Outcomes following Boerhaave's syndrome

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ABSTRACT

INTRODUCTION Boerhaave's syndrome is associated with high mortality and morbidity. This study aimed to assess outcome following treatment in a specialist upper gastrointestinal surgical unit.

METHODS Patients were identified from a prospectively collected database (Lothian Surgical Audit) and their records reviewed. Primary outcomes were mortality and serious morbidity. Secondary outcomes included time to theatre, operation undertaken and length of hospital stay.

RESULTS Twenty patients with Boerhaave's syndrome were identified between 1997 and 2011. Four patients (20%) died in hospital. The mean time to theatre from symptom onset was 2.4 days. This was 7.3 days in the patients who died compared with 1.5 days in survivors. Five patients underwent primary repair of rupture, eleven underwent direct closure over a T-tube and one rupture was irreparable. Three patients were managed non-operatively and all survived. Outcomes were similar for the different surgical groups. There was one death following primary closure (20%) and two after T-tube drainage (18%). The mean length of hospital stay was 35.7 days after T-tube drainage and 20.5 days after primary repair. The 3 patients with small, self-contained leaks had a mean length of stay of 5.7 days.

CONCLUSIONS Aggressive surgical management with direct repair is associated with good survival in patients with Boerhaave's syndrome. Delayed time to theatre is associated with increased mortality. Patients with small, contained leaks without signs of sepsis can be managed non-operatively with a good outcome.

KEYWORDS

Boerhaave's syndrome – Surgery – Oesophageal rupture

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First described by Dr Herman Boerhaave in 1724,¹ Boerhaave's syndrome is an uncommon condition comprising spontaneous oesophageal rupture. It is caused by forceful emesis against a closed cricopharyngeus,² and carries a high mortality and morbidity if not detected and treated promptly.⁵ Mortality rates exceed 90% if untreated⁴ and have been reported up to 40% even after appropriate surgical intervention.⁵ This is due primarily to overwhelming sepsis associated with mediastinal and pleural contamination.

The standard management for patients presenting early is thoracotomy with washout of the pleural cavity. The oesophageal tear is most commonly closed primarily or over a T-tube⁵ to create a controlled fistula. Non-operative management has been reported in selected cases without pleural contamination or where there has been a delay in presentation.^{6–8} With the increasing trend of subspecialisation, this study aimed to analyse outcomes in patients with Boerhaave's syndrome who were treated in a specialist oesophagogastric surgical unit.

Methods

All patients admitted to the Royal Infirmary of Edinburgh with spontaneous oesophageal rupture between 1997 and 2011 were identified from a prospectively collected database (Lothian Surgical Audit). Patients with causative mechanisms (eg iatrogenic ruptures) were excluded, as were patients with partial-thickness oesophageal tears. Presenting symptoms, initial diagnosis, investigation, time to theatre, operation undertaken and length of hospital stay were noted. Primary outcomes were mortality and chronic morbidity following discharge from hospital.

Spontaneous oesophageal rupture was defined as complete disruption of the oesophageal wall without a penetrating injury.¹ This series included patients referred from other hospitals who were confirmed to have spontaneous oesophageal rupture and who were deemed fit for transfer.

Following initial resuscitation and chest tube drainage of any hydropneumothorax, primary surgical management was thoracotomy and washout with primary repair (if sur-

Table 1 Presenting complaint of patients with Boerhaave's syndrome. Information was only available for 17 patients. Documentation was not available for 3 patients transferred from other hospitals.

Presenting complaint	Number of patients (n=17)
Abdominal pain and vomiting	9
Chest pain	2
Haematemesis	3
Back pain	2
'Flu-like' symptoms	1

Table 2 Initial working diagnosis by the admitting team in the accident and emergency department. This highlights the range of conditions that can be confused with Boerhaave's syndrome, contributing to the delay in management.

