Management of post dilatation oesophageal perforation: an experience from a tertiary centre

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Abstract

Background Treatment of oesophageal perforation remains controversial. This study shows that native oesophagus should be preserved. Early recognition improves survival.

Aim The aim of this study was to evaluate the outcome of management of post dilatation oesophageal perforation in a tertiary centre.

Methods Between 1999 and 2007, 35 patients with oesophageal perforation following dilatation were treated. Post dilatation corrosive stricture perforations constituted the major aetiology.

Results Twenty-four (69%) underwent early intervention (< 24 hours) and the remaining 11 (31%) were late (>24 hours). The 30-day mortality was found to be 9%, and mean hospital stay was 14 ± 14.7 days. Comparing outcomes between early and late groups, statistically significant difference was observed, with increased mortality ($p=0.001$) and hospital stay ($p=0.001$) following late intervention.

Conclusion Early intervention decreases mortality and hospital stay in oesophageal perforation and preservation

of oesophagus may be attempted, as native oesophagus is the best conduit.

Keywords Oesophagus · Perforation · Dilatation · Early intervention

Introduction

Corrosive stricture oesophagus is a common problem requiring frequent dilatations under fluoroscopy. Also, dilatation of malignant obstructions in oesophagus is required for nutritional support. The commonest cause of oesophageal perforation is instrumentation. Incidence of perforation following bouginage is 0.25%. Recognition of the importance of early diagnosis and intervention has brought about a dramatic decline in the mortality related to oesophageal perforation.

In spite of advances in radiology, anaesthesia, postoperative care and antibiotics [1] the management of oesophageal perforation has remained controversial. The recommendations vary from non operative management [2] to aggressive surgical management [3]. Moreover, the varied aetiology has led to more individualised treatment. Different operative modalities like one stage resection with or without reconstruction [4] and exclusion/diversion [5] have been described as surgical options for this condition in the literature. Surgeons need to be familiar with all options of treatment to allow individualisation of treatment.

In general, the management of oesophageal perforation is dictated by its location, duration, aetiology and underlying oesophageal disease and expertise of the surgeon. We reviewed the management of 35 patients of post dilatation oesophageal perforation seen between 1999 to 2007.

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Patient and methods

The records of 35 consecutive patients with post dilatation oesophageal perforation treated in our institution from 1999 to 2007 were reviewed. The aetiology, management and outcome of the patients were analyzed. Patients treated with in 24 hours of perforation were considered as early intervention group. Those treated after 24 hours were considered as late intervention group. The location of perforation was defined as cervical, thoracic and abdominal. Though initially oesophagogram was used, in recent years the clinical diagnosis of oesophageal perforation is confirmed by computed tomography (CT scan) with oral contrast.

Management

Non-operative management was used in those with minimal septic signs and recent perforation [2]. Pleural collections were drained by chest tubes placement based on computed tomogram.

Operative management comprised resection, drainage, diversion and primary repair [2, 5, 6]. The operative procedure was based on aetiology of perforation, its location, size, presence of underlying disease, duration of perforation and the condition of the patient. Resection by transhiatal route was done in those with neoplasm. Diversion was done by lateral cervical oesophagostomy. Cervical perforations were managed by drainage alone. Collar mediastinotomy, wide pleural space and transhiatal mediastinal drainage was done in patients undergoing drainage. Primary repair was done with reinforcement. Patients subjected to operative management had feeding tube placement performed for alimentation.

Patients were grouped as early and late intervention and outcome analysed based on hospital stay, morbidity and mortality.

Demographics

There were 13 males and 22 females. Age at the time of perforation ranged from 18–63 yrs. The perforation followed bouginage of corrosive stricture in 28(80%), balloon dilatation in 1 (3%) and dilatation of malignant obstruction in 6 (17%) (Table 1). Twenty-four (69%) patients presented early (<24 hrs), 11 (31%) were late (> 24 hrs) presentation.

The site of perforation was cervical oesophagus in 5 patients (14%), thoracic perforation in 25 (72%) (three

malignant) and abdominal perforation in 5 patients (14%) (3 were malignant).

The diagnosis of perforation was confirmed preoperatively with oesophagograms in 9% (3/35) of patients. It was false negative in 4 patients. Computed tomography with contrast was diagnostic in 91% (32/35) of patients.

Sixteen (46%) were referred from outside hospitals and the rest 19 (54%) were from our hospital. Non-operative management was successful in 40% (14/35) patients. Sixty percent patients (21/35) underwent surgical management.

