CASE REPORT

Acute respiratory failure following traumatic tooth aspiration

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SUMMARY

Foreign body aspiration can infrequently occur following trauma. Tooth aspiration after trauma is a rare clinical scenario. Here, we report a case in which tooth aspiration after trauma led to a presentation of acute respiratory failure with clinical findings mimicking tension pneumothorax. Successful removal of the aspirated tooth was accomplished by rigid bronchoscopy. Tooth aspiration must be considered in the list of differential diagnosis for any patient having signs or symptoms of respiratory distress following trauma especially maxillofacial trauma.

BACKGROUND

Tracheobronchial foreign body aspiration is more common in children but cases of adult foreign body aspiration are occasionally encountered.¹ In the absence of acute symptoms at presentation, foreign body aspiration following trauma can remain undetected and lead to delayed complications.² In the index patient, inhalation of a tooth occurred subsequent to polytrauma sustained during a roadside accident. The clinical profile mimicked tension pneumothorax on the side of aspirated tooth, leading to an intercostal drain insertion with no clinical improvement. The subsequent establishment of correct diagnosis was followed up with successful bronchoscopic management. To our knowledge, a case of tooth aspiration in the setting of trauma leading to acute respiratory failure with clinical findings mimicking tension pneumothorax has not been previously reported.

CASE PRESENTATION

A 22-year-old man suffered from polytrauma along with maxillofacial trauma after a roadside traffic accident. At initial evaluation in the emergency room, the patient was drowsy, pulse rate was 115/min, blood pressure was 84/50 mm Hg and respiratory rate was 24/min. He was endotracheally intubated and mechanical ventilation was initiated. A central venous catheter was inserted through the right subclavian vein following which iatrogenic right pneumothorax was suspected and a right side intercostal drain was inserted. On preliminary investigation, liver lacerations and diffuse brain oedema were found, for which conservative management was planned. The patient was shifted to the intensive care unit (ICU) for further treatment after an initial haemodynamic stabilisation.

On transfer to the ICU, the pulse rate was 140/min and blood pressure had dropped to 80/50 mm Hg. Treatment with vasopressors was initiated. Arterial

blood gas analysis revealed metabolic acidosis and hypoxaemia (pH 7.01, PaO₂ 58 mm Hg, PaCO₂ 37 mm Hg, HCO₃ 14 mEq/l and SpO₂ 90%). On clinical examination, breath sounds were absent over the left hemithorax and chest was hyper-resonant to percussion. Suspecting a left sided tension pneumothorax, an intercostal drain was inserted on the left side. Despite these measures, breath sounds continued to remain diminished over the left hemithorax and shock persisted. There was no improvement in oxygen saturation even on mechanical ventilation with high FiO₂.

Chest radiograph revealed an opacity resembling the outline of a tooth in the left main bronchus (figure 1A, arrow). The left hemithorax was more radiolucent with features suggestive of hyperinflation. The patient was on synchronised intermittent mandatory ventilation maintaining SpO₂ of 94% on 100% oxygen. On bedside when flexible bronchoscopy was performed through endotracheal tube, the tooth was seen to be impacted in the left main bronchus and extraction was unsuccessful. Emergency rigid bronchoscopy was performed on the bedside in the ICU.

Morphine was used for analgesia. Intubation was performed with a 7.5 mm ventilating tracheobronchoscope of 43 cm length (Karl Storz GmbH & Co. KG, Germany). The tooth was seen to completely occlude the left main bronchus, 4 cm distal to the carina (figure 2A). The tooth was grasped with rigid forceps (bronchoscopic alligator forceps, grasping with double active jaw; Karl Storz GmbH & Co. KG) and removed (figure 2B). Total duration of the procedure from induction of anaesthesia to rigid bronchoscopic removal was 10 min. The patient was reintubated with a size of 8.5 mm endotracheal tube for mechanical ventilation.

Following the procedure, there was a dramatic reduction of FiO₂ requirements and shock recovered over the next hour. The patient gradually improved over the next few days. He subsequently underwent tracheostomy and was weaned off mechanical ventilation after 10 days. Both the intercostal drains and the central venous catheter were removed. The chest radiograph performed subsequently was normal (figure 1B). The patient later underwent an uneventful surgical fixation of the humerus fracture sustained during initial episode of injury. He was discharged from the hospital, 1 month following admission and remains asymptomatic till date.

