Risk Factors for Mortality of Esophageal Perforation : A Clinical Experience in 32 Cases

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Abstract

Although surgical intervention is a standard treatment of esophageal perforation, the mortality is still high. We studied 32 patients with esophageal perforation and analyzed the risk factors for mortality, including the etiology of perforation, the location of perforation, preexisting diseases, general condition, the surgical timing, the surgical and medical treatment, and the contrast media leakage. The preexisting diseases included diabetes mellitus, old cerebral vascular accident, malignancy, liver cirrhosis, and sepsis. The total mortality rate of our 32 patients was 31.3%. The mortality rate in patients with preexisting diseases was not significantly different from those without (53.8% vs. 15.8% P=0.05). However, patients with poor general condition, including preexisting disease and multiple organ injury associated with car accident, had significantly higher mortality rate than those without (62.5% vs. 0%. P<0.01). The mortality rate was not affected by the etiology or the location of perforation, the surgical timing, and contrast media leakage. We conclude that poor general condition is the major risk factor for mortality in esophageal perforation. (J Intern Med Taiwan 2002;13: 256-262)

Key Words：Esophageal perforation, Mortality, Risk factor

Introduction

Esophageal perforation is a rare complication even though many diagnostic and therapeutic procedures in daily practice require passing instruments through the esophagus. Despite prompt treatment and improved management, the mortality is still significant in esophageal perforation. The esophagus lacks a serosal layer and the adventitia of the esophagus is contiguous with the connective tissue of the mediastinum. As a result, esophageal perforation allows the bacteria and digestive enzymes to enter the mediastinum and spread to the neck and the pleura. If an early

diagnosis is not made, mediastinitis, pleural emphysema, empyema, or even a subdiaphragmatic abscess can develop rapidly. Therefore, surgical treatment for esophageal perforation is usually recommended 1. Conservative treatment is reported to have a high mortality rate up to 69% 2. Previous reports have shown that the mortality rate in patients with prompt surgical treatment ranged from 0 to 34 %, and those without immediate treatments 68.7% to 75% 1. A more recent report suggested that patients with mild fever, absence of shock and sepsis might be considered for conservative management 3. Because the outcome of esophageal perforation is variable and the risk factors for its mortality are not well known we reviewed 32 patients with esophageal perforation and analyzed the relationship of mortality and several factors, including the etiology and location of perforation, preexisting diseases, general condition, contrast media leakage, surgical or medical treatment and the surgical timing.

Patients and Methods

We reviewed our patient database from October 1986 to June 2000, and identified 32 patients who had a diagnosis of esophageal perforation which was confirmed by one of the followings: (1) free perforation observed by endoscopy (1 case); (2) extravasation of contrast media on esophagogram (28 cases); (3) passage of gastric contents through a chest tube (1 case); and (4) esophageal perforation found at surgery (2 cases). In the last category, one case was an unexpected finding during surgery for neck abscess in a 5-year-old child, and the second case was a 74 year-old female who had liver cirrhosis and, following endoscopic injection therapy for esophageal variceal bleeding, developed pleural effusion and free air in the medistinum. Esophageal perforation was suspected before surgery in this case. Other patients who had a clinical suspicion of esophageal perforation but did not have confirmation by any of the above 4 criteria were excluded from this study.

Of the 32 patients, 8 received conservative treatment. Two patients had iatrogenic perforation as a result of neck operation. In three patients esophageal perforation occurred following foreign body ingestion. These five patients were in stable condition without sign of sepsis and were under close observation. The 6th patient who had preexisting gallbladder cancer and liver cirrhosis had iatrogenic perforation after overtube insertion for endoscopic variceal ligation. The diagnosis of esophageal perforation after foreign body ingestion was delayed in the 7th patient who was a diabetic. The last patient had esophageal perforation secondary to esophageal cancer. In the last three patients their conditions were too critical to undergo surgical intervention.

We evaluated the mortality rate and each of the following clinical variables: etiology, the location of perforation, surgical or medical treatment, early surgery (≦24 hours

after diagnosis) or delay surgery (>24 hours after diagnosis), patient's preexisting diseases, general condition, and contrast medium leakage.

Statistical analyses were performed by chi-square test and Fisher's exact test.

Results

The median age of 32 patients was 55 years, a range from 1 to 76 year. There were 25 male and 7 female. The overall mortality rate was 31.3% (10/32).

