often preceded by brief but alarming episodes of bleeding termed the *signal hemorrhage*.[6]

To ensure a successful outcome, the surgical procedure should follow established principles for managing an aortic aneurysm—not using a prosthetic graft on a potentially infected mediastinum. Because there was no frank pus in the operative findings and bacterial culture of the intraoperative mass was negative, the infection was probably controlled by antibiotics to a certain degree in our patient. Omentum has been shown to be highly effective in combating infection.[7] Most surgeons have recommended esophageal resection and either primary or staged reconstruction of the gastrointestinal tract rather than risk esophageal leak after surgery, a commonly fatal complication due to the notoriously poor healing for the esophagus.[8,9] We fortunately opted not to reconstruct the esophagus because we thought the fistula itself was small. It is possible in selected cases to manage esophageal leakage with omental coverage to achieve healing free of infection without temporary or permanent discontinuity of the gastrointestinal tract.

Conclusion

We report successful repair of an infected aortic pseudoaneurysm following esophageal injury due to a fish bone. Although rare, the possibility of pseudoaneurysm must be considered after removal of an esophageal foreign body.

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