Oesophageal rupture: a rare complication of blunt trauma
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Patient: 12 years, male

Clinical History:
A 12-year-old boy fell from the third floor of his school building.

Imaging Findings:
A 12-year-old boy was brought to the hospital following a fall from the third floor of his school building. Although he did not sustain any life threatening injuries, he was having mild respiratory distress. He also complained of severe pain in the chest and upper abdomen. No significant osseous injury was documented. His chest radiograph however revealed a pneumothorax on the left side, for which an intercostal drainage tube was inserted (Fig. 1). The tube continued to drain a significant amount of fluid even on the third day following his injury with worsening of the clinical symptoms. This raised the suspicion of a hollow viscus injury. A contrast oesophagography with dilute water soluble non-ionic contrast media confirmed an oesophageal perforation (Fig. 2). CT was performed subsequently which demonstrated bilateral pleuro-oesophageal fistulae with extension of the orally administered contrast into the pleural spaces bilaterally (Fig. 3, 4). Associated bilateral pulmonary consolidation and left sided hydropneumothorax was present (Fig. 5). The patient was initially managed conservatively with intercostal tube drainage and broad spectrum antibiotics. As the patient continued to deteriorate, surgical repair of the esophageal tear was performed. Inspite of a second revision surgery, the patient died of disseminated intravascular coagulation (DIC) secondary to overwhelming sepsis.

Discussion:
Oesophageal perforation secondary to blunt trauma to the chest is extremely rare, with limited case reports available in the medical literature (1-4). The most common segment to get involved is the cervical oesophagus. Thoracic oesophagus involvement is quite rare, and most of these injuries are encountered in adults following high speed road traffic accidents (2,3). In paediatric population these injuries are highly uncommon accounting for < 1% of all the oesophageal injuries. The more common causes of oesophageal injury in paediatric patients include penetrating or iatrogenic trauma. The mechanism of thoracic oesophageal rupture in blunt trauma remains unclear. The most commonly accepted theory, similar to the mechanism in Boerhaave syndrome, is a sudden elevation of intraluminal oesophageal pressure (1-3). It is proposed that air under pressure forces the crico-pharyngeal sphincter to give way, leading to rapid dilatation of the oesophagus, and with a closed gastro-oesophageal sphincter this high pressure results in oesophageal rupture. Raised intraluminal pressure and resultant oesophageal rupture can also be sequential to expulsion of gas from the stomach into the oesophagus through the gastro-oesophageal junction, against a closed glottis. It is the distal third thoracic oesophagus on the left side i.e. the weakest portion, which gets perforated most commonly. Other proposed mechanisms include compression of oesophagus between the sternum and vertebrae, or disruption of the oesophageal vasculature resulting in ischemic insult and late oesophageal perforation (2,3).

These patients can present with non specific complaints and often a high degree of clinical suspicion is required for
clinching the correct diagnosis (4). Clinical symptoms may range from chest pain, dysphagia, odynophagia, respiratory distress, pyrexia to extensive subcutaneous emphysema. Plain radiograph of chest may be non-contributory or at times may reveal vital findings such as pneumothorax, pleural effusion, hydro-pneumothorax, pneumomediastinum or subcutaneous emphysema (4). In co-operative and clinically stable patients the primary imaging evaluation includes oesophagography using water-soluble contrast medium (3). Since barium swallow has a greater sensitivity for the detection of small perforations, it may be used in patients where there is no leak demonstrable with water soluble contrast. CT is the procedure of choice to assess the sequelae of oesophageal rupture. It is especially useful in sick patients where contrast oesophagography is not feasible. CT can also be used to exclude associated thoracic, pulmonary and osseous injuries. CT findings of oesophageal injury include oesophageal wall thickening, peri-oesophageal haematoma or gas, contrast material extravasation, loculated fluid collections in the mediastinum, and mediastinal inflammation (3,5). Ancillary findings such as pneumo or hydro-pneumothorax, pneumomediastinum, pleural effusion and pulmonary consolidation may be present. There are no well defined guidelines for the management of these patients. Therapeutic management needs to be individualised depending upon the cause and site of rupture, associated injuries and overall condition of the patient (2,3).

Treatment can be either conservative or surgical (1-4). Surgical options include primary oesophageal repair within 48 hours, oesophageal resection, exclusion, and chest drainage with or without oesophageal repair (1-3). In general, most cervical oesophageal perforations unlike intrathoracic perforations can be treated conservatively (2).

Differential Diagnosis List: Esophageal rupture after a fall from height

Final Diagnosis: Esophageal rupture after a fall from height

References:

Description: Chest radiograph shows hydro-pneumothorax on the left side. Intercostal drainage tube is seen in situ. No overt bony injuries are evident. Origin:
Figure 2

Description: Contrast oesophagography demonstrates bilateral contrast extravasation suggestive of oesophageal rupture. Origin:
Figure 3

Description: Left side hydropneumothorax and basal consolidation are well visualised on this lung window setting. Origin:
**Figure 4**

*a*

**Description:** Axial CT thorax demonstrates peri-oesophageal air which is extending into the bilateral pleural spaces. **Origin:**

*b*

**Description:** Axial CT thorax demonstrates peri-oesophageal air which is extending into the bilateral pleural spaces. Note is made of bilateral pleural effusion. **Origin:**
Description: Lung window settings confirm peri-oesophageal air extension into bilateral pleural spaces.
Origin:
**Figure 5**

**a**

**Description:** Orally administered diluted water soluble contrast delineates bilateral oesophago-pleural fistulae. **Origin:**

**b**

**Description:** Orally administered diluted water soluble contrast delineates bilateral oesophago-pleural fistula with pooling of contrast in the bilateral pleural spaces. **Origin:**