Thirteen of the 32 patients with esophageal perforation had preexisting diseases including diabetes mellitus (6 cases), old stroke (3 cases), malignancy (4 cases), liver cirrhosis (3 cases), and/or sepsis (5 Cases). Seven of the 13 patients with preexisting disease died (53.8%) whereas three of the 19 without preexisting disease expired (15.8%) (P=0.05) (Table 1). All of the 7 patients who died with preexisting disease had poor general condition so did the three patients without preexisting disease who died of multiple organ injury in car accident. Thus, we analyzed the correlation of mortality rate and poor general condition. A total of 16 patients had poor general condition, ten of them died (62.5%) whereas and all of the 16 patients without poor general condition survived (0%) (P=0.00025) (Table 2).

The mechanism of esophageal perforation was classified into barogenic trauma (30 cases) and non-barogenic trauma (2 cases). Among the 30 barogenic traumas, the etiologies were foreign body ingestion (14 cases), iatrogenic injury (8 cases), blunt injury due to car accidence (3 cases), Boerhaave's syndrome (3 cases), and stab wound (2 cases) (Table 2).

As shown in Table 3, the perforation occurred in the upper, the middle, and the lower esophagus in 19, 7, and 6 cases respectively, and their corresponding mortality rates were 26%, 29%, 50 %, a difference which is not statistically significant (P=0.543). All three cases of blunt injury due to car accident expired, and all three cases of Boerhaave's syndrome and 2 cases of stab wound survived. The mortality rate ranged from 0 to 100% among different etiologies of esophageal perforation, but no conclusion could be made because of small number of cases. Two cases of non-barogenic perforation were due to esophageal cancer, one of them died. The relationship of mortality rate and contrast material leakage is shown in Table 4. The mortality rate in patients with leakage was not significantly higher than that of patients without leakage (33.3% vs. 25%, P= 1.0).

Twenty-four of 32 patients underwent surgery and 8 received conservative medical treatment. The surgical management included repair of perforation, esophagotomy with T-tube drainage, gastrostomy and feeding jejunostomy. The conservative medical treatment included nasogastric tube decompression, total parenteral nutrition, and antibiotics therapy. The mortality rate was 33.3% in the surgical intervention group and 25% in the medical treatment group (P>0.05) (Table 5). Among the 24 surgically

treated patients, the mortality rate of delayed surgery was not higher than that of early surgery (25 % vs. 37.5%, Fisher's exact test P>0.05). For each separate etiology, the mortality rate was also not significantly different between early and delay surgically treated groups (Table 6).

Discussion

The overall mortality rate of esophageal perforation in our series of 32 patients was 31.3%. The mortality rate was significantly higher in patients with poor general condition than those without (62.5% vs. 0%. P<0.00025). Twenty-four of our patients had surgical intervention and 8 received conservative medical treatment. The mortality rate in the medically managed group was not significantly higher than that of surgically treated group (25% and 33.3%, P=1.0) (Table 5), which could be because of the bias on patient selection for medical treatment. Of the 8 patients who had medical treatment, 5 had stable clinical condition and all of them survived. Three patients in the medical treatment group had poor condition, and two of them expired. The overall mortality in the medical treatment group was 66.6%, similar to a rate of 69% in a previous report 2. Eight of the 24 patients in the surgical treatment group died, 2 had foreign-body perforation and 3 iatrogenic perforation. All of these 5 patients who died had pre-exiting diseases, including old stroke, diabetes mellitus, lung cancer, liver cirrhosis or infection. Another three deaths in the surgically treated group were patients with car accident who had multiple organ injury resulting in poor general condition. All of these 8 surgical deaths occurred despite early surgical intervention. In contrast, both of 2 patients with esophageal perforations caused by stab wound survived after surgical treatment, which could be explained by the fact these 2 patients had only simple stab injuries to the esophagus and their general conditions were good. Thus, the findings in our study indicate that poor general condition of the patients is an important risk factor for mortality in esophageal perforation.

The majority of esophageal perforation in our series was due to barogenic trauma, including foreign body ingestion, iatrogenic injury, car accident, Boerhaave's syndrome, and stab wound. With increasing use of endoscopic procedure, the incidence of iatrogenic perforation has increased 1. But in our series, esophageal perforation caused by foreign body ingestion was still the most common cause. Two non-barogenic perforations were secondary to esophageal cancer. The mortality rate ranged from 0 to 100% among different etiologies of esophageal perforation, but no conclusion could be made because of the small number of cases for each etiology. Consistent with previous reports 4, the perforation is more common in the upper third of esophagus in our series, because the esophageal perforation caused by foreign body ingestion and iatrogenic injury often occurs at the physiological narrowing. The

mortality rate was not significantly different among different locations of the esophagus (Table 3).

