Primary esophageal repair for Boerhaave’s syndrome whatever the free interval between perforation and treatment

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Abstract

Objectives: Boerhaave’s syndrome is the most sinister cause of esophageal perforation responsible with mortality rate ranging from 20 to 30%. Combination of mediastinal contamination with microorganisms, gastric acid and digestive enzymes, long free interval between injury and initiation of treatment causes severe mediastinitis which is fatal in most untreated cases. The aim of this paper is to emphasize primary esophageal repair and resuscitation whatever the free interval from rupture and repair. Methods: A retrospective review of patients treated for Boerhaave’s syndrome in our department from January 1980 to February 2003 was performed. The principle of treatment was surgical treatment and avoidance of esophageal exclusion or esophagectomy whichever was possible. Results: There were 25 patients (17 males and 8 females). All patients were operated on by primary esophageal repair, except for three who underwent immediate exclusion of the esophagus and one patient who deceased on arrival before being operated. Patients were classified according to free interval between perforation and treatment: group 1 (n = 9; 36%) within the 24 h (range from 12 to 24 h) and group 2 (n = 16; 64%) more than 24 h (range from 2 to 17 days). Altogether 6 patients deceased (24%). In hospital mortality rate for groups 1 and 2 was, respectively, 44% (four patients) and 13% (two patients), not significantly different. Mean hospital stay was 63 days. Two patients developed anastomotic leakage needing esophagectomy and retrosternal coloplasty in one or more steps. One patient developed pleural abscess treated by percutaneous drainage. Three patients presented temporary symptomatic esophageal stenosis, of whom one underwent dilation. Conclusions: Long free interval before treatment does not preclude primary esophageal repair in Boerhaave’s syndrome. Esophageal exclusion may be more often than not avoided in most cases.

1. Introduction

Spontaneous perforation of the esophagus or Boerhaave’s syndrome is the most serious cause of esophageal perforation, responsible for a mortality rate ranging from 20 to 30% [1–4]. The very specific anatomical configuration of the esophagus without any serosal layer allows gastric contents direct access to the mediastinum and pleural cavity, leading to severe mediastinitis, empyema and ultimately multiorgan failure. Late diagnosis or misdiagnosis occurs in more than 50% of patients because of the rarity of this affection and its non-specific presentation which often simulates other disorders such as myocardial infarction, peptic ulcer perforation or acute pancreatitis [1].

Management is controversial since treatment can be surgical or non-surgical, and indications vary according to the functional state of the esophagus, the presence of associated lesions and the habits of the different teams. As delay in diagnosis of more than 24 h was frequently reported to have a profound effect on the mortality [1,5], management was historically accorded to the free interval between perforation and treatment. It has been suggested that primary repair is only appropriate in patients treated in a delay of less than 24 h after perforation, and that esophageal exclusion or non-operative treatment is indicated after [4].

Herein, we present our experience with patients treated mainly by the same principle of surgical treatment and primary repair of the tear. The aim of this study is to determine if the time interval between perforation and repair had an influence on the subsequent outcomes and to advocate primary repair whatever be the delay.
2. Patients and methods

A retrospective review of patients treated for spontaneous perforation of the esophagus in our center was undertaken.

All patients included in this study suffered from a spontaneous esophageal rupture, without any pre-existing trauma or endoscopic gesture. All patients with esophageal surgical history (caustic burns, reflux surgery) or severe reflux esophagitis were excluded. The diagnosis of Boerhaave’s syndrome was not always made before admission, as some patients were referred for thoracic empyema or acute respiratory distress syndrome. In those cases, chest tube drainage was already performed when the patient was referred.

A water-soluble esophageal contrast was performed on arrival for suitable patients and all underwent a rigid tube esophagoscopy in the operating room, performed by the surgeon previous to surgery.

Some patients seen within recent years underwent CT scan which was generally performed in the previous center before they were referred. In our center, the CT scan was not always performed to preclude delay in surgical management. Principle of management was resuscitation and primary esophageal repair whatever the free interval between onset of symptoms and treatment. That means stitching the esophageal tear by interrupted resorbable sutures with reinforcement by intercostal flap when judged necessary according to the aspect of esophageal tissues.

Operating steps were the following [6]:

- The side of thoracic approach (right or left) was chosen according to the site of pleural effusion, the site of the leak and the result of esophagoscopy.
- A pleural and mediastinal lavage was performed with debridement of necrotic tissue.
- After exposition of the retracted mucosal and submucosal edges of the tear, a double layer interrupted absorbable suture (mucosal and muscular plan) was performed, buttressed by a pleural or an intercostal muscular flap in some cases.
- Two aspirated drains were put in the pleural space and a small drain was left adjacent to the esophageal suture line.
- A complete reexpansion of the lung was so performed to eliminate potential spaces and the possibility of empyema with decortication if necessary.
- A short laparotomy was routinely associated to perform a discharge gastrostomy and a feeding jejunostomy.

