

Thoracoscopic repair of instrumental perforation of the oesophagus: first report

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Abstract

Background Perforation of the oesophagus is a life-threatening condition requiring early recognition and repair to prevent mediastinitis and death. Primary closure with mediastinal drainage is recognised as the treatment of choice for patients presenting within 24 hours. Many are frail, however, and unsuitable for major surgery.

Aim To report the first case of thoracoscopic repair of the oesophagus for oesophageal perforation following instrumentation.

Methods Flexible endoscopy revealed a 10cm perforation in the right lower oesophagus. With the gastroscope in the oesophagus, four thoracoports were introduced. Using suction and irrigation, the pleural cavity was suctioned free of debris and a 10cm longitudinal tear of the right lateral aspect of the oesophagus was repaired using interrupted polyglactin sutures through all layers.

Results The patient tolerated the procedure well and made an uncomplicated recovery.

Conclusion The uncomplicated recovery of this frail patient without need for blood transfusions or assisted ventilation supports the notion that the thoracoscopic approach may have significant advantages. With increased experience and technical refinements there should be less reluctance to refer these patients for earlier definitive surgical repair.

Introduction

Perforation of the oesophagus is a life-threatening condition requiring early recognition and repair to prevent mediastinitis and death. Primary closure of the defect with mediastinal drainage is recognised as the treatment of choice for patients presenting within 24 hours of perforation. This complication more often arises in frail elderly patients with co-morbid processes and where thoracotomy carries significant morbidity and mortality.

To date, there have been no reported cases of thoracoscopic repair of the oesophagus for oesophageal perforation following instrumentation. There are two case reports of thoracoscopic repair for spontaneous rupture; one of which had a leak following the surgery. The authors report on the first successful case of thoracoscopic repair of the oesophagus following iatrogenic perforation (GC O'S).

Case report

A frail 80-year-old woman was transferred from another centre to which she had presented with complete oesophageal obstruction due to a piece of meat. Flexible and rigid oesophagoscopy had been performed and the foreign body at 30cm had to be removed piecemeal via a rigid oesophagoscope. The following day, she complained of chest and abdominal pain. Chest x-ray and pleural aspiration showed right haemopneumothorax. A chest drain was inserted and the pneumothorax resolved. A water-soluble contrast swallow showed a leak of contrast from the oesophagus at the carina into the right pleural cavity (see Figure 1).

Following emergency transfer to the authors' service 36 hours post-oesophagoscopy, her pulse rate was 94/min, her blood pressure was 128/70mmHg and her respirations 26 per minute. She was receiving intravenous fluids and was on 28%

oxygen via facemask.

Following induction of anaesthesia, a double lumen endobronchial tube was introduced for selective single-lung ventilation and she was placed in the left lateral position. Flexible endoscopy revealed a 10cm perforation in the right lower oesophagus. The gastroscope was left in the oesophagus to facilitate intra-operative definition and insufflation, as required. Once the right lung was collapsed four thoracoscopic ports were introduced. One port was for a 10mm end-viewing camera, one other 10mm port was placed for a lung retractor. Two other 5mm ports were used for operating instruments (see Figure 2).

Using suction and irrigation, the pleural cavity was suctioned free of debris. The lung was retracted medially and a 10cm longitudinal tear of the right lateral aspect of the oesophagus was visualised containing the tip of the gastroscope (see Figure 3). The rupture was repaired using interrupted polyglactin (3-O Vicryl, Ethicon) sutures through all layers of the oesophageal wall and associated mediastinal pleura (see Figure 4). Insufflation of air from the intra-oesophageal gastroscope was used to check the suture line. Further sutures were placed at areas where leakage of air was seen. At conclusion, the repair was seen to be airtight. It was possible to complete the repair without needing to mobilise the oesophagus from its bed.

Two intercostal chest drains were inserted via the thoracoscopy port incisions. These were respectively placed under video assistance, anterior to the lung apex and posterior to the lung base in the right pleural cavity, and were connected to underwater sealed drains. In order to maintain an empty oesophagus and a dry suture line, a double lumen drain (Shirley type) was placed via a pharyngotomy into the distal oesophagus and was maintained on continuous suction at 10 to 15cm water for five days. She tolerated the procedure well and

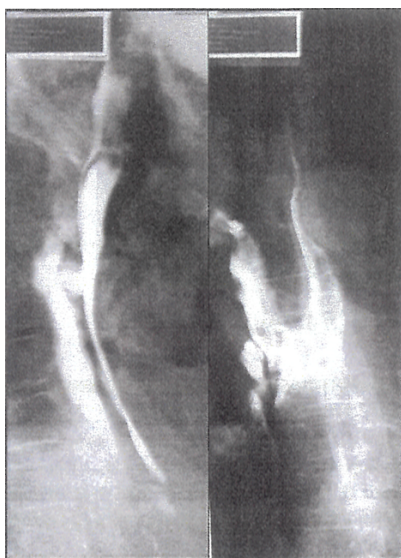


Figure 1. Extravasation of water-soluble contrast from oesophagus

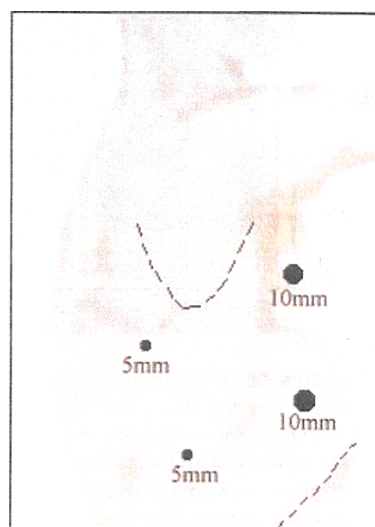


Figure 2. Position of thoracoscopic port sites for videoendoscopy, lung retraction and suturing

was transferred to intensive care for 48 hours. Post-operative assisted ventilator therapy was not necessary and she made an uncomplicated recovery. She commenced liquids on day seven.