DISCUSSION

A carefully obtained history suggestive of 'penetration syndrome' defined by the sudden onset of

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Figure 1 Chest radiograph showing the radio-opaque tooth (arrow) along with hyperlucent left hemithorax. (A) In addition, right subclavian central venous catheter, right pneumothorax and bilateral chest drains in situ are seen. (B) The normal chest radiograph following tooth removal.

choking and coughing with or without vomiting should trigger evaluation for foreign body aspiration.³ However, history is frequently unavailable in patients who have sustained trauma and/or have altered sensorium.

Aspiration of a number of items has been documented in the literature in the setting of trauma. The items reported include dentures, dental devices, chewing gum, windshield glass and dashboard plastic.⁴⁻⁷ Tooth aspiration has been reported in the setting of trauma.^{2 4 6 8 9} Tooth aspiration is usually recognised easily as compared with aspiration of other materials owing to its radio-opaque nature, but may be missed if there is superimposition of other thoracic radio-opaque structures like the spine or the ribs on chest radiograph. Displacement injuries of the tooth are commoner than tooth fractures with avulsion and avulsed teeth, which are often found at the site of the accident. Aspiration of an unerupted permanent tooth has also been reported following maxillofacial trauma.⁹ Teeth may also be swallowed.⁵ Apart from trauma, other settings in which tooth aspiration has been reported include intraoral manipulation during general anaesthesia, adenotonsillectomy and dental extraction.¹⁰⁻¹²

The right main bronchus is the most common site for foreign body lodgement in adults because of its wider diameter and vertical disposition. Foreign bodies can also lodge in the left bronchial tree as in the index case. The clinicoradiological presentation in this patient occurred because of air trapping. The aspirated tooth acted as a ball valve, allowing air to enter the bronchus during inspiration, but becoming occluded on expiration leading to intra-alveolar hypertension, which increased with each breath. This led to the clinical findings which mimicked tension pneumothorax. In addition, the presence of a contralateral iatrogenic pneumothorax placed cardiorespiratory

haemodynamics of the patient at further disadvantage leading to profound haemodynamic derangement.

As the presentation may be immediate or delayed and occasionally life threatening as highlighted by the index case, a bronchoscopic examination is definitely warranted in all the patients of trauma with continued respiratory distress to rule out the presence of a tracheobronchial foreign body.⁷ Tooth aspiration can occur during the episode of trauma itself or a loose/avulsed tooth may be pushed into the airway during emergent endotracheal intubation.⁷ Therefore, it is recommended that a thorough oropharyngeal examination must be performed in all the patients suffering from polytrauma and in those found to have a missing tooth; a possibility of tracheobronchial tooth aspiration should always be kept in mind. In the index case, aspiration of an already avulsed tooth during trauma lying in the oropharynx might have occurred during endotracheal intubation. The tooth was not broken off during endotracheal intubation as revealed by the emergency medical staff.

The definitive treatment for airway foreign body aspiration is airway control followed by prompt removal of the foreign body, with either flexible or rigid bronchoscopy. During the past few decades, flexible bronchoscopy has been advocated as the primary diagnostic and therapeutic modality for management of tracheobronchial foreign body aspiration with reported successful removal rates >90%.¹³ It has also been recommended as the preferred method in adults with cervicofacial trauma, mechanically ventilated patients or those with distally located foreign bodies. As the patient had facial trauma, flexible bronchoscopic extraction was attempted initially, which however was unsuccessful. The presence of craniofacial trauma and cervical spine lesions have been mentioned as contraindications to rigid bronchoscopy.¹ Although in adults, rigid bronchoscopy is usually

Figure 2 Rigid bronchoscopic image demonstrating the impacted tooth in the left main bronchus (A). The bronchoscopically removed tooth is shown in (B).

reserved as a final therapeutic option, the present case highlights the indispensable nature of rigid bronchoscopy in patients with life threatening airway compromise even in the presence of facial trauma. Even though the flexible bronchoscope is the instrument utilised most often for adult airway foreign body removal, rigid bronchoscopy is potentially advantageous in the presence of respiratory failure.

Learning points

- ▶ Foreign body aspiration is an important and often unrecognised complication in patients with trauma.
- ▶ Rigid bronchoscopy is the modality of choice for removal of tracheobronchial foreign bodies in patients with respiratory failure.
- ▶ In patients with maxillofacial trauma who have respiratory distress, a possibility of tooth aspiration should be considered in the list of differential diagnoses.

Competing interests None.

Patient consent Obtained.

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