Postoperatively the patients were extubated as soon as possible. All patients were fed parenterally via a central venous line and enterally via the jejunostomy. Systemic antibiotics were given at admission and continued after the operation until beginning of oral feeding. The nasogastric suction tube was left in place until the absence of a leak was confirmed by an oral water-soluble contrast swallow (this was routinely performed on the seventh postoperative day). In cases with a persistent leak the mediastinal drain was gradually removed over a number of days, which eventually enabled the leak to seal itself off. Oral feeding was progressively begun by soft to hard food in 5 days.

Several parameters were studied: age, sex, gastric, esophageal, and general patient history; inducing factors, risk factors, pleuresia, toxic shock syndrome, mediastinitis, other symptoms; location and size of the tear, aspect of the esophagus, interval between diagnosis and treatment.

For analysis of the impact of free interval between perforation and treatment, patients were classified into two groups: group 1, patients referred within 24 h after perforation and group 2, patients seen more than 24 h after perforation.

For the statistical study, we used a $\chi^2$-test with a Yates correction for small numbers, as well as a t-test, and considered results as significant for a P-value inferior or equal to 0.05.

3. Results

3.1. Patient demography

From January 1980 to February 2003, 25 patients were treated for Boerhaave’s syndrome. They were eight females (32%) and 17 males (68%), with a mean age of 62.8 years (range 32–78). Nine patients (36%) were admitted within the first 24 h after the perforation (group 1, mean delay 17.3 h range from 12 to 24 h), and 16 (64%) after (group 2) (mean delay 6.09 days, range from 2 to 17 days).

3.2. Risk factors

Underlying gastro-esophageal disease was found in six cases: hiatus hernia in two cases, gastro-esophageal reflux without hiatus hernia in one, esophageal dyskinesia with dysphagia in one, history of partial gastrectomy for gastric ulcer in one, a treated duodenal ulcer in one.

3.3. Clinical presentation

The commonest presenting symptom was an acute pain, which was present and retrospectively found in all cases. Half of the patients had a recent large meal and five patients vomited before the onset of pain. Subcutaneous emphysema was noted at first presentation in five cases. In six patients the symptoms were of sudden onset of septic shock. Two patients had a history of alcohol consumption. In five patients the presentation was a chronic empyema.
3.4. Investigations

The chest X-ray was abnormal in all cases showing pleurodesis or pneumomediastinum (Fig. 1). Water-soluble esophagogram always showed the leak when it was done (15 cases) (Fig. 2). The CT scan was always abnormal when it was performed, but was not sufficient to suggest the diagnosis in two cases (Fig. 3). Two methylene blue swallows were performed and both were successful in staining the chest drainage.

3.5. Characteristics of the esophageal tear

The tear was on the thoracic esophagus in all cases, on the left side in 20 cases and on the right in five. It was located at the lower third in 21 cases (87.5%), extended to the middle third in four cases (16.6%), unspecified in one patient who deceased on arrival in the operating room. The length of the tear ranged from 0.5 to 10 cm (mean 3.5 cm).

3.6. Treatment

For all the series, the mean delay before treatment was 2 days (range 0–40). All patients whatever the delay underwent surgery except for one who died on arrival in the operating room. In all but three cases, surgery consisted of primary repair as described above. Indeed, in the beginning of the series, an immediate exclusion of the esophagus was performed in three cases:

- The first patient was admitted for an early diagnosed rupture. It was a contused 10 cm linear tear, which was considered non-safe to be repaired. A chest tube drainage with bipolar esophageal exclusion was performed. He developed a mediastinal abscess treated on the 10th postoperative day by thoracic esophagectomy and retrosternal coloplasty during the same procedure. A fistula of the cervical suture line appeared on the 21st day needing redo operation. The patient died on the 29th day from mediastinitis.
- The second patient was admitted on the fifth day after the perforation, in a state of toxic shock. Resuscitation, chest drainage and superior esophageal exclusion was immediately performed. The patient deceased on the second postoperative day.
- The third patient was admitted on the 17th day after perforation, with stable hemodynamic status. A chest tube drainage and temporary bipolar staple line exclusion was performed. The postoperative period was relatively simple marked only by a cervical esophageal stenosis released by endoscopic dilation 8 months later.

