Uncommon Etiology Of Obstructive Atelectasis

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Citation

J Miller, C Hinrichs. *Uncommon Etiology Of Obstructive Atelectasis*. The Internet Journal of Family Practice. 1999 Volume 1 Number 1.

Abstract

Although dislodgement of a tooth is a recognized complication of emergency endotracheal intubation, pulmonary sequellae are quite rare. We describe a case of an individual who, upon recovering from cardiac arrest requiring ventilatory support, suffered persistent signs and symptoms of pneumonia. Conventional radiography suggested the possibility of dental aspiration and secondary post-obstructive atelectasis and pneumonitis, which was elegantly confirmed by helical CT. CT depicted the exact location of the molar tooth within the superior segment of the right lower lobe bronchus, facilitating subsequent bronchoscopic extraction and clinical recovery.

INTRODUCTION

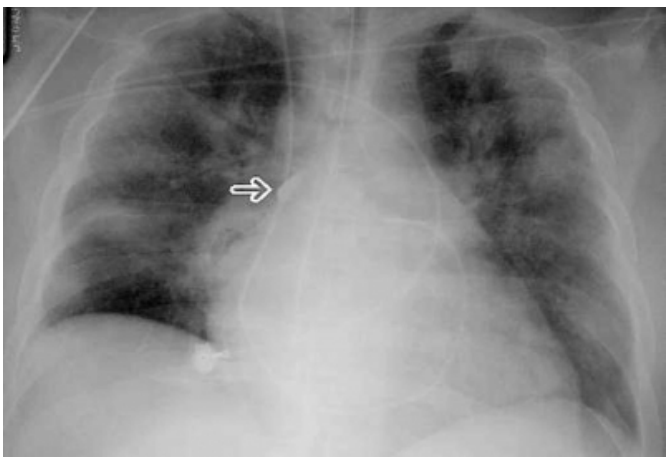
Although common amongst young children, foreign body aspiration is an infrequent occurrence in the adult population. However, on rare occasions, iatrogenic interventions may result in the inhalation of a foreign body by an older individual [1]. While intubating patients in respiratory distress, a tooth may infrequently become dislodged. Usually this requires only a simple dental repair for correction. However, we will describe the clinical and radiologic consequences of the much more pernicious and fortunately, unusual, aspiration of a tooth into a peripheral airway.

CASE REPORT

A 40 year-old male with a history of chronic alcohol abuse summoned emergency medial services complaining of acute weakness and lethargy. Upon arrival of the ambulance, the patient was found to be mildly dyspneic but denied chest pain or palpitations. However, he went into cardiac asystole before he could be transported and was emergently intubated to facilitate cardiopulmonary resuscitation. After two minutes of chest compressions and manual ventilation, the patient's pulse returned and he was transported to the emergency department of our level I trauma center. Upon arrival, he was found to be hypotensive (BP 70/30 mmHg), and in tachycardic atrial fibrillation (HR 150-160 beats/min). The patient was hydrated with normal saline, a Swan Ganz catheter was placed to enable right heart monitoring, and his blood pressure rapidly improved. Gastric lavage identified coffee ground emesis and it was conjectured that the circulatory compromise was the result of hypovolemia secondary to gastrointestinal bleeding. A portable anterior-posterior chest radiograph (CXR) (Fig. 1) revealed the endotracheal tube, Swan Ganz catheter, and nasogastric tube to be in proper position, with patchy infiltrates in both lung fields. No comment was made concerning a small opacity overlying the silhouette of the right mainstem bronchus.

Figure 1

Fig.1– Portable CXR exhibiting a density overlying the right main stem bronchus. (arrow)

