Original Articles

The Diagnosis and Treatment of Esophageal Perforations Resulting from Nonmalignant Causes

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Abstract: Esophageal perforations are extremely difficult to diagnose and treat. We report herein our results of a review of 26 patients with esophageal perforation which were spontaneous in 11, iatrogenic in 11, and caused by a foreign body in 4. Surgical treatment was performed in 7 of the patients with spontaneous rupture, but the remaining 19 patients were treated conservatively. The abnormality was found by plain radiography (X-ray) in 22 (85%) of the 26 patients, and by computed tomography (CT) in all 13 patients who underwent this procedure. The detection rates by esophagography and esophagoscopy were 100%, or all of 25 patients examined, and 60%, or 9 of 15 patients examined, respectively. Of 12 patients with underlying diseases, 4 (33%) died after the perforation, whereas only 1 (7%) of 14 patients without any underlying disease died. Postoperative empyema developed in all of 3 patients treated by intraoperative unfixed intrathoracic drainage (UID), but in none of the 4 treated by fixed intrathoracic drainage (FID). Conservative treatment achieved satisfactory results for spontaneous esophageal ruptures confined to the mediastinum, and for iatrogenic perforations and esophageal perforations caused by foreign bodies, provided there was no serious underlying disease such as advanced cirrhosis. Moreover, intraoperative FID proved useful in helping to prevent postoperative empyema.

Key Words: esophageal perforation, diagnosis, treatment

Introduction

Esophageal perforation is generally treated surgically,1-3 but can be managed conservatively in some cases.4-6 We conducted a review of 26 patients with esophageal perforation to determine the most efficient procedures for providing accurate diagnosis and optimal treatment.

Subjects and Methods

A retrospective analysis was conducted on 26 patients with esophageal perforation caused by nonmalignant disease who received treatment at our hospital between December 1977 and January 1995. They comprised 22 men and 4 women, aged between 40 and 75 years, with a mean age of 56 years. The following factors were investigated:

1. the etiology of the perforation;
2. the initial diagnosis;
3. the time from perforation until diagnosis;
4. the findings based on imaging techniques, including plain radiography (X-ray), computed tomography (CT), esophagography, and esophagoscopy;
5. the site of the perforation, i.e., whether it was in the upper, middle, or lower esophagus;
6. the diameter of the perforation;
7. the outcome of patients with different types of perforations;
8. the outcome in relation to the method of treatment;
9. the effect of underlying diseases on the outcome;
10. the surgical procedure and method of drainage.

The perforation was classified as extramediastinal when esophagography showed the extramediastinal leakage of contrast medium, or when the mediastinal pleura was involved and a pneumothorax developed (Fig. 1), whereas it was classified as intramediastinal when any evidence of pneumothorax or the extramediastinal leakage of contrast medium was absent (Fig. 2). Conservative therapy involved the cessation of oral intake, the initiation of total parenteral nutrition (TPN), the administration of antibiotics, and intermittent esophageal aspiration. When thoracotomy was done but only drainage was performed, this treatment...
was also defined as conservative. In addition, we report a method we developed for chest drainage after esophageal perforation (Fig. 3). In brief, a 32-French thoracic drainage tube (Sumitomo Bakelite, Tokyo, Japan) was inserted and fixed with absorbable sutures in the posterior diaphragm near the lateral border of the vertebral column. An 18-French Salem sump tube (Nippon Sherwood, Tokyo) was placed nearby, followed by lavage and aspiration beginning immediately after the completion of surgery. We infused physiologic saline from the sump tube at a rate of 80 ml/h and began continuous aspiration through the thoracic drain under a pressure of $-15$ cm H$_2$O. First, 11 saline was infused over a 30-min period to confirm that the irrigation was smooth, and irrigation was usually continued for 3 days. When recovery was complete, the tube became obstructed, preventing further irrigation. If the absence of empyema was confirmed by X-ray, CT, or both, on postoperative day 7, the tube was removed. This method was called fixed intrathoracic drainage (FID), whereas the usual method in which aspiration is performed via an unfixed tube inserted into the posterior part of the chest was called unfixed intrathoracic drainage (UID).

**Results**

The details regarding the diagnosis of spontaneous perforation are outlined in Table 1, and the background, treatment, and clinical course of these patients are summarized in Table 2. Table 3 and 4 give the same information for the other types of perforation.

**Etiology**

Spontaneous esophageal perforations, known as Boerhaave’s syndrome, occurred in 11 patients, iatrogenic perforations occurred in 11 patients, and perforations were caused by a swallowed object in 4 patients. The iatrogenic perforations were caused by the placement of a Sengstaken–Blakemore tube (S–B tube, Sumitomo Bakelite) in four patients, esophageal dilatation in three patients, endoscopic esophageal mucosal resection in two patients, sclerotherapy in one patient, and a suction tube in one patient. The swallowed objects causing perforation were dentures in two patients, a fish bone in one patient, and a medication package in one patient.