

# A fish bone induced aortic arch pseudoaneurysm in a male patient

## A case report

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### Abstract

**Rationale:** Esophageal foreign body is a commonly seen in China. However, pseudoaneurysm of the aortic arch caused by ingestion of fish bones is a rare, life-threatening condition.

**Patient concerns:** A 71-year-old male was admitted to the Ear, Nose, and Throat department with a 4-day history of chest pain after eating fish.

**Diagnoses:** After taking out the fish bone by rigid endoscopy, magnetic resonance imaging and computerized tomography angiography (CTA) scans revealed the presence of an aortic arch pseudoaneurysm, which was likely caused by the fish bone.

**Interventions:** A successful endovascular graft exclusion surgery was performed to block the aorta ulcer.

**Outcomes:** The patient recovered and was discharged 20 days after hospitalization. The patient was healthy and had no fever or chest pain 4 months after discharge from the hospital.

**Lessons:** Esophageal foreign bodies may lead to life-threatening impairment of the aorta or other big arteries. When esophageal foreign bodies puncture the esophageal wall, especially in the second stenosis of the esophagus, an enhanced-contrast computed tomography scan or a CTA scan may be necessary to exclude any potential impairment of the arteries.

**Abbreviations:** CT = computed tomography, CTA = computed tomography angiography, ENT = ear, nose, and throat, EVGE = endovascular graft exclusion, MRI = magnetic resonance imaging.

**Keywords:** aortic arch pseudoaneurysm, esophageal foreign body, rigid endoscopy

## 1. Introduction

Esophageal foreign bodies are commonly seen in China and worldwide. In the USA, more than 100,000 cases are reported annually.<sup>[1]</sup> Typical symptoms include dysphagia, nausea/vomiting, odynophagia, retrosternal pain, and drooling.<sup>[2]</sup> The ingestion of sharp-pointed objects with a long duration of impact may lead to serious complications, such as neck abscess, esophageal perforation, mediastinitis, and artery and lung injury.

Here, we report a rare case of a fish bone-induced aortic arch pseudoaneurysm.

## 2. Case report

A 71-year-old man was admitted to the ear, nose, and throat (ENT) department with a 4-day history of chest pain after eating fish. During these 4 days, he had a normal diet. One day before he came to our department, he went to the local hospital where they performed a computed tomography (CT) scan that showed a high-density shadow in the esophagus at the third thoracic vertebra (T3) level right beside the arcus aortae. Next, the local clinicians took an image of the esophagus using an electronic gastroscope with the intention of removing the fish bone (Fig. 1A). However, the image demonstrated that the 2 sides of the fish bone were penetrating the esophageal wall. Therefore, the local clinicians did not remove the fish bone because of the high risk of esophageal perforation and transferred the patient to our hospital.

Upon admission to our facility, a physical examination revealed no abnormalities. Additionally, the patient was healthy before this incident and had no specific hereditary diseases. Next, we performed a 3D CT scan of the esophagus to get a more detailed image of the location of the foreign body. The CT showed a 3-cm long oblique, high-density shadow in the esophagus near the arcus aortae (Fig. 1B and C). A rigid endoscopy revealed that the fish bone was 24 cm downstream of the incisor, and one side was penetrating the esophageal wall. We clamped one side of the fish bone using foreign body forceps and

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The patient provided written informed consent for publication of the case.

The authors have no conflicts of interest to disclose.