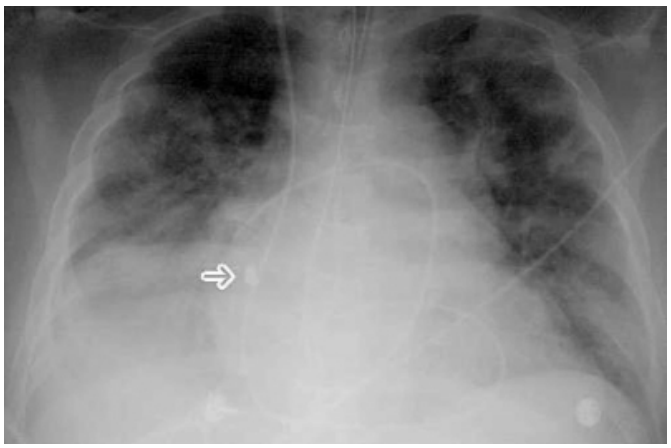


Although the patient's respiratory status slowly improved over the following 48 hours, he remained obtunded and intubated with a rising temperature and leukocyte count. A repeat portable anterior-posterior chest radiograph (Fig. 2) depicted elevation of the right hemidiaphragm and a worsening consolidation in the right lung base, thought to represent atelectasis. A 2 cm focal density was now reported

adjacent to the Swan Ganz catheter overlying the approximate vicinity of the right bronchus intermedius. Subsequent serial chest radiographs confirmed the presence of this small opacity.

Figure 2

Fig.2– Later portable CXR showing the tooth moving inferiorly and changing orientation (arrow)



Upon re-evaluation of the initial radiograph (Fig.1), the density, which was the size and shape of a tooth, appeared to have traveled towards the lung base, possibly within an airway. A contrast enhanced chest CT scan (GE HighSpeed Advantage,GE Medical Systems, Milwaukee, WI) was performed employing 5 mm collimation, which confirmed the presence of a calcific density, consistent with a molar tooth, lodged in the superior segment bronchus of the right lower lobe, associated with segmental atelectasis (fig 3).

Figure 3

Fig.3 a&b – CT scan through the chest at the level of the superior segment bronchus. Note density representing an inhaled tooth within superior segment right lower lobe bronchus causing post-obstructive atelectasis (arrow)

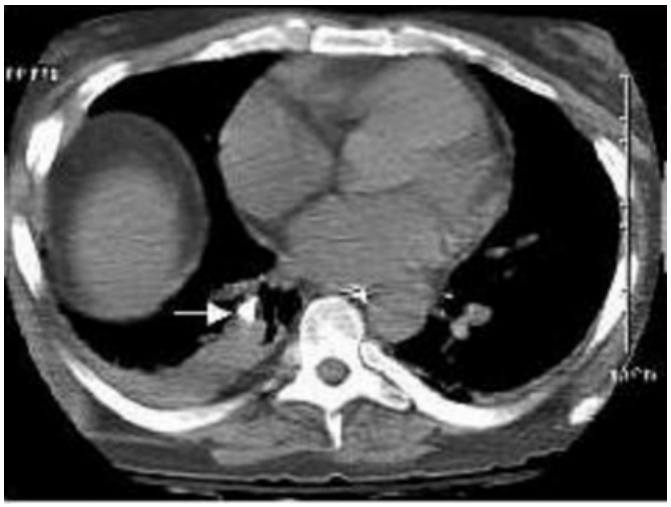
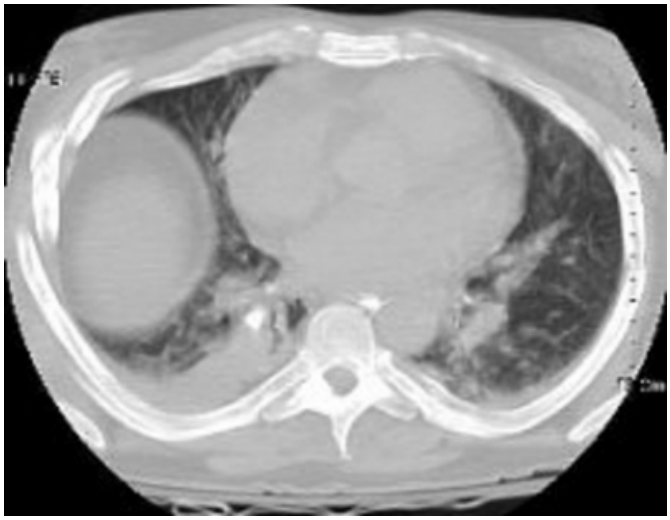


Figure 4



The tooth and surrounding edema of the bronchial wall were visualized directly by fiberoptic bronchoscopy. An attempt at flexible bronchoscopic removal was unsuccessful. Extraction of the tooth from the superior segment bronchus with pinch graspers through a rigid bronchoscope under general anesthesia was then attempted, but was also unsuccessful. The patient was then reintubated with a larger caliber endotracheal tube through which a flexible bronchoscope equipped with a small basket was directed at the tooth. The tooth was removed in toto and confirmed histologically. The patient recovered fully and was discharged two weeks later.

