Esophageal Perforation Caused by a Fish Bone Treated with Surgically Indwelling Drainage and Fibrin Glue Injection for Fistula Formation

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We herein report a case of thoracic esophageal perforation caused by a fish bone. The patient was a 68-year-old female who presented with a persistent sore throat after eating sea bream four days previously. She was diagnosed with an esophageal perforation and posterior mediastinal abscess formation by chest computed tomography and inflammatory findings in her blood test. Surgically indwelling drainage was able to effectively control the leakage of contaminants and infection. Endoscopic injection of fibrin glue into the long-standing thoracic-esophageal fistula promoted closure of the esophageal wall defect and enabled her to restart oral intake. This case report suggests that effective drainage and the use of fibrin glue sealant may be one of the treatment options for esophageal perforation.

Keywords: esophageal perforation, fish bone, fibrin glue, drainage

Introduction

A perforation of the thoracic esophagus is a potentially lethal injury. Although the treatment of esophageal perforation may be conservative or surgical, it is accepted that the method chosen for treatment plays an important role in the mortality rate. We herein report a case of thoracic esophageal perforation caused by a fish bone and that was effectively treated with surgical drainage and endoscopic injection of fibrin glue to close the thoracic-esophageal fistula.

Case Report

A 68-year-old female was admitted to our hospital complaining of a persistent sore throat after eating sea bream four days prior. Her physiological findings showed only a fever of 37.5°C. However, a blood examination showed inflammatory findings: CRP increased to 12.7 mg/dl and an elevated white blood cell count of 13800/mm³. Chest computed tomography (CT) revealed a linear shadow suggestive of a fish bone in the upper part of the esophagus and an air-fluid level in the posterior mediastinum (Fig. 1a). The patient was diagnosed with an esophageal perforation and posterior mediastinal abscess formation induced by a fish bone. After removal of the fish bone (Fig. 1b) with a rigid esophageal scope under general anesthesia, a right thoracotomy was performed. The abscess was located just cephalad to the azygos vein, and the mediastinal pleura around the abscess was sufficiently incised. Because we could not identify the site of esophageal injury, the operation was finished with drainage of the upper mediastinum. On the 6th hospital day, chest X-ray and CT images revealed right lung collapse and intrathoracic fluid collection, and the conditions were diagnosed as acute empyema due to poor drainage (Fig. 2a and 2b).
We decided to perform the second operation to curette and clean the thoracic cavity, indwelling drainage tube, and, if possible, to detect and repair the perforated site of the esophagus. A defect of the esophageal wall was observed in the surgical field, but repair of the infected tissue was judged likely to cause suture failure. Therefore, the operation was finished by placing a drain just beside the injury site.

This drainage was effective (Fig. 2c), and the inflammatory symptoms improved with antibiotic administration and abstinence from oral intake. However, contrast-enhanced examination of the esophagus on the 27th hospital day showed leakage into the intrathoracic drain. Although conservative treatment with parenteral nutrition through an elemental diet tube was continued, contrast-enhanced examination on the 51st hospital day also showed the same findings, and fiberscopy revealed fistula formation in the esophagus (Fig. 3a). Therefore, on the 57th, 72nd, and 93rd hospital days, transendoscopic application of fibrin glue was conducted. Contrast-enhanced examination on the 104th hospital day confirmed closure of the fistula, and oral

Fig. 1 (a) Chest CT scans showing a linear shadow suggestive of a fish bone in the upper part of the esophagus and an air-fluid level in the posterior mediastinum. (b) The fish bone was removed endoscopically.