Initial diagnosis	Number of patients (n=20)
Boerhaave's syndrome	9
Gastrointestinal perforation	6
Pancreatitis	1
Abdominal aortic aneurysm	2
Meningoencephalitis	1
Food bolus	1

gery took place within 48 hours of symptom onset) or closure over a T-tube (if surgery took place after 48 hours). All patients had a feeding jejunostomy placed at the time of surgery and nasogastric drainage.

Postoperatively, patients received broad spectrum antimicrobials and supportive care on a critical care unit. Failure to progress or deterioration was investigated with contrast enhanced computed tomography (CT). Radiological drainage was used to target further collections.

An aggressive non-operative management approach was used as the primary treatment for selected patients with contained oesophageal ruptures not reaching the pleura.

Results

Twenty consecutive patients with Boerhaave's syndrome were identified. Ten were female and the mean age was 57 years (range: 20–85 years). The mean age in survivors was 52 years, compared with 77 years in those who died. Fourteen patients were admitted directly to the Royal Infirmary of Edinburgh and six were transferred from other hospitals.

Preoperative management

All patients presented with a history of vomiting prior to admission. Nine patients presented with abdominal pain and two with chest pain. One patient presented only with 'flu-like' symptoms (Table 1). Only two patients presented with Meckler's triad of surgical emphysema, chest pain and vomiting.

Table 3 Imaging undertaken for patients with Boerhaave's syndrome. Patients underwent multiple imaging. Computed tomography and water soluble swallow are the 'gold standard'. Endoscopy was most commonly carried out in theatre prior to surgery to image the defect more clearly. Laparotomy was carried out on three patients with signs of peritonitis and viscus rupture.

Imaging undertaken	Number of patients (n=20)
Chest x-ray	14
Computed tomography	8
Upper gastrointestinal endoscopy	8
Water soluble swallow	5
Laparotomy	3

Oesophageal perforation was included in the differential diagnoses of only nine patients at the time of initial presentation to hospital. A variety of differential diagnoses were documented for the other patients (Table 2).

Patients underwent various imaging techniques, detailed in Table 3. CT led to the diagnosis in nine patients, upper gastrointestinal endoscopy in three patients, chest x-ray in two patients and water soluble contrast swallow in four patients. Flexible gastroscopy was performed on the operating table in 12 of the 16 patients managed operatively, and confirmed the site and extent of the rupture in all cases.

Definitive management

The mean time to theatre was 2.4 days from symptom onset (range: 12 hours – 15 days). This fell from 7.5 days (range: 1–15 days) in the deceased group to 1.5 days in survivors (range: 12 hours – 6 days). There was no difference in time to theatre between those who went on to develop chronic morbidity and those who did not. No patients waited longer than 24 hours for surgery after arrival in our unit and all delays longer than this related to delayed diagnosis in other departments or hospitals.

Sixteen patients underwent operative repair (primary closure in five patients and closure over a T-tube in 11 patients). All these patients had a feeding jejunostomy placed through a mini-laparotomy and bilateral chest drainage. One patient went for a diagnostic laparotomy but owing to the size of the tear and the poor clinical condition of the patient, definitive surgery was not thought suitable and the patient received palliative care only. The two definitive surgical groups had similar outcomes: mortality was one in five patients (20%) in the primary closure group and two in eleven patients (18%) with T-tube drainage. The mean length of stay was shorter in the primary repair group: 20.5 days (range: 18–40 days) versus 35.7 days (range: 18–85 days).

Three patients were managed non-operatively owing to small, self-contained leaks, which did not breach the mediastinal pleura, and all recovered fully with no subsequent readmissions. These patients were managed with aggres-

sive medical management and close observation. This involved broad spectrum antibiotics, proton pump inhibitors and nasogastric decompression. Enteral nutrition was maintained using nasojejunal feeding. The mean hospital stay was 5.7 days in this group and there were no in-hospital deaths.