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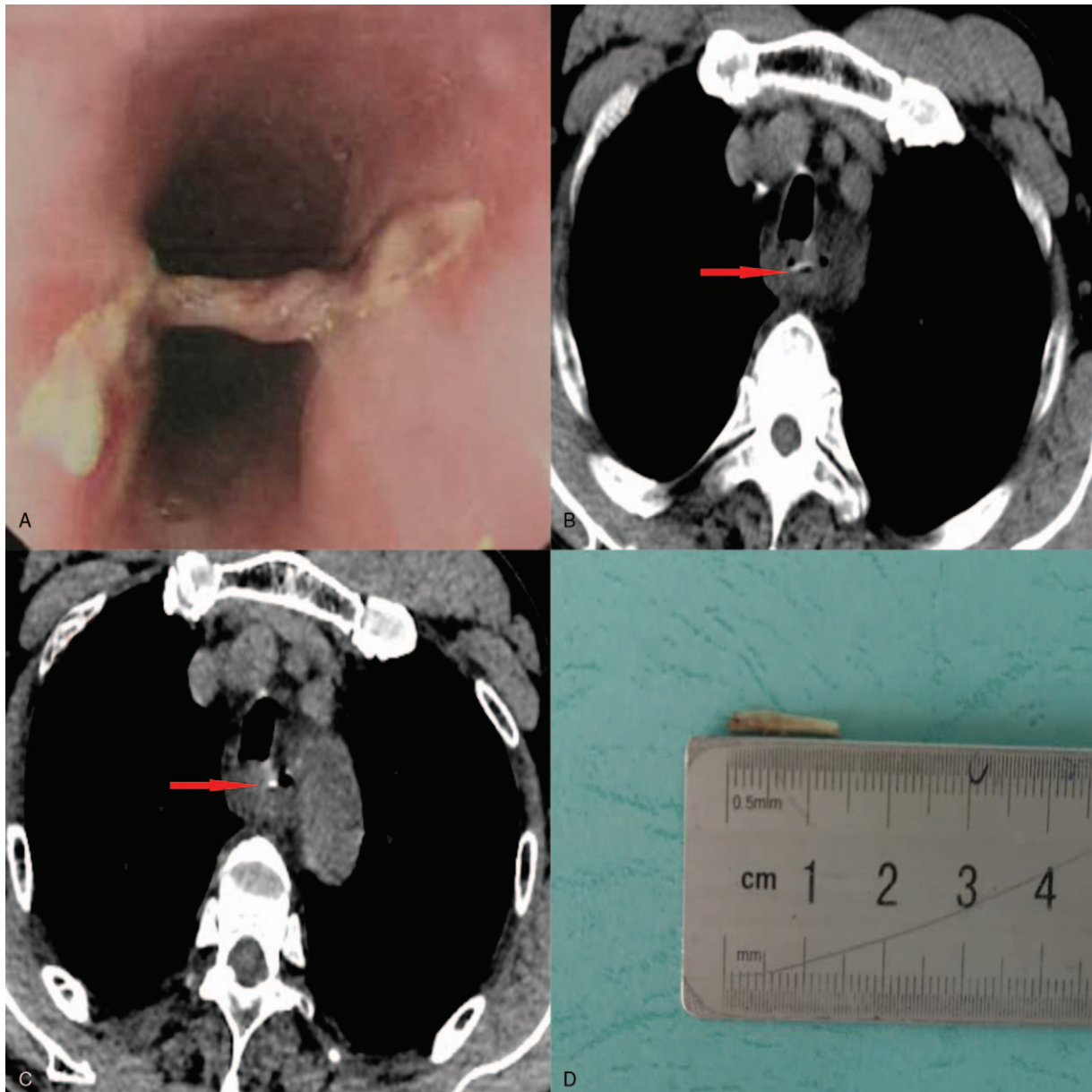