A water-soluble contrast swallow study 10 days after surgery was normal and without extravasation of contrast (see Figure 5). She was discharged home at 14 days — at this stage she was on an unrestricted diet and functioned independently.

Discussion

Oesophageal perforation is a difficult management problem. Frequently the patients are elderly with significant co-morbid processes.^{1,2} In addition to the pain of the thoracotomy incision, the post-operative morbidity is often compounded by fractures of fragile ribs sustained during retraction. The trauma of the obligatory transthoracic repair superimposed on the effects of pre-existing mediastinitis makes an already frail patient vulnerable to septic complications. Many require protracted periods of intensive therapy, prolonged convalescence and the mortality rates are significant. Complication rates increase precipitously when intervention is delayed beyond 24 hours.

Due to the morbidity associated with thoracotomy, there remains controversy regarding conservative management versus surgical repair. Surgical repair is obligatory where the perforation communicates freely with the pleural cavity. Some

advocate non-operative management particularly where the perforation is confined by the mediastinal pleura.^{3,5} In these circumstances, surgery is reserved until there is clinical deterioration. Salvage surgery then is associated with very high mortality rates as the systemic septic process is already established. The overall mortality rates for oesophageal disruption range from 12 to 36% in reported series,^{1,3,6,7} however this ranges from 21% with primary closure to 50% when treatment consists of drainage.¹

The minimally invasive technique of thoracoscopic repair and thoracic irrigation is well suited to oesophageal perforation and thoracic contamination with foregut secretions and food products. The authors report the surgical technique they used for video-thoracoscopic repair of an iatrogenic perforation of the oesophagus. They found intra-operative endoscopy of the oesophagus invaluable for immediate recognition of the perforation and for testing the integrity of the subsequent repair. Continued suction was applied to the oesophageal lumen postoperatively on empirical grounds to maintain, while healing, a dry and unstressed anastomosis. They did not support repair with transposed tissues; since it was not necessary to mobilise the oesophagus from its bed, it was possible to incorporate the mediastinal pleura into the repair. The uncomplicated recovery of this frail patient without need for blood transfusions or assisted ventilation therapy supports

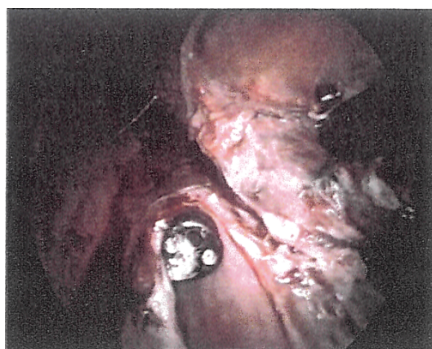


Figure 3. Gastroscope in oesophageal rupture

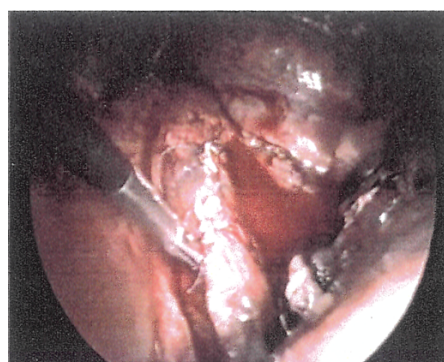


Figure 4. Repaired oesophageal rupture

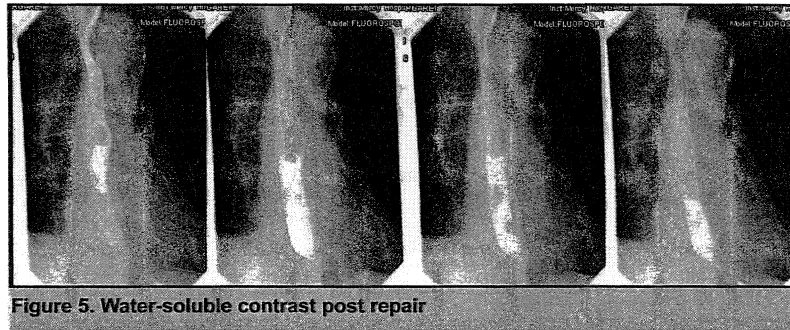


Figure 5. Water-soluble contrast post repair

the notion that the thoracoscopic approach may have significant advantages over the open technique. The authors are unaware of a previous report of thoracoscopic repair of an iatrogenic perforation of the oesophagus. To date, there have been two other reported cases of thoracoscopic repair of spontaneous oesophageal ruptures — Boerhaave syndrome.^{9,10} It is likely that with increased experience and further refinements of technique there would be less reluctance to refer these patients for earlier definitive surgical repair.

Key technical steps

Intra-operative

- Selective bronchial intubation for single lung anaesthesia
- Intra-operative endoscopy to visualise perforation and assess co-existing pathology
- Optimal siting of four ports for telescope, retractor and suture instruments
- Debridement of thoracic cavity
- Closure of perforation by interrupted sutures
- Oesophageal air insufflation to check integrity of repair

Post-operative

- Intercostal drains
- Continuous oesophageal tube suction to prevent anastomotic stress

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