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## Oesophageal Perforation: What Was The Culprit?

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**Abstract**— Oesophageal perforation is a rare clinical situation. However, it is associated with high morbidity and mortality rate. A 39-year-old lady with underlying epilepsy was admitted to hospital for alleged accidental ingestion of broken dentures while sleeping. She underwent emergency direct laryngoscopy, oesophagoscopy and oesophagogastroduodenoscopy. However, no foreign body was found. She was subsequently discharged home. Two days later, the patient presented again with dyspnoea, fever and chest discomfort. A chest radiograph showed bilateral pleural effusion, left pneumothorax and right mediastinal shift. A suspicion of oesophageal perforation was raised. Upper gastrointestinal study revealed an oesophageal perforation. Under conservative management, her condition was complicated with thoracic empyema. She subsequently underwent video assisted thoracoscopy and decortication. Fortunately, after one month of hospitalization, she regained full recovery. In conclusion, any chest symptoms which arise after oesophagogastroduodenoscopy should be dealt with extra caution. Patients outcome after oesophageal injury are time dependent, thus any delay in obtaining radiological assessment should be avoided.

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### 1 INTRODUCTION

Almost half of the iatrogenic oesophageal perforation cases are associated with endoscopic instrumentation of the upper gastrointestinal tract.[1, 2] Symptoms related to oesophageal perforation can be variable and non-specific. Patients presenting with complaint of acute and sudden onset of chest pain, shortness of breath, vomiting or fever after an endoscopic examination, should raise a high clinical suspicion of oesophageal perforation.

This case report illustrates some of the main challenges in diagnosing oesophageal perforation. [3] A high index of suspicion and timely management of oesophageal perforation are the keys to ensure a good outcome.

### 2 CASE REPORT

We present a case of 39-year-old lady with underlying epilepsy since childhood. She was compliant to anti-epileptic treatment and had approximately three episodes of seizure every month (brief episodes of lip twitching only).

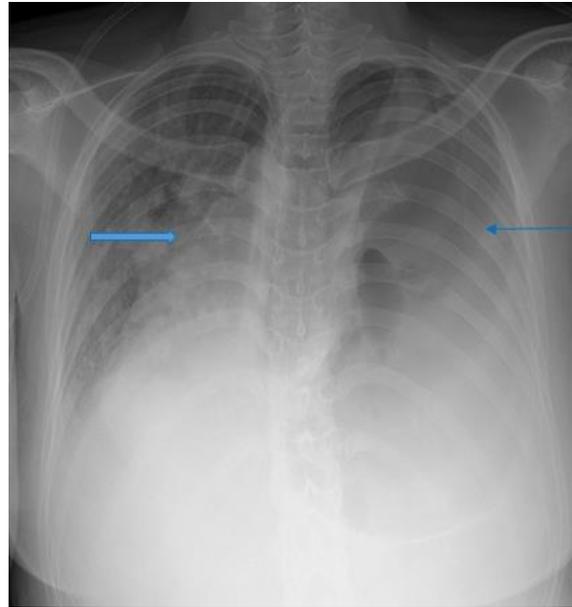
The patient had been wearing dentures for the past 26 years. On the night of the incident,

she awoke from sleep due to foreign body and choking sensation in the throat. She then realised that part of her dentures were missing (Figure 1) and had been accidentally swallowed. She had a few episodes of vomiting but did not feel any difficulty in breathing. She visited a nearby hospital the next morning and underwent an emergency direct laryngoscopy and oesophagoscopy. No foreign body was found. She was then referred for oesophagogastroduodenoscopy. Endoscopic findings showed reflux oesophagitis and lower oesophageal ulcer with slough. There was no evidence of foreign body. The patient was then discharged home.

Two days later, the patient presented to our hospital with complaints of chest discomfort and shortness of breath. She claimed shortness of breath started after the endoscopic procedure and worsened at home. Clinically, the patient was pink, alert, conscious, afebrile and her blood pressure was normal. However, she was tachypnoeic and tachycardic. Oxygen saturation was 94% under room air and 100% under ventimask oxygen 35%. Lung auscultation revealed reduced air entry at left hemithorax.

Arterial blood gas showed Type 1 respiratory failure with pH 7.33, pO<sub>2</sub> 68.8, SPO<sub>2</sub> 94.2, PCO<sub>2</sub> 29.3 and full blood count showed raised total white count (19.9 x 10<sup>9</sup> /L). The rest of the blood investigations were normal.

An urgent chest radiograph showed bilateral pleural effusion with left pneumothorax and shifting of mediastinum to the right (Figure 2). A suspicion of traumatic oesophageal perforation was raised. A left chest tube was inserted, and one liter of serous fluid was drained. An urgent fluoroscopic upper gastrointestinal study was performed using low osmolar contrast media (Omnipaque 320mg/L). It showed leakage of contrast from distal third of oesophagus, approximately two centimeters above gastro-oesophageal junction into the left thoracic cavity. Contrast is further seen tracking supero-laterally and outlining the left hemidiaphragm. (Figure 3). A complementary non-contrast enhanced computed tomography (CT) thorax was done, and the finding was consistent with posterior lateral perforation of the left-sided wall of oesophagus, at the level of T10. Left hydropneumothorax was also detected (Figure 4).



