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Case report

Pneumorachis in a Preschooler with Foreign Body Aspiration

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ABSTRACT

Pneumothorax, pneumomediastinum and subcutaneous emphysema due to foreign body aspiration (FBA) are rarely encountered in clinical practice. Epidural emphysema or pneumorachis as it is known is an even rarer condition associated with FBA reported infrequently in literature. We present here, a rare case of FBA encompassing features of all of the above mentioned entities in a preschooler who presented with symptoms of acute respiratory distress following a respiratory tract infection of 2 weeks duration. A possibility of foreign body aspiration was considered on the basis of her clinical and radiological investigations suggesting hyperinflation and collapse at different places with air leaks leading to the above complications. Accordingly, a diagnostic bronchoscopy was performed which revealed a peanut in the left main bronchus which was successfully extracted leading to resolution of symptoms in the child.

Key words: Foreign body aspiration; Pneumothorax; Pneumomediastinum; Pneumorachis; Epidural emphysema; Bronchoscopy.

INTRODUCTION

We present here a preschooler who posed a diagnostic dilemma to us at presentation with subcutaneous emphysema following sub-acute history of respiratory tract infection. She was later diagnosed to have aspirated a peanut which had resulted in hyperinflation, pneumomediastinum (PM), pneumothorax, pneumorachis and sub-cutaneous emphysema (SE) in her. Although documented before, PM and SE secondary to FB inhalation is a very rare event. The association of FBA with pneumorachis is rarer still, with only one documented case of the same till date [1]. We chose to report this case to highlight the diagnostic challenge the child had posed to us at presentation which could only be confirmed due to a high index of suspicion. We also wish to highlight the rare association of pneumorachis with FBA as was seen in this child.

CASE

A 2-year-old girl presented to the emergency with history suggestive of respiratory tract infection in the form of fever and cough of 10 days duration. The child's condition had worsened 2 days prior to presentation as she had developed breathlessness in addition. Hours before admission she had developed swelling over her neck and chest which was progressively increasing. There was no history of asthma, trauma or foreign body aspiration forthcoming from the parents at the time of admission. On examination, the child was febrile with a pulse rate of 116/min and respiratory rate of 56/min with subcostal and intercostal retractions.There was no cyanosis and oxygen saturation was 92% on room air. Bilateral palpable crepitus was present in the neck, chest and back, extending till the wrists. The quality and equality of breath sounds were difficult to assess due to the subcutaneous emphysema. However, they were grossly decreased on the left side compared to the right. Rest of the systemic examination was normal. The child was started on non-invasive positive pressure ventilation with 100% oxygen due to her low saturations and respiratory distress after which her irritability decreased and saturations improved. She was started on

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maintenance intravenous fluid therapy to maintain hydration till her respiratory distress settled. She was also started on broad spectrum antibiotics with gram positive coverage in view of a possibility of pneumonia with complications.

Investigations

Chest X-ray showed subcutaneous emphysema with hyperinflation of the leftupper lobe, collapse of the left lower lobe of the lung and pneumomediastinum (PM) (*figure 1)*.No fractured ribs were apparent. A Computed Tomography (CT) scan confirmed the SE and demonstrated an obstructive hyperinflation of the left lingular lobe and the medial segment of the right middle lobe. It also revealed a left lower lobe segmental collapse-consolidation with a small pneumothorax on the same side (*figure 2*). In addition, epidural emphysema (pneumorachis) was also found extending from C5 to T12 vertebral level (*figure 3*). A possibility of foreign body aspiration was strongly considered in view of her clinical and radiological presentation which was urgently confirmed with the help of a diagnostic bronchoscopy.

Treatment and outcome

On bronchoscopy, a peanut was visualized in the left main bronchus surrounded by significant granulation tissue and edema extending to the right bronchus. The FB was removed and bronchial toileting done, following which the respiratory distress and subcutaneous emphysema improved over the next 24 hours. The child was discharged after 4 days of hospital stay and is presently asymptomatic and doing well.

DISCUSSION

This child had posed a diagnostic dilemma to us at presentation as her history and clinical examination were consistent with lower respiratory tract infection with complications.

Figure 1 : Chest X ray of the child showing pneumomediastinum

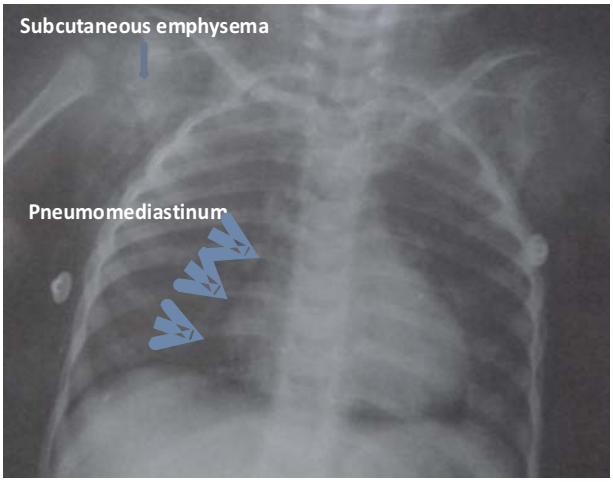


Figure 2 : CT scan of the chest of the child showing hyperinflation and collapse of areas of left lung