Image studies provide a reliable way to make a definite diagnosis of esophageal perforation. Absence of contrast leakage may suggest a small or a sealed-off perforation. A contrast leakage on image study suggests leakage of gastric juice and other substance into the mediastinum and causes inflammatory process. Thus, presence of leakage is expected to be a risk factor for mortality. However, in our study, the mortality rate was not significantly different between those with and those without contrast leakage (Table 4). Therefore, we believe contrast leakage alone is not a risk factor for poor outcome.

Boerhaave's syndrome, which is caused by sudden violent vomiting, usually occurs at lower
esophagus. The gastric contents (digestive enzymes and bacteria) may leak into the thoracic cavity. Surgery is the standard treatment. All of our 3 cases of Boerhaave's syndromes survived after surgical treatment, two had surgery within 24 hours, one longer than 24 hours. Nehra also reported survival in all of his 5 patients with Boerhaave's syndrome after an early surgical intervention within 12 hours 5. In the report by Van Walleghem a delayed diagnosis of Boerhaave's syndrome over 24 hours complication of mediastinitis, pleural emphysema or subdiaphragmatic abscess developed and the mortality rate was as high as 80% 6. Therefore, early diagnosis of esophageal perforation is important in Boerhaave's syndrome 5.

Early diagnosis and treatment of esophageal perforation is closely related to the rate of survival 7,8. It has been reported that delayed management on perforation for more than 24 hours is associated with a 3-5 fold increase in mortality 9,10. However, in our series, there was no difference in mortality rate between early and delay surgical treatment (37.5% vs. 25%) (Table 6). Our data are similar to the results from the studies by Erwall et al, Reeder et al and Tilanus et al 2,8,11.

Esophagogastrectomy instead of simple closure of the perforation has been previously suggested in a patient with esophageal cancer 6. In our 2 patients with malignant perforations, one was elected to have
esophagogastrectomy because of a good general condition; the patient survived. The other patient expired after medical treatment. We agree with the suggestions made by previous authors 6 that aggressive treatment, esophagogastrectomy, should be considered in appropriate patients with esophageal perforation secondary to malignant tumor.

In conclusion, our study showed that esophageal perforation in patients with poor general condition because of preexisting diseases or multiple organ injury after car accident had a higher mortality rate. In our series, a delay in surgical treatment or

contrast media leakage was not a risk factor for mortality. Conservative medical treatment in selected patients who had stable condition also had a good outcome.

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食道破裂之臨床經驗：32 病例之報告

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摘　　要

雖然食道破裂的標準治療方式是外科治療，但是死亡率仍然高。我們分析 32 個食道破裂的病人，嘗試從食道破裂的原因、位置、病人本身既有疾病 (preexisting disease) 、病人大致的情況 (general condition)、開刀的時機、內外科不同之治療方式及食道攝影是否顯影劑外漏，找出造成死亡的危險因子。病人本身既有疾病 (preexisting disease)，指的是糖尿病、中風、癌症、肝硬化，及敗血症。病人的大致情況不佳 (poor general condition) 指的是本身既有疾病 (preexisting disease)加上導因於車禍造成之多重器官損傷。32 個食道破裂的病人，總死亡率爲 31.3%。病人的大致情況不佳 (poor general condition) 者有較高之死亡率 (62.5 vs. 0%,P<0.00025)。造成食道破裂的原因、位置、開刀的時機、內外科不同之治療方式及食道攝影是否顯影劑外漏不是造成死亡的危險因子。3 位車禍造成之食道破裂全死亡。2 位刀傷及 3 位 Boerhaave 症候群造成之食道破裂經治療全存活。我們的結論是：病人的大致情況不佳(poor general condition) 是食道破裂造成死亡最主要的危險因子。

Table 1: The relationship between preexisting diseases and mortality No=32)

Mortality rate / Etiology (No)	Preexisting diseases (+) Death/No. (%)	Preexisting diseases(-) Death/No. (%)	Total Death/No. (%)
Barogenic trauma			
Foreign body (14)	3/6 (50)	0/8 (0)	3/14 (21.4)
Iatrogenic (8)	3/4 (75)	0/4 (0)	3/8 (37.5)
Car accident (3)	0/0 (0)	3/3 (100)	3/3 (100)
Boerhaave's (3)	0/1 (0)	0/2 (0)	0/3 (0)
Stab wound (2)	0/0 (0)	0/2 (0)	0/2 (0)
Non-barogenic trauma Esophageal cancer (2)	1/2 (50)	0/0 (0)	1/2 (50)
Total	7/13 (53.8)*	3/19 (15.8)*	10/32 (31.3)