**Figure 2.** Initial chest radiograph in PA projection, demonstrating bilateral pleural effusion (more on the left) with left pneumothorax (*line arrow*) and mediastinal shift to the right (*solid arrow*). PA, Posteroanterior



**Figure 1.** A picture of patient's denture showed part of the denture was broken and missing.



**Figure 3.** A fluoroscopic upper gastrointestinal study in PA projection shows leakage of contrast from distal third of oesophagus (*line arrow*), approximately two centimeters above gastro-oesophageal junction into the left thoracic cavity. Contrast is further seen tracking supero-laterally and outlining the left hemidiaphragm (*solid arrow*). PA, Posteroanterior

(1)



**Figure 4.** A complementary non-contrast enhanced CT thorax showed postero-lateral perforation of left side wall of oesophagus (line arrow) at level of T10 complicated with left hydropneumothorax (solid arrow). Right pleural effusion is also seen.  
CT, computed tomography

Patient was subsequently admitted to surgical high dependency unit and planned for conservative management including oxygen therapy, total parenteral nutrition and antibiotics. Culture of pleural fluid isolated sensitive strain of *Staphylococcus aureus* which was sensitive to antibiotics.

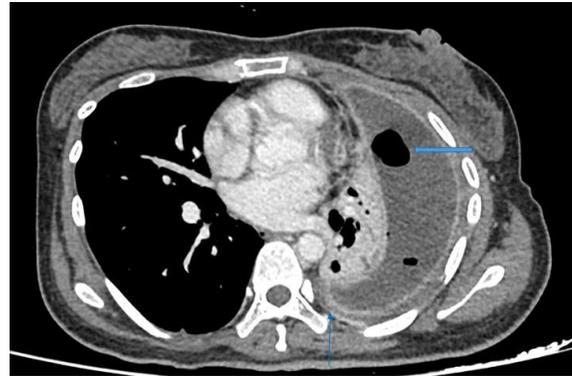
Two weeks later, repeated contrast enhanced CT thorax showed that contrast extravasation was no longer present and there was resolution of right pleural effusion. However, there was persistent left hydropneumothorax with infected effusion, leading to thoracic empyema (Figure 5). Besides, the patient did not fully improve clinically. She developed fever subsequently with a rise in the level of C-reactive protein (from 85 to 158mg/L). Pleural slough culture showed growth of *Pseudomonas aeruginosa*. Thus, she was arranged for video assisted thoracoscopic surgery and decortication.

After treated for one month in the ward, the patient passed out the foreign body in her faeces, which was her broken denture (Figure 6). Her condition improved, she was able to resume oral intake and able to wean off oxygen support. Upon discharge from hospital, she was well with no active complaints.

### 3 DISCUSSION

Oesophageal perforation is a rare but potentially fatal condition. Thoracic, abdominal and cervical esophageal perforation carries a mortality rate of 27%, 21% and 6% respectively.[4] Delayed diagnosis and treatment increases this rate. Death rate can be 10-25% even after proper treatment started within one day of diagnosis, and

mortality can be as high as 40-60% if treatment is received after two days.[4] In order to understand the severity of the condition, one need to understand the anatomy of oesophagus.



**Figure 5.** Contrast enhanced CT thorax in axial view, two weeks post-presentation showing split pleura sign (line arrow) consistent with empyema with air locules within (solid arrow). There was no evidence of contrast extravasation. It also showed resolution of right pleural effusion.



**Figure 6.** The missing part of denture was found in the patient's faeces one month later.

Oesophagus is divided into four regions namely cervical, thoracic, lower thoraco-esophageal junction and abdominal. Several factors predispose oesophagus to perforation. The first one being its location close to the extrinsic structures at the level of cricopharyngeal muscle, aortic arch, left main bronchus and diaphragmatic hiatus. Besides, it is near to the intrathoracic organs such as thyroid, trachea, aorta and spine. This puts the oesophagus at a higher risk due to any disease process, diagnostic and therapeutic procedures involving these organs. Besides, its relatively poor blood supply increases the probability of getting an injury or pressure necrosis. Oesophagus is also vulnerable due to its lack of serosal layer, leaving no barrier

between oesophageal content and thoracic cavity after an injury.[1] This may lead to mediastinitis, pleuritis, subsequently sepsis and death especially if it's not identified on time.

Oesophageal perforations can be divided into iatrogenic and non-iatrogenic. Iatrogenic injuries comprises majority of the cases, with endoscopic injury being the most common cause [1] although the relative incidence of oesophageal injury during endoscopy is low (<0.04%).[1] Non-iatrogenic injuries are usually associated with spontaneous perforations secondary to foreign bodies ingestion, food impaction and trauma.

