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Management of Delayed Diagnosed Esophageal Perforation

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ABSTRACT

Background: The esophageal perforation can be fatal unless diagnosed promptly and treated effectively. The high mortality rate related to delayed treatment is due to an inability to effectively close the perforation site to prevent leakage and ongoing sepsis.

Materials and Methods: This study was performed on patients who were referred to three hospitals of Shaheed Beheshti and Tehran Universities of Medical Sciences during two years. All patients admitted in these hospitals with esophageal perforation lasting for more than 24 hours were studied.

Result: There were 24 patients (12 males, 12 females) with the mean age of 37.5 yrs. The most frequent symptoms and signs were: Chest and abdominal pain in 11 cases (45.83%), empyema in 11 cases (45.83%), fever in 10 cases (41.66%), pleural effusion in 8 cases (33.33%) and emphysema in 3 cases (12.5%). The most common causes of esophageal perforation were use of devices during esophagoscopy and foreign bodies in 13 cases (54.17%), iatrogenic trauma in 4 cases (16.67%), Boerhaave's syndrome in 4 cases (16.67%), ingestion of burning chemicals in 2 cases (8.33%) and esophageal cancer in 1 case (4.17%). Four (16.66%) of all patients died while others were discharged with no significant complication in long time.

Conclusion: This study was performed on patients referred to university hospitals; therefore, the results are different from those of community. Most of the perforations were due to intraoperative negligence or device manipulation. The outcomes of the whole procedures were good concluding that late diagnosed esophageal perforations can be managed surgically with good results but with a longer period of hospitalization. (*Tanaffos* 2006; 5(1):51-57)

Key words: Esophagus, Delayed esophageal perforation, Mediastinitis

INTRODUCTION

Esophageal perforation is a potentially fatal surgical emergency. Death usually occurs as the

result of mediastinitis and sepsis (1, 2, 3, 4, 5, 6).

Initial symptoms are mostly insignificant and the diagnosis is usually obscure and uncertain. By passage of time, complications due to esophageal perforation such as empyema may appear. Even at

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this stage the diagnosis is uncertain. Definite diagnosis of esophageal perforation is often made at the time of autopsy. Esophageal perforation has various causes; the most frequent being endoscopic procedure for diagnosis or treatment of esophageal or gastric diseases or extraction of foreign body (1).

As reported, foreign body and spontaneous perforation of esophagus known as Boerhaave's syndrome are the cause in 14% and 15%, respectively while trauma is responsible for 10% of the perforations (1, 2, 7).

This complication has equal sexual pattern with no significant mean age. In old aged ones it is usually associated with esophageal cancer while in children swallowing a foreign body is mostly the cause.

Pain is the remarkable stable symptom strongly suggestive of perforation. Patterns of pain are different as odynophagia, chest pain, abdominal or cervical pain due to the site of perforation. Pain in cervical area after esophageal instrumentation or substernal pain after severe vomiting is more diagnostic. If subcutaneous emphysema occurs, diagnosis is almost definite.

Pneumothorax or acute pancreatitis is included in differential diagnosis if the pneumothorax is detected in the chest radiography with or without effusion (hydropneumothorax).

Hydropneumothorax is also seen in acute pancreatitis which is more common at the left side. An increase in serum amylase occurs as well which is due to the release of saliva through the perforated site into the adjacent tissues. At this time, evaluation of isoenzymes is helpful in distinguishing them. Spontaneous perforation of esophagus usually occurs into the left pleural space above the esophagogastric junction. Parapneumonic effusion or empyemas are also included in differential diagnosis because the patient is feverish and suffer chest pain. It is always

recommended to examine the esophagus endoscopically with or without esophagogram in case of empyema without any specific cause (idiopathic empyema)(8).

There is no unanimous treatment planning for thoracic esophageal perforations. The treatment procedures usually include multi-stage operations with prolonged hospitalization along with a number of complications and considerable costs for the patients (8, 9, 11)

Treatment procedures vary from chest tube drainage to more invasive surgical approaches including decortication, esophagectomy without reconstruction and esophageal replacement, esophagectomy with primary reconstruction and even primary closure of perforation with or without buttressing with adjacent tissues such as pleural, muscular or omentum flaps (2, 7).

Cervical esophageal perforations usually respond to simple treatments including surgical drainage alone or closure of the perforation with or without drainage and sometimes along with general supports (nutritional supply IV or through a feeding gastrostomy and administration of antibiotics) (12, 13, 14).

Abdominal esophageal perforations are also treated by surgery, drainage, and evacuation of the abscess and primary closure of the perforation (15, 16).