Preexisting diseases: diabetes mellitus, old cerebral vascular accident,

malignancy, liver cirrhosis, and sepsis.* *P*=0.05

Table 2: The relationship between poor general conditions[!] and mortality (No=32)

Mortality rate / Etiology (No)	Poor general conditions (+) Death/No. (%)	Poor general conditions (-) Death/No. (%)	Total Death/No. (%)
Barogenic trauma			
Foreign body (14)	3/6 (50)	0/8 (0)	3/14 (21.4)
Iatrogenic (8)	3/4 (75)	0/4 (0)	3/8 (37.5)
Car accident (3)	3/3 (100)	0/0 (0)	3/3 (100)
Boerhaave's (3)	0/1 (0)	0/2 (0)	0/3 (0)
Stab wound (2)	0/0 (0)	0/2 (0)	0/2 (0)
Non-barogenic trauma			
Esophageal cancer (2)	1/2 (50)	0/0 (0)	1/2 (50)
Total	10/16 (62.5)*	0/16 (0)*	10/32 (31.3)

[!] Poor general conditions: preexisting diseases and multiple organ injury in car accident.

* P=0.00025

Table 3: The relationship between location of perforation and mortality (No=32)

Mortality rate / Etiology (No.)	Upper third Death/No. (%)	Middle third Death/No. (%)	Lower third Death/No. (%)	Total Death/No. (%)
Foreign body (14)	2/11	1/3	-	3/14 (21.4)
Iatrogenic (8)	0/3	0/2	3/3	3/8 (37.5)
Car accident (3)	3/3	-	-	3/3 (100)
Boerhaave's (3)	-	-	0/3	0/3 (0)
Stab wound (2)	0/2	-	-	0/2 (0)
Esophageal cancer (2)	-	1/2	-	1/2 (50)
Total	5/19 (26.%)*	2/7 (29%)*	3/6 (50%)*	10/32 (31.3)

* P=0.543

Table 4: The relationship between contrast material leakage and mortality (No=32)

	Leakage (+)	Leakage (-)	Total
Number of cases	24	8	32
Mortality	8	2	10
Mortality rate	33.3%*	25%*	31.3%

* *P*=1.0

Table 5: The relationship between treatment and mortality (No=32)

Mortality rate / Etiology (No)	Surgical treatment	Conservative treatment	Total
	Death/No. (%)	Death/ No. (%)	Death/ No. (%)
Barogenic trauma	8/23 (34.8)	1/7 (14.3)	9/30 (30)
Foreign body (14)	2/10 (20)	1/4 (25)	3/14 (21.4)
Iatrogenic (8)	3/5 (66.6)	0/3 (0)	3/8 (37.5)
Car accident (3)	3/3 (100)	-	3/3 (100)
Boerhaave's (3)	0/3 (0)	-	0/3 (0)
Stab wound (2)	0/2 (0)	-	0/2 (0)
Non-barogenic trauma	0/1 (0)	1/1 (100)	1/2 (50)
Esophageal cancer (2)	0/1 (0)	1/1 (100)	1/2 (50)
Total	8/24 (33.3)*	2/ 8(25)*	10/32 (31.3)

* P=1.0

Table 6: The mortality rate and the interval between diagnosis and operation (No=24)

Interval / Etiology (No)	≦24 hours	>24 hours	Total
	Death/No. (%)	Death/No. (%)	Death/No (%)
Barogenic trauma	6/16 (37.5)	2/7 (28.6)	8/23 (34.8)
Foreign body (10)	1/6 (16.6)	1/4 (25)	2/10 (20)
Iatrogenic (5)	2/3 (66.6)	1/2 (50)	3/5 (60)
Car accident (3)	3/3 (100)	-	3/3 (100)
Boerhaave's (3)	0/2 (0)	0/1 (0)	0/3 (0)
Stab wound (2)	0/2 (0)	-	0/2 (0)
Non-barogenic trauma	-	0/1 (0)	0/1 (0)
Esophageal cancer (1)	-	0/1 (0)	0/1 (0)
Total	6/16 (37.5)*	2/8 (25)*	8/24 (33.3)

* P=0.667