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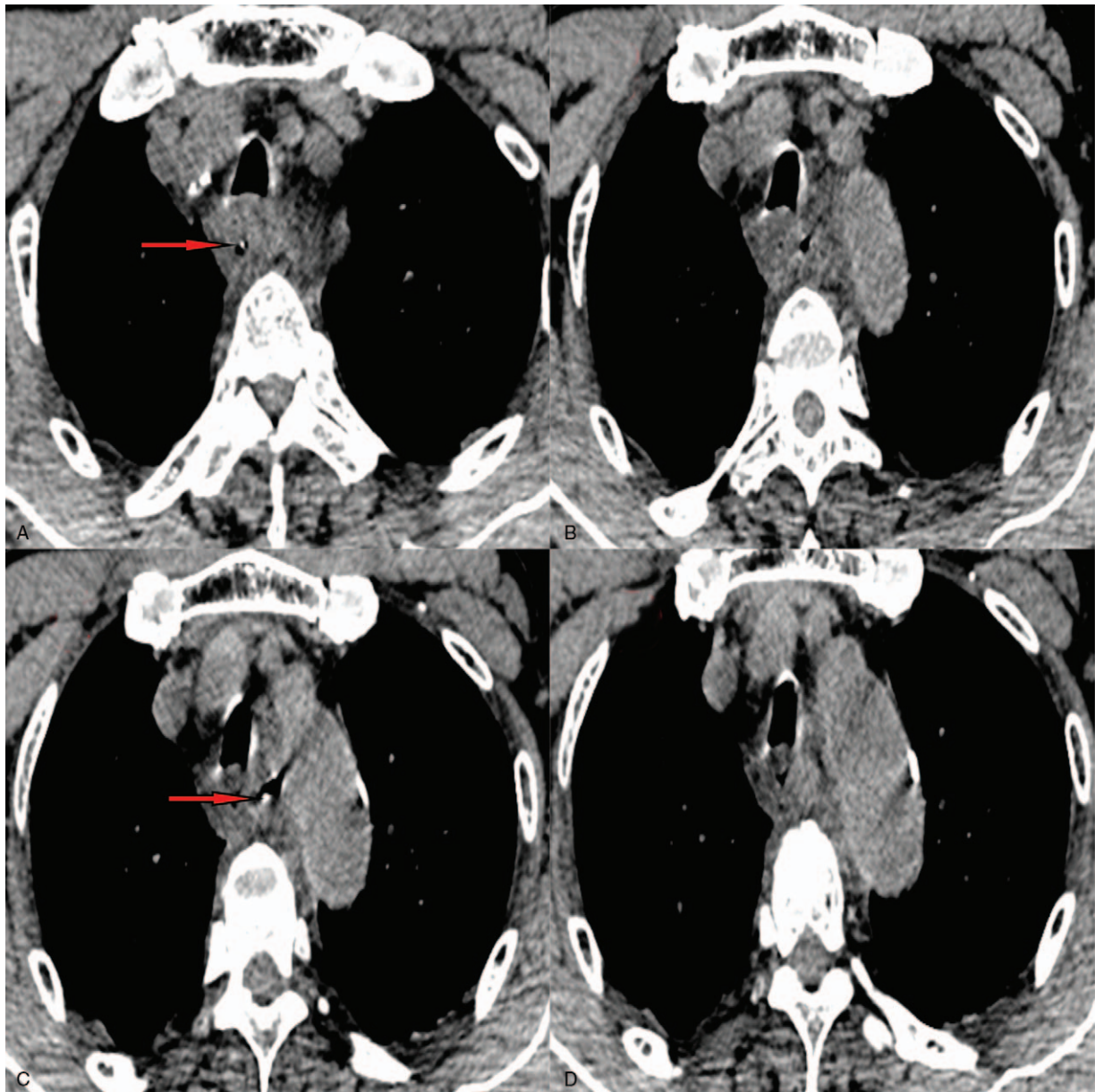


