

Internal Drainage of an Esophageal Perforation in a Patient with a High Surgical Risk

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A 71-year-old man presented with a productive cough and fever, and he was diagnosed as having an esophageal perforation and a mediastinal abscess. He had a history of traumatic hemothorax and pleural drainage for empyema in the right chest and was considered unable to tolerate thoracic surgery because of sepsis and progressive aspiration pneumonia. In order to aggressively drain the mediastinal contamination, we performed internal drainage by placing a Levin tube into the mediastinum through the perforation site. This procedure, in conjunction with controlling sepsis and providing sufficient postpyloric nutrition, allowed the esophageal injury to completely heal.

Key words: 1. Esophageal perforation
2. Mediastinitis

Case report

A 71-year-old man with symptoms including a productive cough and fever was transferred to our emergency room. He underwent endoscopic removal of a fish bone and 1 week later was admitted to a local clinic for symptoms suggestive of mediastinitis. However, no mucosal defect was found during an esophageal endoscopic examination, and he was conservatively managed with nothing by mouth and antibiotics. After the productive cough and fever progressed, chest computed tomography (CT) was performed at the clinic, and the CT scan showed a wide esophageal perforation, mediastinal abscess, and right pleural empyema. Upon arrival at our institution, his blood pressure was steady, but he was tachypneic. A gastrografin esophagogram showed a perforation in the middle thoracic esophagus (Fig. 1).

Urgent intervention was necessary, but the aspiration pneumonia progressed while the patient was in the intensive care unit. Moreover, he had a history of traumatic hemothorax and pleural drainage for empyema in the right chest, and there were some calcified pleural lesions visible in the CT scan. We thought that a right-side approach in the chest, which is the conventional option, would be time-consuming and present a high risk. Considering the patient's septic condition and perioperative risk, we decided to avoid intervention with a thoracic incision, and therefore chose to perform neither a conventional thoracotomy nor video-assisted thoracoscopic surgery. Instead, we performed posterior mediastinal drainage with the Barovac PS400L (Sewoon Medical Co. Ltd., Cheonan, Korea) by making an incision on the left side of the neck on the second hospital day. However, the drainage seemed insufficient. On the following day, an

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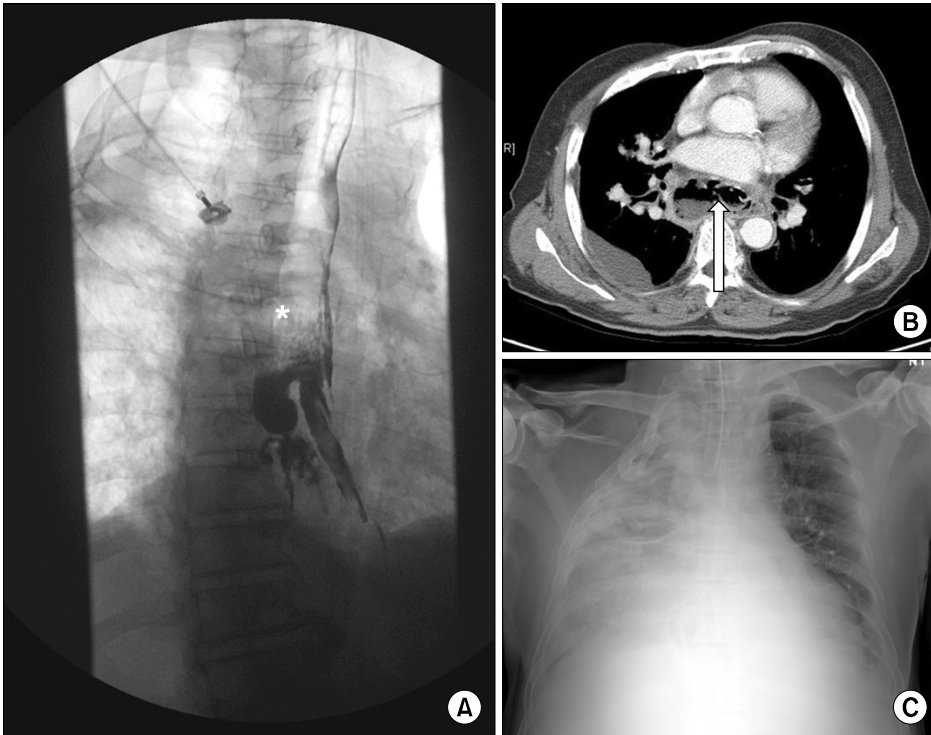


Fig. 1. Initial workup images. (A) Gastrografin esophagogram showing a perforation (*) in the middle of the thoracic esophagus. (B) Chest computed tomography scan showing a wide esophageal perforation (arrow), mediastinal abscess, and right pleural empyema. (C) Chest radiograph showing increased haziness in the entire right lung due to aspiration pneumonia.