Statistical analysis

The statistical analysis was performed with the SPSS software (version 11.5 for Windows). Clinical variables are given in frequencies with their percentages. The statistical analysis was done by using student's *t*-test and χ^2 test. A *p* value < 0.05 was considered as significant.

Results

Non-operative management

Non-operative management was applied without any deaths in 14 patients (3 cervical, 11 thoracic). All presented early and followed corrosive stricture dilatation. The decision to use conservative management had to be revised in 2 patients. Mean hospitalisation was 9 days $\pm$ 1.44 days.

Operative management

A total of 21 patients (60%) underwent surgical management. Drainage was done in 5, diversion procedure in 10, oesophageal resection in 5 and primary repair in 1.

Drainage of neck, pleural drainage and transhiatal mediastinal drainage, was done in 4 cases and cervical drainage alone in 1 patient. Conventional collar mediastinotomy is best suited for cervical perforation. There was one death in this group. The patient was a late presentation (> 72 hrs) and was moribund. He died of sepsis and multi-organ failure on second day of hospitalisation.

Ten patients with perforation underwent diversion in the form of cervical oesophagostomy (side to side) and drainage. Seven were late presentations and 3 were early. One patient developed persistent oesophagopleural fistula and

Table 1 Aetiology of perforation

Pre-existing disease	Location			No (%)
	Cervical	Thoracic	Abdominal	
Corrosive stricture	5	22	2	29 (83)
Carcinoma	0	3	3	6 (17)
Total	5	25	5	35

patient underwent stapler exclusion of oesophagus, which led to prompt healing of fistula. He recovered after 2 months in hospital.

Five patients were subjected to transhiatal oesophagectomy. All were malignant perforations. Transhiatal resection and reconstruction were performed at the same sitting with gastric advancement through posterior route in 3 and colon interposition in 2. In this group one patient died due to respiratory insufficiency on ninth postoperative day. Two patients with resection and reconstruction developed cervical anastomotic leak and were successfully managed conservatively. Both patients developed anastomotic strictures and are undergoing on demand dilatation.

Primary suture repair of the perforation was done in one patient. In one patient with abdominal oesophageal perforation reinforcement with omental wrap was done.

Patient's subjected to operative management had feeding tube placement performed for alimentation.

Outcome

Mortality

Overall mortality in the entire group was 3 of 35 patients (9%). These 3 patients represent 14% of 21 patients who underwent operative treatment. When analysed, none of the patients treated with in 24 hours died whereas the mortality was confined to the late group ($p=0.02$). All the deaths occurred in patients with pre existing diseases (malignancy 2 and corrosive stricture 1). Deaths were due to sepsis in 2 patients and respiratory insufficiency in one (Table 2).

Morbidity

In this series significant complications occurred in 11 patients (31%). It included pulmonary complications, cervical anastomotic leak, wound infection and oesophagopleural fistula. Pulmonary complications such as pneumonia and atelectasis were common (25%). Postoperative ventilatory support was often required and this was reflected in prolonged hospital stays. Cervical anastomotic leaks developed in 3 patients and were managed conservatively. They developed anastomotic stricture in the follow-up period for which antegrade dilatations were done.

Table 2 Outcome in patients with oesophageal perforation

Outcome	Early	late	p value
Mortality	0	3	$p = 0.001$
Morbidity	7	4	NS
Hospital stay (days)	10	21	$p = 0.001$

NS=not significant

Hospital stay

The mean hospitalisation stay for the entire group of patients was 14 ± 14.7 days. Time from injury to management had a significant influence on hospital stay. Patients intervened late, had a longer stay in the hospital (21.3 ± 25.3 days) ($p=0.05$) than those with early intervention (10 ± 2 days) (Table 2).

Mean hospitalisation was increased in patients undergoing diversion with 24 ± 25 days. Following discharge, 2 patients underwent colon interposition within 6 months due to difficult dilatation. These two patients belonged to the late intervention group. About 23 patients have undergone antegrade dilatation, 2 patients underwent retrograde dilatation and antrectomy for gastric stricture in 1 patient.

Discussion

Controversy continues about treatment of oesophageal perforation, with different authors emphasizing a particular treatment approach. The controversy is also due to variability in causes and underlying disease. Since randomising treatment cannot be done, different modalities are discussed comparing merits and demerits. Selection of treatment for oesophageal perforations must be individualised to the patient, depending on the cause, duration, underlying oesophageal disease, and above all, condition of the patient.

Corrosive acid ingestion is more common in India because acid, being cheaper than alkalis, is more commonly used as toilet bowl cleaners. They are ingested with suicidal intent mostly by young girls [7].