**Figure 1.** (A) Gastroscopic image of the fish bone with its 2 ends penetrating into the esophageal wall. (B) and (C) Axial CT scan of the esophagus. The white high density shadow which represents the fish bone, is marked by the red arrow. (D) The fish bone we pulled out of the esophagus and its length. CT=computed tomography.

pulled it out slowly. Very little erythema was observed at the penetrating site; however, the extracted fish bone was only 1.3 cm long (Fig. 1D). Although we repeatedly checked the whole of the esophagus for missing parts of the bone, we did not find any remnants. The patient did not experience odynophagia or chest pain the day after surgery. Evaluation of another CT scan revealed the presence of a linear high-density shadow at the T2-T3 level of the esophagus, and the surrounding fat clearance was swollen (Fig. 2A–D), which indicated that the fish bone was still in the esophageal track. However, we did not find the fish bone after performing rigid endoscopy.

Antibiotics, including cefminox (2g, twice daily) and teicoplanin (0.4g, once daily), were administered for the next 6 days. Next, we performed magnetic resonance imaging (MRI) and an enhanced CT scan of the esophagus, but we did not observe the

quondam high-density shadow. However, an aortic arch pseudoaneurysm, which may have been caused by the fish bone, was discovered (Fig. 3A), and a whole aorta CT angiography (CTA) confirmed this finding. The diameter of the aortic arch pseudoaneurysm was 1.1 cm, and the diameter of the crevasse of the aortic arch was 0.7 cm (Fig. 3B–D). Still, the patient did not experience odynophagia or chest pain. Additionally, his body temperature was normal and the percentage of white blood cells and neutrophil granulocytes were within the normal range. Five days later, he was transferred to the cardiac surgery department where he underwent an endovascular graft exclusion (EVGE), and an aortic endoprosthesis was implanted to block the crevasse. Three days after the operation, the patient was transferred back to our department. Before discharge, we performed a contrast-enhanced CT scan of the esophagus that showed that the swollen



**Figure 2.** (A)–(D) Axial CT scan of the esophagus. The white high density shadow, which represents the potential residual part of the fish bone is marked by the red arrow. CT = computed tomography.

esophagus duck was obviously released (Fig. 4A and B); the high-density shadow, which represented the fish bone, was absent; and a stent was observed in the arcus aortae. The patient recovered well and was discharged 20 days after hospitalization. Twenty days after discharge, the patient returned to our department and we performed another whole aorta CTA scan. Results of the CTA scan indicated that the aortic arch pseudoaneurysm was completely sealed with no endoleaks (Fig. 4C and D).

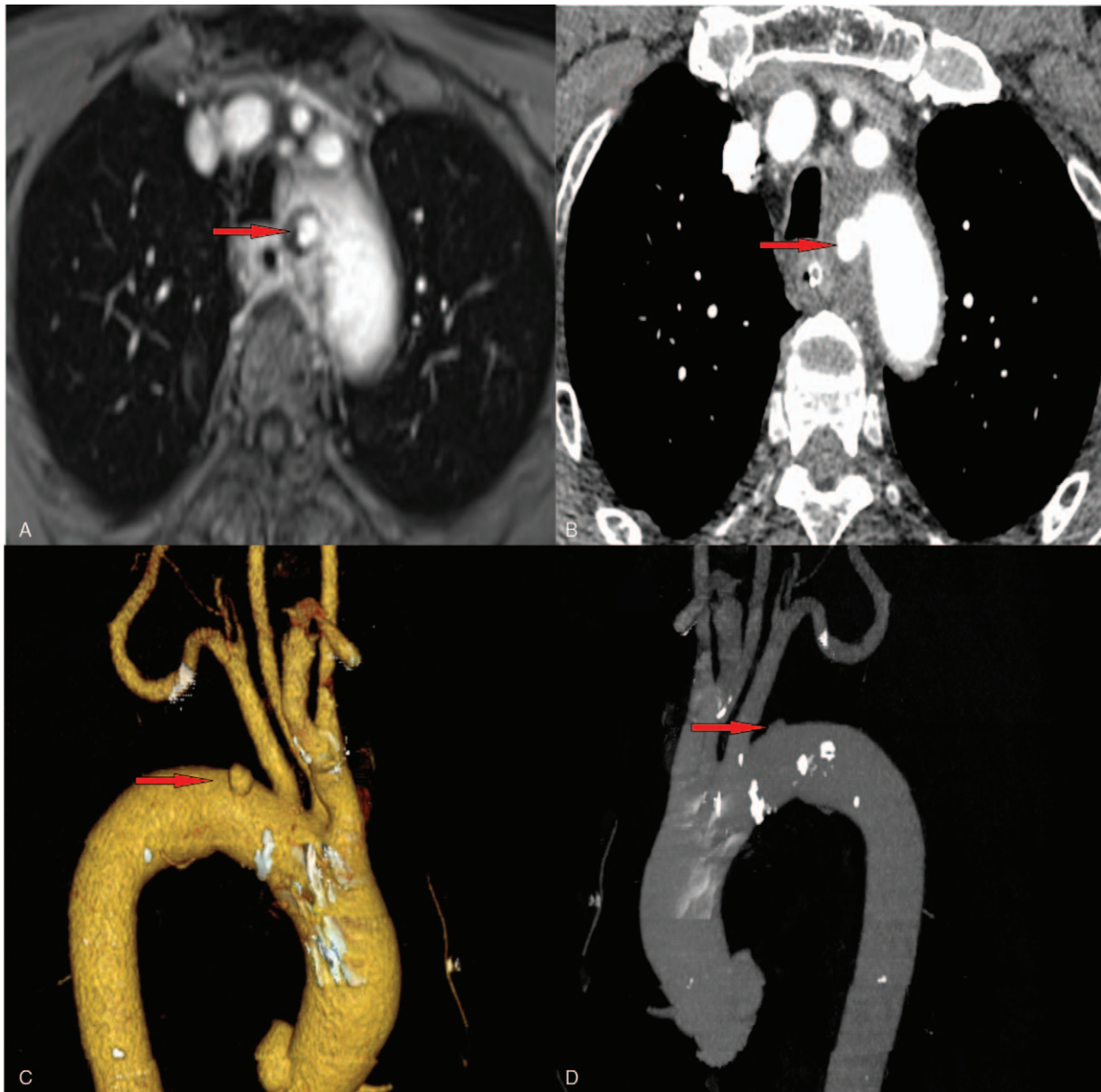
After conducting a follow-up telephone call with the patient 4-months after discharge, the patient reported that he was healthy, had no fever or chest pain, and was grateful for our help.