Unsuccessful primary closure of esophageal perforation appears to be due to the absence of serous layer in esophagus. Presence of thick intact muscular layers in esophagus (compared to muscular layers of intestines) somehow compensates the absence of serous layer. On the other hand, covering the perforation with pleura (or another viable tissue) will buttress the site. Primary closure of thoracic esophageal perforations even in delayed cases is

feasible if the perforation is not large and is sutured layer by layer along the esophageal longitudinal axis(14, 16). Perforation site should be buttressed with viable tissue following primary closure. Primary closure decreases morbidity and reduces treatment stages as well as hospitalization period (16).

MATERIALS AND METHODS

This was a two- year study performed on patients with esophageal perforation admitted to Modarres, Masih Daneshvari, and Imam Khomeini Hospitals in Tehran. Total number of 24 patients who received treatments in more than 24 hours after the perforation were studied. The treatment procedures varied from non-operative management to different surgical interventions based on the case from drainage to primary closure of the perforation alone or buttressing with viable adjacent tissues with or without drainage, esophagectomy with primary or delayed esophageal reconstruction and thoracotomy with decortication.

This variety of treatment procedures was due to the patients' condition and surgeon's choice.

All patients presenting with esophageal rupture during a 2- year- period were enrolled into the study. Most patients were referred to medical school educational hospitals by other medical centers, so the primary manipulation had been performed on all prior to their referral (so they all had a history of prior primary manipulation).

Data were analyzed using SPSS software version 10.

RESULTS

Of 24 patients under treatment with the total mean age of 37.5 yrs, 12 (50%) were female with the mean age of 33.16 yrs and 12 (50%) were male with the mean age of 41.16 yrs.

Causes were instrumentation or foreign body in 13 cases(54.17%), trauma in 4 cases (16.67%), Boerhaave's syndrome in 4 cases (16.67%), ingestion

of burning chemicals in 2 cases (8.33%), and esophageal cancer in one case (4.17%).

The most common signs and symptoms were: chest and abdominal pain in 11 cases (43.85%), empyema in 11 cases (45.83%), fever in 10 cases (41.66%), pleural effusion in 8 cases (33.33%) subcutaneous emphysema in 3 cases (12.5%), nausea and vomiting, dyspnea and peritonitis each in 2 cases (8.33%), and signs of sepsis, regurgitation, lung abscess, cervical infection and T.E. fistula each in one case (4.16%).

In two cases in whom ingestion of burning chemicals were the cause, total esophageal necrosis occurred. There were five cases (20.83%) of cervical, 12 (50%) cases of thoracic and only one case (4.16%) of abdominal esophageal perforations. Twenty-one patients underwent surgery. Types of surgical intervention and hospitalization periods were different based on the case. Three patients were recovered after a period of nonoperative management and were discharged in a good general condition. Patients with postoperative anastomotic leak had the longest hospitalization period. Four patients (16.7%) died after surgery and remaining were discharged in a good health.

DISCUSSION

As demonstrated in statistical results, the most common cause of esophageal perforation was esophageal instrumentation and foreign body. In other studies, esophageal instrumentation during surgery or endoscopy was also the most common cause of esophageal rupture. Foreign body causes esophageal rupture in two patterns:

1. Foreign body is sharp itself. Its impaction and secondary complications cause esophageal perforation.
2. Diagnostic or therapeutic procedures for extracting the foreign body cause esophageal perforation.

This type of complications could be reduced. During the study, it was revealed that the rate of morbidity and mortality increases by age. This might be due to the fact that elderly patients despite being immunologically weak possess some other underlying diseases that increase the risk of fatality. Also, no significant difference was observed regarding mean age between women and men. Boerhaave's syndrome was the third cause of perforation in our patients. Mean age of these patients was 40 yrs. Delayed diagnosis in these patients may be due to the low possibility of this complication.

In all patients presented with sudden abdominal or chest pain following recurrent coughs or vomiting, this complication must be considered. Sometimes, even the cause is obscure. Likely, in one of our cases no reason was found for the rupture and the patient did not have any predisposing underlying disease.

In evaluating previous studies, there were cases of idiopathic spontaneous perforations (with no significant cause) with no predisposing factors (1, 9, 11).

In patients who underwent surgery with extensive drainage and esophageal resection hospitalization period was longer (32 days in average) as well as the rate of infectious complications. Morbidity and mortality was higher in those in whom only drainage had been performed.

Considering the complex extraction of amylase isoenzymes, measuring and differentiation of them was not feasible in our centers. However, it must be mentioned that in other studies, evaluation and differentiation of two isoenzymes in pancreas and saliva are effective in diagnosing esophageal perforation and the difference was significant (2, 3).