Fig. 2 (a) A chest X-ray showing air fluid levels in the right thorax. (b) Chest CT images revealed the right lung collapse and intrathoracic fluid collection, which suggested insufficient drainage. (c) Chest CT images after the 2nd operation showed a well expanded right lung and no residual space, which suggested effective drainage.
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Fig. 3

(a) Gastrointestinal fiberscopy revealed fistula formation (arrow) in the esophagus and an elemental diet tube (asterisk) was inserted into the duodenum. (b) Gastrointestinal fiberscopy showed a completely closed fistula (arrow) of the esophagus.

ingestion could be resumed, which led to hospital discharge on the 128th hospital day (Fig. 3b). Because of the potential for fistula formation in the thoracic cavity associated with long-term drain placement, the drain was successfully removed by a gradual withdrawal in the outpatient department. Sixteen months have passed since the operation, and the patient’s postoperative course has been good without any recurrent infections in the mediastinum or thoracic cavity.

Discussion

Perforations of the intrathoracic esophagus result from various etiologies including iatrogenic injury, spontaneous perforations and other injuries caused by foreign body ingestion, trauma, tumors and so on.\(^2,3\) Loose connective tissue around the esophagus allows bacteria and gastric juices easy access to the mediastinum through the perforation hole.\(^4\) Contained esophageal perforation and leakage can be treated conservatively.\(^5\) However, once abscesses have formed in the mediastinum, the clinical course is poor, often resulting in multiorgan failure and sepsis, as well as fatality, without proper management.\(^4,6\) Although our patient’s vital signs were stable with slightly worsening inflammatory findings, we performed an emergency drainage operation with thoracotomy because CT revealed mediastinal abscess formation.

Various treatment options, including surgical and nonsurgical management have been advocated. The management of esophageal perforations has been reported to be challenging especially for late-diagnosed or overlooked esophageal ruptures, and no gold standard surgical treatment has yet been established.\(^3,4\) In our case, four days had passed since the patient had ingested a fish bone and an infection of the perforated site was established at the time of diagnosis. The defect of her esophageal wall turned out to be enlarged because of the infection and necrosis at the site of injury during the operations, and surgical repair was deemed to be unfavorable. On the other hand, in recent years, several reports have described a primary repair to be the first-line treatment regardless of the time interval between perforation and surgery.\(^7-9\) In the present case, we were able to successfully control the infection by performing repeated indwelling drainage. However, it is possible that this patient might also have been successfully treated by performing direct closure of the perforated site. Therefore, if we could have accurately identified the perforated site by intraoperative endoscopic examinations, then it may have been possible to carry out a primary repair during the first operation. Recently, some newly-designed stents that are more easily extractable have been used for benign esophageal perforation.\(^10,11\) However, caution should be exercised, because rare but critical complications, including the development of an epidural abscess and an aorta-esophageal fistula, were reported.\(^10,12\) Although the patient demonstrated a satisfactory improvement by the drainage, thus allowing us to treat her successfully without either surgery or stent placement, it is likely that appropriate stent placement would have shortened the treatment period in comparison to drainage only.

The injection of the biological adhesive fibrin glue is effective for the treatment of gastrointestinal
Fibrin glue is thought to close the fistula by two major phases of physiological coagulation: acting as a closing plug among tissues and promoting the growth of granulation tissue. Thus, the glue is absorbed within 4 weeks and is replaced by connective scar tissue. Murakami et al. reported that 89% of patients with postoperative digestive fistulas were successfully treated with 1.96 sessions of fibrin glue injection. In our case, 3 injections of the fibrin glue at about 2 w intervals successfully resolved a long-standing fistula resistant to exhaustive conservative management. When this method does not achieve satisfactory results, the either surgical repair or stent placement at the perforated site should be considered.

The sufficient accumulation of similarly treated cases using this method is thus necessary in order to confirm the efficacy and safety of this treatment modality.

**Conclusion**

We managed to control the leakage of contaminants and infection by means of drainage alone in a patient presenting with esophageal perforation caused by a fish bone. However, surgical repair and stent placement should be considered as the first-line treatment for such wall defects. The present report also demonstrates that fibrin glue injection may be useful to promote the closure of long-standing thoracic-esophageal fistulas.

**Disclosure Statement**

Toru Kimura and his co-authors have no conflict of interest.

**References**