### 3. Discussion

Foreign bodies, especially fish bones in the digestive tract, are commonly seen in China. Some foreign bodies become lodged in

the oral cavity, but they are most commonly observed in the tonsils and root of tongue. When foreign bodies are stuck in the esophagus, hospitalization is usually required. According to a retrospective study, 57%, 26%, and 17% of impacted foreign bodies are observed in the cervical esophagus, thoracic esophagus, and carioesophageal junction, respectively.<sup>[3]</sup> Sharp and pointed foreign bodies may penetrate the esophageal wall and lead to complications, such as neck abscess, spinal epidural abscess, esophageal perforation, mediastinitis, and artery and lung injury, which are life threatening.<sup>[4–6]</sup> Therefore, when objects, especially sharp, pointed and large objects, are diagnosed as esophageal foreign bodies, effective treatments should be administered as soon as possible to avoid serious complications and decrease recovery time.<sup>[7]</sup>

Flexible and rigid endoscopies are the 2 most widely used therapeutic options for the removal of esophageal foreign body.

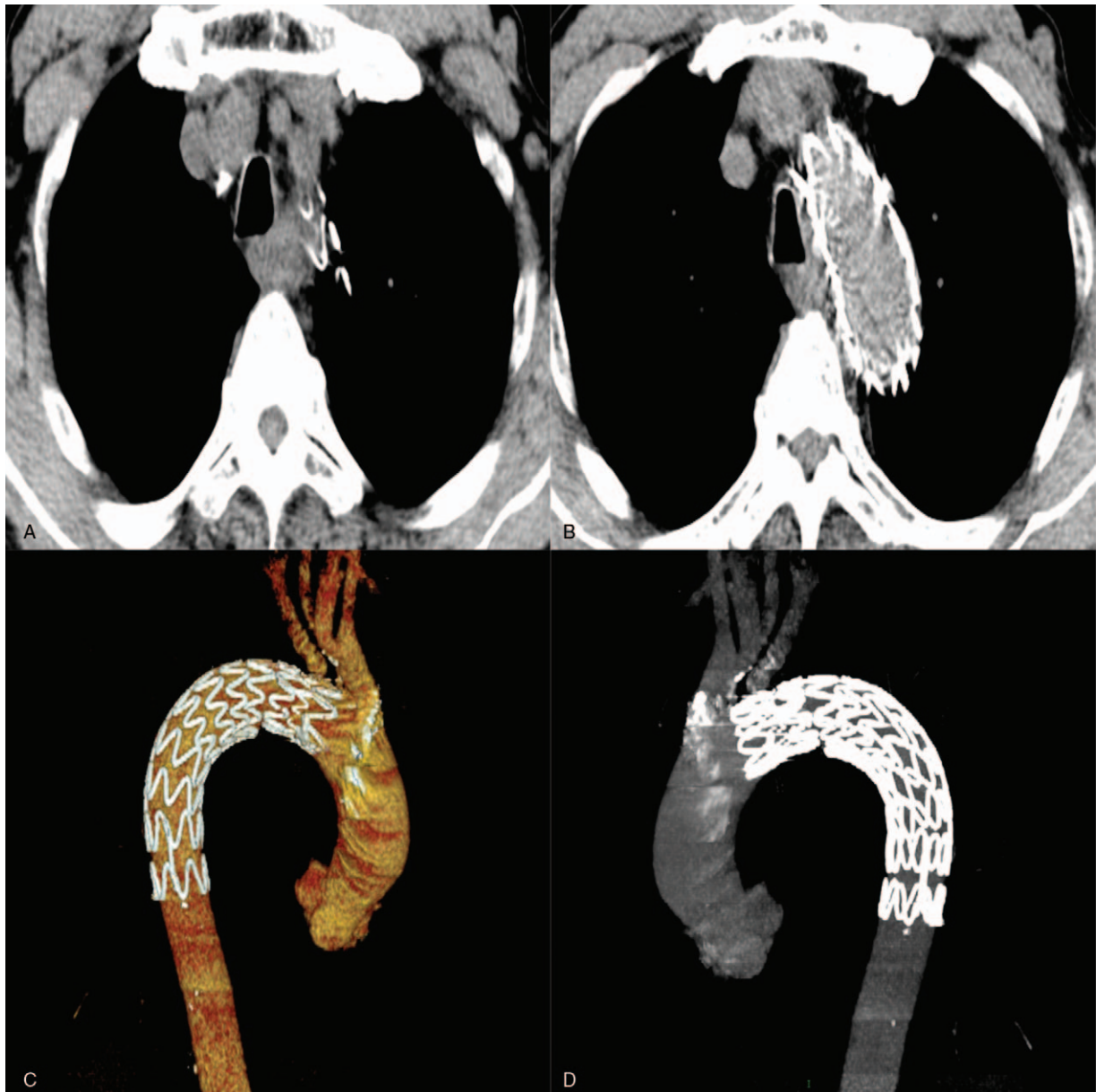


**Figure 3.** (A) Axial MRI scan of the esophagus and the aorta. The aortic arch pseudoaneurysm is marked by the red arrow. (B) Axial CTA scan of the aorta. The aortic arch pseudoaneurysm is marked by the red arrow. (C) and (D) 3D reconstruction of the aortic arch; the aortic arch pseudoaneurysm is marked by the red arrow. CTA=computed tomography angiography, MRI=magnetic resonance imaging.

Flexible endoscopy is a convenient, first-line option for most esophageal foreign bodies and does not require general anesthesia. Rigid endoscopy is suitable for sharp-pointed or large objects and requires the administration of general anesthesia.