DISCUSSION

Although the sine qua non of atelectasis is the loss of volume of lung tissue, whether the entire lung, lobar, segmental or subsegmental, a myriad of pathologic factors may induce the same result.1 Resorptive atelectasis is due to endobronchial obstruction, intralumenally as by a tumor or mucus plug or by extrinsic bronchial compression, as in lymphadenopathy.[2] Passive atelectasis is caused by parenchymal compression extrinsic to the lung tissue, such as a pleural effusion, pneumothorax, or hypovenilation, while an intraparenchymal mass may, itself, result in compressive atelectasis of an adjacent region of lung. Finally, interstitial fibrosis of any source leads to a loss of lung volume known as cicatrizing atelectasis [3]

Acute, obstructive atelectasis often leads to sudden respiratory distress, but insidious pulmonary volume loss may be asymptomatic.1 Therefore, radiology plays a key role in detecting the presence, location and possible source of atelectasis. Plain film radiography provides a rapid means

of assessing atelectasis, whether it is clinically suspected or not. Signs of volume loss include ipsilateral mediastinal shift and displacement of the hila or fissures in conjunction with abnormal linear or sharply demarcated densities, which represent the collapsed portion of lung.[4] However, it is often difficult radiographically to ascertain the precise source of the atelectasis and, especially in a supine individual, even more difficult to distinguish atelectasis from a pneumonic infiltrate. Computed tomography (CT), because of its enhanced contrast resolution and cross sectional capabilities, is much more accurate in detecting subtle obstructing lesions and signs of volume loss, even when obscured radiographically by small size or overlying anatomic or pathologic densities.[5]

Previous authors have described the myriad of foreign bodies that, when inhaled, may obstruct an airway. This is primarily of concern in young children, where the foreign body may induce either distal atelectasis or air trapping and hyperinflation.[6] Iatrogenic causes of foreign body bronchial obstruction, other than by nasogastric or tracheal tubes, as well as foreign body inhalation in the adult, are not as well catalogued and frequently overlooked. Furthermore, although the dislodgement of teeth is a common pitfall during intubation, it rarely results in other than cosmetic consequences.[7] Our case is of particular interest because we have used radiologic techniques to detect, follow and categorize an unusual obstructing foreign body in an adult which would have otherwise gone undiagnosed due to the non-specific nature of his symptoms. Chest radiographs detected the dense tooth as it traversed the right lower lobe bronchus and distinguished a non-specific right lower lobe density. CT confirmed the precise endobronchial location of the foreign body and clearly defined the resulting radiographic opacity to represent segmental atelectasis.

In conclusion, we have described the radiologic monitoring of clinically unsuspected endobronchial obstruction and secondary atelectasis due to a tooth dislodged during emergency intubation. As such dental injury is not uncommon during urgent endotracheal tube placement, intensive care clinicians and radiologists, alike, should be aware of this complication when visualizing unusual calcific opacities on the chest radiographs of intubated patients. If necessary, CT scanning should be performed to better characterize the abnormal density.

References

1. Woodring JH, Reed JC. Types and mechanism of pulmonary atelectasis. J Thorac Imaging 1996; 11:92-108
2. Molina PL, Hiken JN, Glazer HS. Imaging evaluation of obstructive atelectasis. J Thorac Imaging 1996; 11:176-86
3. Gibb KA, Carden DL. Atelectasis. Emerg Med Clin North Am 1983; 1:371-8
4. Woodring JH, Reed JC. Radiographic manifestation of lobar atelectasis. J Thorac Imaging 1996; 11:109-44
5. Woodring JH. Determining the cause of pulmonary atelectasis: a comparison of plain radiography and CT. AJR Am J Roentgenol 1988; 150:7575-63
6. Zerella JT, Dimler M, McGill LC, et al. Foreign body aspiration in children: value of radiography and complications of bronchoscopy. J Pediatr Surg 1998; 33:1651-4
7. Warner ME, Benenfeld SM, Warner MA, et al. Perianesthetic dental injuries: frequency, outcomes, and risk factors. Anesthesiology 1999; 90:1302-5

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