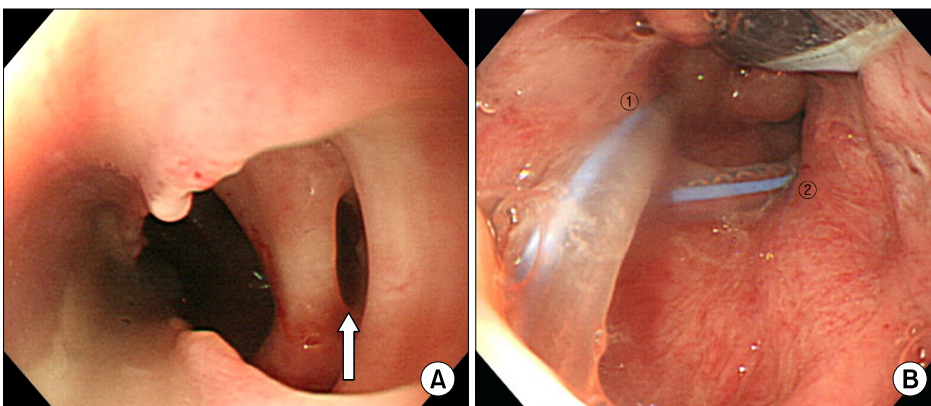


Fig. 2. Initial esophageal esophagogram. (A) A 4-cm perforation (arrow) is shown. (B) One Levin tube (①) was placed in the stomach, and another (②) Levin tube was placed in the mediastinum through the perforation.

esophageal endoscopy was performed, and results showed multiple sites of wall injuries; one perforation site was 26–30 cm from the incisor, another 3-mm perforation was 32 cm from the incisor, and a 2.5-cm-deep laceration was 35 cm from the incisor. We then inserted 2 Levin tubes via esophageal endoscopy: one 12-Fr tube was inserted into the mediastinum through the larger perforation site for internal mediastinal drainage and another 12-Fr tube was inserted into the stomach for gastric drainage (Fig. 2). After *Stenotrophomonas maltophilia* was identified during the initial microbiological culture of

the sputum, the antibiotic regimen was adjusted.

We started continuous suction of 60–80 mm Hg both for the internal mediastinal drainage and for the gastric drainage. After beginning the aggressive mediastinal and gastric drainage, the patient's condition improved. On the ninth hospital day, we performed a jejunostomy to provide sufficient nutritional support and a gastrostomy for gastric drainage and to allow one Levin tube to be removed. We maintained continuous suction for the internal mediastinal drainage, but we started natural drainage during the jejunostomy and gastrostomy. The patient was ex-