Similar to the reports of Platel et al. the most common site of perforation was in thoracic esophagus (6). In our investigation, the morbidity and mortality rate was higher among those with thoracic esophageal perforation and the difference

was significant ($p < 0.005$). In Platel et al. study, this rate was higher in this group of patients due to mediastinitis.

The lowest mortality rate was in those with cervical esophageal perforation (10). We had no mortality in this group in our study as well.

In patients who had swallowed chemical agents accidentally or to commit suicide, a longer segment of esophagus had been injured (almost full length of esophagus and stomach were injured) and the difference was statistically significant ($P < 0.05$).

Since there were no data available regarding the length of esophagus being injured, our findings were not comparable.

In evaluating clinical signs and symptoms it was revealed that longest delay in treatment occurred when the main sign of disease was empyema and infectious pleural effusion. The highest rate of mortality was in this group of patients, with significant difference.

In our understudy patients, four died (16.67%), and hence no significant difference was found regarding mortality rate reported in other studies. This rate was about 20 to 25% in most studies. Three of them (75%) were women. One of them was a 15-year-old patient who had esophageal perforation due to ingestion of burning chemicals and had referred to hospital after a week as a result of empyema. She died in less than 24 hours after surgery due to bleeding from the fistula located between the innominate artery and trachea.

The second one was a 56-year-old woman who had referred with 15 days delayed empyema. Twenty-four hours after surgery and esophageal resection, she died due to cardiopulmonary arrest with unknown cause.

The third one was a 72-year-old woman who developed chest and abdominal pain following endoscopy. Her general condition was grave. She did not respond to initial resuscitation and died after only

four hours of admission by going into coma. Thoracic esophageal perforation was detected and confirmed by autopsy.

Another case was a 59-year old man whose esophagus injured during pulmonary lobectomy. He underwent unsuccessful treatment for empyema 10 days after surgery and died.

In these patients, no significant statistical difference was found between the main cause of esophageal perforation and death.

However, delayed diagnosis in these patients was more than those who had recovered. This difference was statistically significant ($p < 0.01$). In all these patients thoracic esophageal perforation was the cause of death.

It seems that there is a direct relation between the gender of patients and death. The mortality rate in women was three times greater than in men; although this might not be a generalized rule due to the low number of patients in our study.

There was no significant difference between men and women regarding Boerhaave's syndrome. Esophageal burning was higher in women and was not seen in men.

In evaluating types of surgical interventions it was revealed that in those who underwent early operation and their esophagus had been excluded (whether primarily or with a delay), a final satisfaction of the patient and medical team was achieved, despite the long period of disease and high number of operations. The rate of mortality was lower in this group which was similar to other studies (5, 8, 9, 11).

In cases treated with drainage alone or drainage along with esophageal diversion and nutritional supply through a feeding gastrostomy, the hospitalization period had been increased as well as the morbidity rate.

Of those who underwent surgery (mostly primary closure or esophagectomy), primary closure was mostly performed in cervical esophageal perforations

while esophagectomy was often performed in thoracic esophageal perforations. There was no significant statistical difference between primary closure with drainage and primary closure alone. In one patient, a muscular flap from sternocleidomastoid (SCM) was used to buttress the perforation site. As a result of secondary leakage, a muscular flap from pectoralis major was used that lead to a full recovery.

We did not use omentum flap for our patients in this study and hence could not make comparisons. However, use of SCM flap primarily failed and another flap was used.

Almost in all patients who underwent esophagectomy and stomach or colon were used for esophageal replacement, no organ gangrene occurred. In a patient, jejunum flap was used for cervical esophageal replacement which failed and finally stomach was used. Therefore, statistically no significant difference was seen between use of muscular flap and esophagectomy. As the perforations were in two different anatomic sites, we can not definitely state that esophagectomy is more effective compared with use of muscular flap following primary closure.

CONCLUSION

Esophageal perforation has different causes. Delayed diagnosis of esophageal rupture and its treatment are of surgical emergencies that increase the complications and also the mortality and morbidities. Moreover, its costs puts a heavy burden on the patient's family and health care system.

In conclusion, we mention the following points regarding esophageal perforations:

- 1) The most common causes of esophageal perforations were instrumentation and trauma during surgery and Boerhaave's syndrome.
- 2) According to results it is concluded that cervical esophageal perforations should be managed by

simple treatments such as primary closure or surgical drainage with or without nutritional supply and antibiotic administration.

- 3) Abdominal esophageal perforation is usually treated by laparotomy and drainage with esophageal repair using viable adjacent tissues like stomach, along with nutritional supply and administration of antibiotics.

Thoracic esophageal perforation usually has the highest rate of mortality and morbidities. Most controversies among surgeons are in regard to this group of patients. Therefore, highest variety in surgical interventions is seen in these patients.