Postoperative management

The overall mean hospital stay was 30.0 days (range: 1–85 days). The overall in-hospital mortality rate in this series was 20% (4 of 20 patients). The main contributing factor to three of these deaths was sepsis leading to multiorgan failure. The fourth patient was deemed unsuitable for definitive surgery following a laparotomy and so received palliative care only.

Ten of the sixteen survivors experienced no further oesophageal morbidity after discharge. Two survivors in the primary repair group and four survivors following T-tube drainage developed chronic problems after discharge from hospital. Three patients developed dysphagia owing to oesophageal strictures, which required repeated dilatation. One patient developed a recurrent empyema that required multiple surgical interventions including second rib resection. One patient developed endocarditis secondary to sepsis, which required valve replacement. The remaining patient had frequent readmissions with vomiting.

Discussion

Boerhaave's syndrome is an uncommon condition, with only 20 patients seen in a population of over 900,000 over 14 years. Mortality rates in this study compare favourably with those quoted in the literature.^{9,10} Rapid surgical intervention is widely recommended, with primary repair where possible.^{11–14} In this study, all patients managed surgically underwent oesophageal repair, either primarily or with T-tube drainage. Oesophageal resection was not performed in any patient. A feeding jejunostomy and appropriate chest drains were sited intraoperatively in all patients.

Surgery was not undertaken in three patients who were clinically stable, with a contained leak, as advocated by others.¹¹ These patients were treated with broad spectrum antibiotics, proton pump inhibitors and close observation. All of these patients recovered fully, without requiring operative management.

As suggested by others,^{9,10} many patients in our series presented with vague symptoms. This can result in a diagnostic challenge, leading to the potential of an oesophageal rupture being overlooked. In our series, only nine patients had spontaneous oesophageal rupture included in their initial list of differential diagnoses by emergency department staff. This can lead to further delay before definitive treatment and is an important learning point for anyone managing acute surgical (and medical) admissions.

Most patients in this series received a chest x-ray followed by either contrast CT or a water soluble contrast swallow, as is widely recommended.^{15,16} When the diagnosis is unclear, contrast enhanced CT is preferred as it will exclude other causes such as vascular emergencies. The role

of gastroscopy is becoming more common among specialist upper gastrointestinal surgeons, either as a diagnostic test when other modalities have been equivocal or before surgery in order to better localise the site and size of the rupture.

Diagnosis was not delayed by more than 24 hours after admission to our unit in any patient in our series although there was clearly some delay in reaching the diagnosis and transferring patients from other units and hospitals. Given that Boerhaave's syndrome frequently presents atypically,¹⁷ unless it is considered in the differential diagnoses, further delays can occur. Once suspected, the management algorithm proposed by Griffin *et al*¹⁸ should be followed.

The overall mean time to theatre was 2.4 days from symptom onset in this series. It was higher in those patients who did not survive, as reported in other studies.¹⁹

Chronic morbidity is common after Boerhaave's syndrome and 38% (6/16) of surviving patients in this series went on to experience further oesophageal morbidity after discharge. There was no apparent difference between those who underwent primary repair or repair over a T-tube. Notably, there was no difference in time to theatre between patients who developed chronic morbidity and those who did not.

This series is limited by the relatively small number of patients and the retrospective nature of the analysis. However, the results do support the view that early diagnosis and surgical intervention, when appropriate, of spontaneous rupture of the oesophagus is associated with a good chance of survival. The key is maintaining vigilance and suspicion of the diagnosis when assessing both medical and surgical emergency admissions.

Conclusions

The successful management of patients with Boerhaave's syndrome relies on early diagnosis and surgical intervention unless the perforation is small and contained, when non-operative treatment can be performed. Primary repair or closure over a T-tube are associated with similar outcomes and postoperative nutritional support using jejunostomy feeding tubes is important. Further improvements are likely to follow earlier diagnosis and referral to a specialist upper gastrointestinal team. Boerhaave's syndrome should be considered in the differential diagnoses of acutely unwell medical and surgical emergency admissions.

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