3.7. Postoperative evolution

Mean postoperative follow-up was 421.25 days (range 60–1945). Oral feeding was allowed after a mean delay of 25 days (range 11–63). Mean hospital stay was 63 days (30–180).
For the 21 patients treated by primary esophageal repair, main postoperative esophageal leak needing redo operation occurred in two cases.

- The first patient underwent bipolar esophageal exclusion on the eighth postoperative day, followed by an esophagectomy 1 month later. A retrosternal coloplasty was then performed 45 days later.

- In spite of resuscitation, the second patient (case # 4, Table 1) had a profound hemodynamic and respiratory instability precluding operation. He died.

Altogether, postoperative in-hospital death occurred in six patients (24%): two of the three patients treated by a primary esophageal exclusion (mortality rate of exclusion 66%) and one patient of toxic shock syndrome on arrival in the operating room (see Table 1). According to free interval, mortality rate was 44% (four patients) in group 1 and 13% (two patients) in group 2. The difference is not significant.

Non-lethal morbidity encompassed a pleural empyema treated by percutaneous drainage in one case, gastro-esophageal reflux syndrome in two cases, temporary symptomatic esophageal stenosis in two cases needing endoscopic dilation in one.

No correlation was found between in-hospital mortality and clinical state on arrival, age, sex, pleuresia, toxic shock syndrome, mediastinitis, and free interval between diagnosis and treatment. No complication was attributed to laparotomy approach, gastrostomy or feeding jejunostomy.

No relapse of perforation occurred in the long term.

### 4. Discussion

The overall mortality rate in our series is 24%, which corresponds to the different published series where mortality varies from 8 to 44%, whatever the surgical technique, and from 0 to 50% when primary esophageal repair is undertaken [1–10].

Mortality of patients seen previous to the 24th hour was unexpectedly higher than patients seen after (44 versus 13%), but the difference is not significant. Among the nine patients seen before the 24th hour, four (44%) showed immediate signs of mediastinitis with toxic shock, of whom three deceased.

Conversely, five of the 15 patients seen after the 24th hour presented a toxic shock syndrome which led to death in two cases. This tendency was found in the series reported by Lawrence et al. [3] where mortality rates were 22% (2 of 9) and 8% for patients seen within 24 h after perforation and more than 24 h, respectively.

It is therefore possible that the 24-h delay after perforation, which is often considered as the main factor influencing mortality (and the most important element of the therapeutic decision) may correspond to the period where these lesions develop into mediastinitis or otherwise stay localized in the pleural cavity with very limited local extension and general consequences. These lesions may therefore turn into a fatal ascending mediastinitis with septic shock, or stay localized with minimal septic and general consequences.

Therefore, when the diagnosis of esophageal perforation is made previously to the 24th hour, it is often in very ill patients with very aggressive lesions of poor prognosis. Conversely, when diagnosis is very late it is a collected pleural infection. This might account for the differences in outcome observed in patients seen before or after the 24th hour after the perforation.

It has been demonstrated elsewhere that surgery is the best treatment for patients seen before the 24th hour [1–9]. Non-operative treatment with or without drainage was suggested in late presentation because of tissue necrosis and edema preventing closure of the tear [4]. We always found the edge of the esophageal tear and have not noticed more
exposes the entire limits of the tear. With proper care, a primary repair of the esophagus, after having eliminated all underlying disease, is almost always viable and sturdy enough for a careful suture reapproximation. We systematically perform manual sutures and have no experience of mechanical sutures as described by Abbot et al. [12,13] may be an alternative to avoid exclusion. Exclusion does have certain morbidity with inhalation pneumonia, stenosis or asynchronism in repermeation. A death rate of 30–60% was reported after emergency primary esophagectomy [6]. Altorjay et al. [14] have advocated it in a series of mainly iatrogenic perforations. We recommend its use exclusively in the treatment of perforated esophageal tumors. We believe that special care must be taken in the repair of the esophagus, after having eliminated all underlying esophageal obstruction. The mucosal–submucosal layer must be clearly identified for meticulous approximation. T-tube drainage as described by Abbot et al. [12,13] may be an alternative event described in three cases reported [16,17]. Lastly, relapse of Boerhaave’s syndrome is a relatively exceptional event described in three cases reported [16,17]. It seems that esophageal reflux and alcohol abuse act as favorizing factors in those reported cases.

5. Conclusion

To our knowledge this is the biggest unincentric reported series of spontaneous perforations of the esophagus, all treated surgically, whatever the delay, and of whom 16 out of 25 (64%) were seen more than 24 h after perforation. We believe that the classical distinction between patients seen before and after the 24th hour is to be reconsidered.

References