- 4) Covering the primary closure with muscular or omentum flaps is helpful and reduces the subsequent complications. Therefore, it is recommended to suture the esophageal layers separately and anatomically using absorbable ligatures. Perforation site should be buttressed with viable tissues such as muscular flap from intercostal muscles or adjacent anatomic sites, pleura or omentum.
- 5) Nutritional supply has a valuable role in treatment of these patients reducing the complications. Therefore, it is recommended to evaluate the feasibility of this action in each patient individually.
- 6) Wide spectrum antibiotics especially those with anaerobic coverage are prescribed.
- 7) As the rate of complications and mortality is high in elderly patients, more attention must be paid to this group.
- 8) In cases of burning with chemical agents, a longer length of esophagus and adjacent organs such as stomach, hypopharynx and larynx are injured and require therapy.

Total number of our understudy patients during two years has been equal to the understudy

population of most studies conducted in a longer period of time, and this is due to the referral of severely-ill patients from medical centers all over the country to the educational centers.

If we conduct a comprehensive survey equally in most medical educational centers of the country, we may achieve an adequate statistical formula regarding the status of esophageal perforation, its prognosis and the method of choice for its treatment in Iran.

REFERENCES

1. Balkan ME, Ozdulger A, Tastepe I. One-stage operation for treatment after delayed diagnosis of thoracic esophageal perforation. *Scand Cardiovasc J* 1997; 31(2):111-5.
2. Inci I, Ozcelik C, Nizam O, Balci AE, Eren N, Ozgen G. Traumatic oesophageal perforation. *Scand Cardiovasc J* 1997; 31(2): 97- 100.
3. Mai C, Nagel M, Saeger HD. [Surgical therapy of esophageal perforation. A determination of current status based on 4 personal cases and the literature]. *Chirurg* 1997; 68 (4): 389-94.
4. Altorjay A, Kiss J, Voros A, Sziranyi E. The role of esophagectomy in the management of esophageal perforations. *Ann Thorac Surg* 1998; 65 (5): 1433 -6.
5. Sakamoto Y, Tanaka N, Furuya T, Ueno T, Okamoto H, Nagai M, et al. Surgical management of late esophageal perforation. *Thorac Cardiovasc Surg* 1997; 45 (6): 269- 72.
6. Platel JP, Thomas P, Giudicelli R, Lecuyer J, Giacoia A, Fuentes P. [Esophageal perforations and ruptures: a plea for conservative treatment]. *Ann Chir* 1997; 51 (6): 611-6.
7. Chang CH, Lin PJ, Chang JP, Hsieh MJ, Lee MC, Chu JJ. One-stage operation for treatment after delayed diagnosis of thoracic esophageal perforation. *Ann Thorac Surg* 1992; 53 (4): 617- 20.
8. Jones WG 2nd, Ginsberg RJ. Esophageal perforation: a continuing challenge. *Ann Thorac Surg* 1992; 53 (3): 534-43.

9. Wright CD, Mathisen DJ, Wain JC, Moncure AC, Hilgenberg AD, Grillo HC. Reinforced primary repair of thoracic esophageal perforation. *Ann Thorac Surg* 1995; 60 (2): 245- 8; discussion 248-9.
10. Port JL, Kent MS, Korst RJ, Bacchetta M, Altorki NK. Thoracic esophageal perforations: a decade of experience. *Ann Thorac Surg* 2003; 75 (4): 1071- 4.
11. Skinner DB, Little AG, DeMeester TR. Management of esophageal perforation. *Am J Surg* 1980; 139 (6): 760- 4.
12. Goldstein LA, Thompson WR. Esophageal perforations: a 15 year experience. *Am J Surg* 1982; 143 (4): 495- 503.
13. Flynn AE, Verrier ED, Way LW, Thomas AN, Pellegrini CA. Esophageal perforation. *Arch Surg* 1989; 124 (10): 1211- 4; discussion 1214-5.
14. Wang N, Razzouk AJ, Safavi A, Gan K, Van Arsdell GS, Burton PM, et al. Delayed primary repair of intrathoracic esophageal perforation: is it safe? *J Thorac Cardiovasc Surg* 1996; 111 (1): 114- 21; discussion 121-2.
15. Bladergroen MR, Lower JE, Postlerthwait, RWosis. Diagnosis and recommended management of esophageal perforations and rupture. *Ann Thoracic Surhery* 1986; 42: 235-9.
16. Salo JA, Isolauro JO, Heikkila LJ, Markkula HT, Heikkinen LO, Kivilaakso EO, Mattila SP. Management of delayed esophageal perforation with mediastinal sepsis. Esophagectomy or primary repair? *J Thorac Cardiovasc Surg* 1993; 106 (6): 1088- 91.

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