<sup>[8]</sup> Surgery is the final option when flexible and rigid endoscopy fail, obvious perforation occurs, or the foreign body penetrates the esophageal tract.

The aortic arch passes by the left side of the esophagus and forms the second stenosis of the esophagus together with the left bronchia. Therefore, penetration of the esophageal wall at this place may lead to very dangerous situations, such as a direct or indirect pseudoaneurysm of the aortic arch. The fish bone can directly puncture the aortic arch and cause the pseudoaneurysm. If the fish bone does not directly puncture the aortic arch, inflammation near the aortic arch wall may impair its integrity

and cause a pseudoaneurysm.<sup>[9]</sup> In the present case, the patient swallowed a fish bone and experienced chest pain for 4 days before he was admitted to our hospital. We have generated several hypotheses to help explain the role of fish bones in the development of pseudoaneurysms in the current case. First, during the 4 days before hospitalization, the patient remained on a normal diet to see if the fish bone would dislodge spontaneously; however, this may have caused the fish bone to penetrate through the esophageal wall to the aortic arch, which may have led to the aortic arch pseudoaneurysm. Second, the preoperative CT revealed a 3-cm-long oblique high-density shadow in the esophagus at the level of the arcus aortae; however, the length of the fish bone we removed during the operation was only 1.3 cm. Additionally, after we carefully examined the entire esophagus, we found no foreign body residue. As for the potential