Most of the earlier series have recommended oral contrast oesophagogram as the test of choice. False negative results of 11% to 25% have been reported in the literature [8].

In recent years, we subject the patients to CT neck and thorax with oral contrast after the plain radiographs to diagnose perforation. CT is a sensitive and specific method for oesophageal perforation [9] and is used to guide drainage of pleural collections. This fact is well supported by Vogel et al who had reported a low mortality using CT scan for initial as well as follow up examinations [10]. In the present series, use of CT scan with oral contrast resulted in early diagnosis and intervention leading to a mortality as low as 9%. Non-operative management was used in 14 patients who met the criteria of Cameron [11] and Altorjay [2]. Recent, contained perforations in stable patients with minimal signs and symptoms were subjected to non-operative treatment. We do not use non-operative treatment in malignant perforations. Three were cervical perforations and remaining were thoracic perforations. There was no mortality in this group. We attribute this success to proper case selection and constant clinical monitoring and even with a slight deterioration in the condition of patient, surgery was undertaken.

Non-operative management was used in perforations following bouginage of corrosive stricture where the presence of peri-oesophageal fibrosis was advantageous in limiting the inflammation. Non-operative management of perforation can be applied successfully in selected patients with oesophageal perforations.

Resection was applied to 5 patients in this series, and was reserved for perforations that occurred with oesophageal neoplasms. Due to poor results in post dilatation malignant perforations, we avoid dilatation and favour feeding jejunostomy for nutrition. Though Iannettoni and associates [2] advocated oesophagectomy even if the stricture is a dilatable corrosive stricture for better functional results, we in our institution are inclined towards preservation of oesophagus except in perforations associated with malignancy.

According to Orringer et al [13] the approach for oesophagectomy (transthoracic versus transhiatal) is dictated by the chronicity of the perforation, presence and degree of pleural contamination and surgeon experience. We prefer transhiatal resection because postoperative pulmonary complications are minimal, as most of our patients have compromised lung function and nutrition. The concept of one stage oesophageal resection and reconstruction was initially described by Hendren and Henderson [14]. In the present series 3 patients underwent transhiatal oesophageal resection with cervical oesophagogastric anastomosis in 3 patients with mortality rate of 20%. We attempted immediate reconstruction since the patients general condition was well preserved and with no significant sepsis.

Ten patients underwent diversion procedure. All patients improved promptly and perforation healed. Two patients underwent colon interposition after 6 months. Chau-Hsiung et al [4] advocated T-tube cervical oesophagostomy and dextran ligature occlusion below the oesophagostomy. The author argues that side to side oesophagostomy does not provide complete diversion and a second operation is necessary to close the oesophagostomy. In this series, stapler exclusion (Ethicon TLH 30 stapler) was used in one patient complicated by oesophagopleural fistula following diversion alone. This staged procedure healed the fistula with spontaneous recanalisation of oesophagus. The authors feel that stapler exclusion recanalises spontaneously restoring intestinal continuity and avoids the need for second operative procedure as has been reported earlier [15].

In our series lateral oesophagostomy provided adequate diversion and only 2 patients required take down of oesophagostomy under local anaesthesia. Since the patients were undergoing on demand dilatation, the oesophagostomy retracted and closed spontaneously. Two patients developed stricture at oesophagostomy site and treated by self dilatation with foley catheter [16].

This technique of diversion is simple and has the advantage of preserving the continuity of oesophagus. Kiernan et al described that diversion avoided complicated reconstructive efforts [17].

We agree with Yeo et al [18] that transhiatal oesophagectomy in patients with malignant perforation is advantageous. However in patients without malignancy, we think that the oesophagus should be salvaged and preserved since native oesophagus is the best conduit. Good outcome follows from rapid diagnosis and early treatment. Of the 35 patients with perforation we had salvaged the oesophagus in 28 patients.

Adequate debridement and wide drainage are essential adjuncts to successful treatment of perforation [18]. Drainage with soft tubes is sufficient for cervical injuries. When thoracic oesophagus perforates, dependent intercostal drainage of pleural space and transhiatal mediastinal drainage is necessary. Feeding jejunostomy should be combined with drainage, to ensure early nutrition and consequent tissue healing.

Conclusion

In conclusion we present our experience of 35 patients with oesophageal perforation following dilatation. It confirms that mortality has decreased considerably in recent years due to early intervention. Non-operative management of perforation can be used successfully in patients with early diagnosis and minimal signs. Preservation of native oesophagus was attempted in all patients except in malignancy.

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