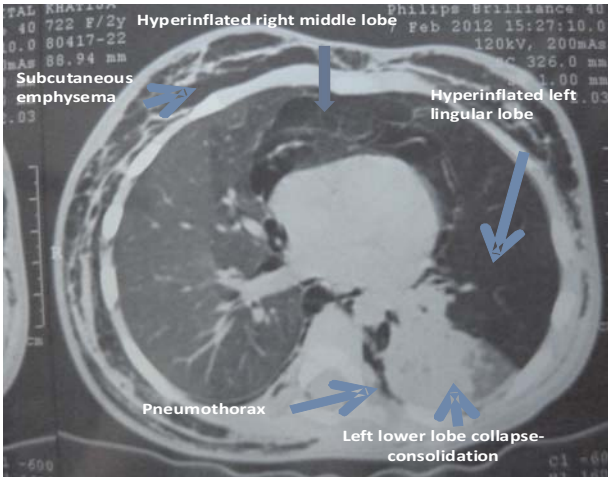
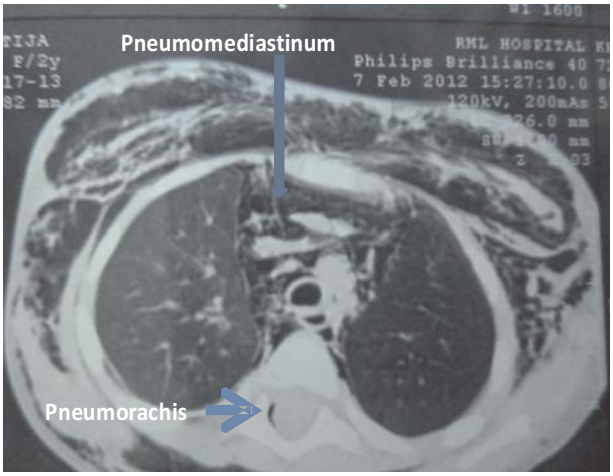


Figure 3 : CT scan of the chest showing epidural emphysema



However, as we examined her more closely and saw her radiological findings we were more and more convinced that it was not a simple case of pneumonia with complications. We again revised the history and asked leading questions to the parents about a possible foreign body aspiration which might have been missed earlier. The parents then came out with the history of the child eating peanuts and coughing suddenly 2 weeks prior to admission at about the same time when the child had developed features of respiratory tract infection. Our suspicion was finally confirmed with the help of a diagnostic bronchoscopy which also helped in removal of the foreign body.

Pneumothorax, pneumomediastinum and subcutaneous emphysema due to foreign body aspiration (FBA) are rarely encountered in clinical practice. In 1989, in a retrospective study of X-rays of 155 children with FBA, only 10 (6.4%) were found to have PM [2]. In another review of 139 cases, PM was present in 2 (1.4%) patients [3]. The incidence of pneumothorax in association with FBA ranges from 0.07-3% [4-5] and that of subcutaneous emphysema is 0.21-5.81% [2,4]. Epidural emphysema or pneumorachis as it is known as is an even rarer condition with only one documented case of the same till date [1].

The cause of extra alveolar air in a case of FBA can be explained by the theory proposed by Macklin and Macklin [6,7]. Hyperinflation of alveoli can cause their rupture into the underlying bronchovascular sheaths, thus causing pulmonary interstitial emphysema. The air travels in these sheaths towards the lower pressured mediastinum, coalescing and gaining in size eventually producing a pneumomediastinum. The visceral space enveloping the mediastinal structures communicates superiorly with the visceral space of the neck, and inferiorly with the retroperitoneal space. Thus PM can lead to subcutaneous emphysema and pneumo-retroperitoneum respectively. PM can also lead to pneumothorax by peripheral dissection of air or by breaching the mediastinal fascia and overlying pleura. Similarly, pneumo-retroperitoneum can lead to pneumo-peritoneum by rupturing the peritoneal tissue. Likewise, in our patient, pneumomediastinum due to hyperinflation led to subcutaneous emphysema starting in the neck and extending along the sub cutaneous plane to involve the chest and upper limbs. Air in the axilla surrounding the brachial plexus and axillary artery can then travel along these fascial planes to reach the epidural space of the spinal column resulting in pneumorachis as was the case in this patient. [6,7].

PM is an uncommon entity in pediatric practice. When it does occur, it can be spontaneous, or secondary to trauma, chest tubes, endobronchial/esophageal procedures, neonatal lung disease, mechanical ventilation, infections and other invasive procedures. It may or may not be accompanied by SE. Rarely SE may occur in the absence of PM and pneumothorax. PM is commonly asymptomatic and resolves spontaneously with treatment of the underlying condition [8]. Occasionally, tension PM occurs, causing decreased cardiac output, or working concurrently with SE to cause tracheal compression and serious airway obstruction. In these cases, urgent decompression of the thoracic inlet and neck by inserting large bore intravenous catheters or needles in the subcutaneous plane is required [9].

Pneumorachis has been reported to occur with spontaneous pneumothorax and pneumomediastinum [10], asthma [11], trauma, coughing, forceful vomiting, strenuous exercise, meningomyelocele, MDMA abuse [12], Marfans syndrome [13] and epidural anesthesia [14]. Occasionally it may be symptomatic, resulting in radicular pain and paraplegia [15]. However, generally it is asymptomatic and an incidental finding not requiring any specific treatment. The air gets absorbed over 2–3 weeks. As this condition is usually accompanied by subcutaneous or mediastinal emphysema, treatment is primarily directed towards these complications.

To conclude, one should have a strong index of suspicion in any child presenting with extra-alveolar air and a possibility of foreign body aspiration ruled out with careful history and

radiological investigations. Timely bronchoscopy may be lifesaving and lung saving in these children.

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