**Figure 4.** (A) and (B) Axial CT scan of the esophagus and the aorta. No residual fish bones were found. (C) and (D) The 3D reconstruction of the aortic arch showed complete sealing of the aortic arch pseudoaneurysm with no endoleak. CT=computed tomography.

missing part of the fish bone, we believe that it may have lodged into the mucous folds of the esophageal wall (or inside of the esophageal wall), slipped into the stomach following changes in position, or undergone organization and dissolution after the operation. The potential missing part of the fish bone may have directly stabbed or penetrated the aortic wall, and this may have been responsible for the formation of pseudoaneurysms. In addition, studies have reported that esophageal foreign bodies cause inflammation and damage the integrity of the wall of the aortic arch. Finally, we believe that a combination of the factors discussed above may have contributed to the pseudoaneurysm. During the first 9 days of hospitalization, we were not aware that the patient had an aortic arch pseudoaneurysm, and the missing part of the fish bone was concerning. The patient did not experience chest pain, and there were no signs of hemorrhage, such as melena and hematemesis. The blood test showed no signs

of severe infection, and the patient's body temperature was normal. We did not discover the aortic arch pseudoaneurysm until the patient underwent an MRI and CTA scan. Fortunately, the pseudoaneurysm did not rupture, which could have led to a fetal hemorrhage.

Surgical intervention is the only effective way to avoid eruption of an aortic arch pseudoaneurysm. Traditionally, the infected area of the aortic pseudoaneurysm is replaced or bypassed. However, this may cause great trauma, and the mortality rate of this operation is relatively high.<sup>[10]</sup> EVGE is a less invasive procedure, and the patient in the current case who received this operation recovered well. Before his operation, we were concerned about the potential infection near the pseudoaneurysm, which may have led to infection of the stent graft or a high risk of bleeding. However, the patient had a normal body temperature, no chest pain, and the blood tests showed no signs

of severe infection. To avoid the high risk of fatality following rupture of the pseudoaneurysm, the patient decided to receive the EVGE operation 3 days after the aortic arch pseudoaneurysm was discovered. The patient recovered well and was discharged 10 days after surgery.

There are many implications associated with the findings of this study. People in China enjoy eating fish, and a large number of individuals may continue to eat large amounts of food after a foreign body is lodged into the esophagus with the intention of pushing it into the stomach. Although studies have suggested that this technique has been effective for dislodging the foreign body and pushing in into the stomach, it may also lead to perforation of the esophageal wall or a hole in the aorta, which can lead to death or the accumulation of medical bills. When patients come to our department with a foreign body in the esophagus, we usually take only a non-contrast CT scan of the esophagus; however, the CT scan did not reveal the aortic arch pseudoaneurysm in this case. Therefore, if the entire length of the fish bone was removed and we discharged the patient, the pseudoaneurysm may have eventually erupted, and this may have led to the sudden death of the patient. A contrast-enhanced CT scan may be recommended if the foreign body punctures the esophageal wall.

Esophageal foreign bodies may lead to rare life-threatening impairment of the thoracic aorta or other larger arteries<sup>[11]</sup> or penetrate the lungs.<sup>[12,13]</sup> A large number of esophageal foreign bodies have been removed using rigid endoscopy operated by an ENT doctor. Even if patients present with no obvious symptoms, contrast-enhanced CT or CTA are recommended when a foreign body punctures the esophageal wall, especially in the second stenosis of the esophagus. Overall, we believe that well-trained physicians and increased awareness can help prevent the potentially fatal complications associated with the ingestion of foreign bodies.

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### Author contributions

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**Project administration:** Qilin Huang.

**Software:** Azhen Wang.

**Validation:** Yun Zhou.

**Visualization:** Yun Zhou.

**Writing – original draft:** Azhen Wang.

**Writing – review and editing:** Qilin Huang.

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