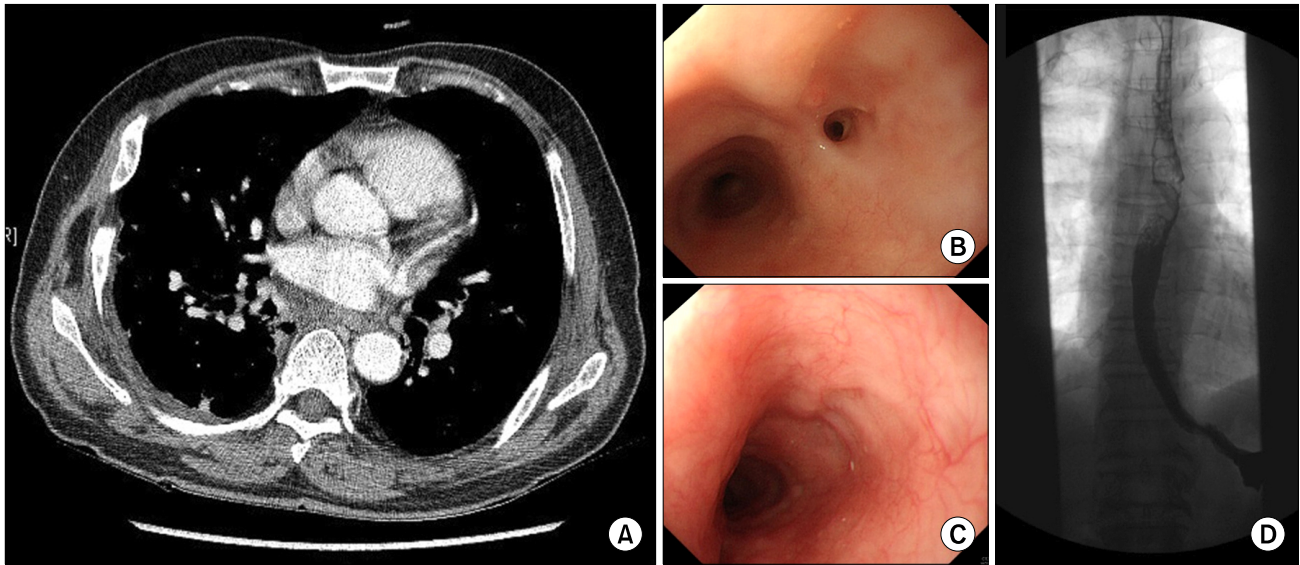


Fig. 3. Follow-up CT scan, endoscopic image, and esophagogram. (A) Chest CT scan showing a notable decrease in the extent of the mediastinal abscess. (B) Endoscopic image showing that the previous injury sites were nearly healed, with a 0.5-cm defect remaining. (C) Endoscopic image after 6 months after the initial presentation, showing that the esophageal injury has completely healed. (D) Esophagogram showing no evidence of leakage. CT, computed tomography.

tubated on the 11th hospital day, and then he was moved to the general ward on the 18th hospital day. The next day, we turned off the suction for the mediastinal drainage and started to drain naturally, because the amount of drainage was sufficiently reduced. The microbiologic culture obtained on the 13th hospital day showed no pathologic microorganism other than normal flora, and the results of multiple consecutive microbiologic cultures were the same.

The remaining Levin tube for the internal drainage was removed on the 25th hospital day. At the follow-up endoscopic examination on the 26th hospital day, the previous injury sites were nearly healed, and there was only a 0.5-cm defect 28 cm from the incisor (Fig. 3). According to the follow-up chest CT scan obtained on the 29th hospital day, there was a notable decrease in the extent of the mediastinal abscess. The follow-up esophagogram on the 39th hospital day showed no evidence of leakage, so the patient was started on an oral diet. Finally, the patient was discharged on the 46th hospital day. There were no abnormal findings on the last follow-up esophagogram and endoscopic examination 6 months after the initial presentation.

Discussion

Esophageal perforation is rare, but it is a highly lethal condition characterized by transmural disruption of the esophagus and contamination of the mediastinum by gastric and oral secretions. In 1947, an aggressive surgical treatment for spontaneous esophageal perforation was introduced [1], and since then, a number of other treatment options have been tested. However, because esophageal perforation is rare and results from extremely heterogeneous causes, there is a lack of convincing data to form a consensus for treatment.

The goals of managing an esophageal perforation are to control the source of the sepsis, close the perforation, and drain the associated contamination. The definitive surgical treatment is to either surgically repair the perforation [2] or perform an esophagectomy [3]. Nondefinitive treatment options include endoscopy (stent grafting, endoscopic clipping, and endoscopic vacuum-assisted closure [E-VAC]) [4], surgical drainage or debridement, T-tube repair, and esophageal exclusion.

Biancari et al. [5] conducted a systematic review and meta-analysis of 75 previous studies regarding esophageal perforation in adults. They reported a

mortality rate of 11.9%, with a mean hospital stay of 32.9 days. Many studies and reviews have associated surgical treatment within 24 hours with a successful outcome [6]. However, Biancari et al. [5] found that a treatment delay of >24 hours was associated with a risk ratio of 2.28, but this was not confirmed by a meta-regression analysis. Sudarshan et al. [7] also reported that time to treatment was not associated with the management of outcomes.

E-VAC is a novel technique for managing an esophageal perforation. E-VAC was first used with good results in the treatment of rectal anastomotic leakages. It was later used to close leaks from perforations in the upper gastrointestinal tract. Recent studies have shown the overall success of E-VAC in such cases to be 84%–100% [8]. The main complication associated with E-VAC is post-therapy stenosis. In fact, we tried to perform E-VAC at the perforation site before the internal mediastinal drainage, but we failed due to technical issues.

In our case, the cause of the esophageal perforation was uncertain, as it could have been the result of a foreign body (a fish bone) or an iatrogenic cause. Considering the time to treatment (>24 hours) and the progression of the aspiration pneumonia, primary repair of the perforation was not a feasible option for the patient. Additionally, we did not think the patient could tolerate surgery. Therefore, we decided to perform the aggressive mediastinal drainage by less-invasive methods, along with the insertion of a posterior mediastinal drainage catheter. After the trial E-VAC failed, we performed the internal drainage by placing one Levin tube into the mediastinum through the perforation site, and we performed a gastric drainage with another Levin tube. With aggressive drainage of the associated contamination, control of the sepsis, and sufficient post-pyloric nutrition, the patient recovered, and the esophageal injury healed.

There is a lack of evidence to support performing internal drainage of a benign esophageal perforation.

The drainage was conducted using continuous suction of 80 mm Hg, based on the E-VAC method, but there is no evidence that specifically supports this step. However, when a patient with an esophageal perforation and a mediastinal abscess has a high perioperative risk for thoracic surgery, and especially when E-VAC has failed, internal drainage should be considered in conjunction with other adjuvant procedures.

Conflict of interest

No potential conflicts of interest relevant to this article are reported.

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