Clinical presentation of oesophageal perforation varies and can be non-specific. It depends on the site of perforation and time of presentation. Pain is the cardinal symptom, which is sudden in onset and directly related to site of perforation. It is present in 70-90% of patients.[2] Cervical perforation results in dysphonia, hoarseness, dysphagia, and subcutaneous emphysema. Neck stiffness may arise due to oesophageal attachment to prevertebral fascia causing limited spread of oropharyngeal soilage.[2] Thoracic perforations are associated with chest pain with radiation to shoulder or back, shortness of breath, hematemesis, nausea and vomiting. In the abdomen, pain at subxiphoid area may represent anterior perforations and dull aching epigastric pain radiating to the back occurs in posterior perforation[2] Peritonitis is another sign related to intra-abdominal perforations.[5] Signs of progressing infection such as tachycardia, breathlessness, fever and sepsis occurs with delayed presentation (>24 hours after perforation).[5] The triad of chest pain, subcutaneous emphysema and vomiting is known as Mackler triad.[6] These signs and symptom should raise a high clinical suspicion of oesophageal perforation. Missed diagnoses made at autopsy have been reported in 17% of the cases.[6]

Clinical diagnosis of oesophageal injury should be confirmed with radiologic evidence. Patients outcome after oesophageal perforation are time dependent, thus any radiological assessment should be done earliest possible. Firstly, a plain chest radiograph should be performed on posteroanterior and lateral projections. Chest radiography demonstrates abnormality in 90% of oesophageal perforations.[5] Most common findings on plain radiograph include pleural effusion, pneumothorax, pneumomediastinum, atelectasis, subdiaphragmatic free air and subcutaneous

emphysema. A lateral neck radiograph may demonstrate air in prevertebral fascial plane in cervical oesophageal perforation. Upper gastrointestinal study is the preferred initial imaging used for diagnosis of oesophageal perforation due to its superior delineation.[5] Sensitivity of 60-70% is expected in diagnosis of oesophageal perforation using water soluble contrast media like gastrograffin.[5] Caution should be taken in use of Gastrograffin as it can cause acute pulmonary oedema in patients at risk of aspiration. A negative initial upper gastrointestinal study should be repeated within 4-6 hours later if clinical suspicion remains.[6] Diluted barium can be used especially if initial esophagogram is negative, however, it comes with drawbacks associated with inflammatory reactions, fibrosing mediastinitis and granuloma formation.[5] Currently, more expensive non-ionic water soluble agents like Omnipaque are used frequently to avoid non-favourable side effects of other agents mentioned above. CT scan is indicated in critically ill, non-cooperative patients or if esophagogram cannot be performed. Its sensitivity values 92-100% in detection of perforation.[5] Findings may include periesophageal air or fluid, oesophageal wall thickening, mediastinal air and fluid collection, pneumomediastinum and of course contrast extravasation from perforated oesophagus. [1, 5] CT scan can be repeated in case of clinical deterioration.

Studies have shown that a delayed presentation with progressive symptoms carries a death rate 40-60%.[4] The patient in our case report had a delayed presentation which complicated with tension hydropneumothorax and then thoracic empyema. She was treated conservatively initially, subsequently underwent video assisted thoracoscopy and decortication. She was discharged well later on. This comes to show that a prompt diagnosis on presentation and timely management whichever it may be, surgical or conservative, can ensure a good prognosis even in a case of delayed presentation. More studies on various clinical presentations, imaging findings and management of oesophageal perforation should be conducted in the near future to serve as a guideline

## CONCLUSION

Oesophageal perforation is a rare but important clinical entity. Any chest symptoms which arise after an upper gastrointestinal procedure should be dealt with extra caution. In such situation,

urgent radiological assessment may be live-saving and reduce morbidity.

#### COMPETING INTERESTS

The authors declare no competing interests.

#### CONSENT FOR PUBLICATION

Written informed consent was obtained from the patient for publication of this case report and the accompanying images. Institutional Review Board approval is not required at the authors' institutions for the presentation of case report.

#### REFERENCES

- [1] Madan R, Bair RJ, Chick JFB. Complex iatrogenic esophageal injuries: an imaging spectrum. *American Journal of Roentgenology*. 2015;204(2):W116-W25.
- [2] Zwischenberger JB, Savage C, Bidani AJA. *Journal of Surgical Medicine and Critical Care*. Surgical aspects of esophageal disease: perforation and caustic injury. 2002;165(8):1037-40.
- [3] Brinster CJ, Singhal S, Lee L, Marshall MB, Kaiser LR, Kucharczuk JC. Evolving options in the management of esophageal perforation. *The Annals of thoracic surgery*. 2004;77(4):1475-83.
- [4] Desai R, Srivastava R, Chitrapu C, Kaleemuddin M, Amenha CJISJ. Approach and management modalities in Esophageal Perforations. 2018;5(2):373-8.
- [5] Tullavardhana TJMAT. Iatrogenic esophageal perforation. 2015;98(Suppl 9):S177-83.
- [6] Søreide JA, Viste A. Esophageal perforation: diagnostic work-up and clinical decision-making in the first 24 hours. *Scand J Trauma Resusc Emerg Med*. 2011;19:66-.