

Subcutaneous Emphysema and Pneumomediastinum due to Foreign Body Aspiration in Children with Asthma

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Summary. Pneumomediastinum (PM) and subcutaneous emphysema (SCE) are well recognized as complications of acute asthma exacerbation in children with asthma. We present herein a report of three cases of asthmatic children who presented with PM and SCE found to be secondary to foreign body aspiration. The cases highlight that clinicians must remain vigilant for co-morbidities in an asthma exacerbation, and less common etiologies of PM and SCE, such as foreign body aspiration, should also be carefully considered in asthmatic children.

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Key words: foreign body aspiration; pneumomediastinum; subcutaneous emphysema.

INTRODUCTION

Pneumomediastinum (PM) is defined as the presence of free air or gas in the mediastinum and is mainly caused by alveolar rupture. It rarely occurs in children and is generally a benign condition requiring only supportive care unless significant pneumothorax develops.¹ It has been shown in two studies that asthma is the most common cause of PM and that very rarely it can also occur due to foreign body aspiration.^{1,2} In another study, foreign body aspiration leading to PM was only reported in 1 of 41 cases of PM.³ A larger review of 155 cases of tracheobronchial aspiration in children presenting over a 35-year period showed that PM and subcutaneous emphysema (SCE) were uncommon complications of foreign body aspiration.⁴ In the Hospital for Sick Children, Toronto, 46 patients with both PM and SCE were identified over 5 years. None of them had foreign body aspiration as the underlying cause.⁵

Since asthma is the main cause of PM and only very rare cases are induced by foreign body aspiration, this may cause a delayed diagnosis of the latter in children with asthma presenting with PM leading to major complications and mortality if left untreated properly. We present here three asthmatic children presenting with PM found to be induced by foreign body aspiration. These cases highlight the difficulties in detecting foreign body aspiration in patients with an asthma exacerbation. In view of the possible complications of delayed diagnosis of foreign body aspiration, early and careful

exclusion of this possibility should be considered in any unusual asthmatic presentation or whenever there is a poor clinical and radiographic response.

CASE 1: DESCRIPTION

A 20-month-old asthmatic toddler was admitted to the emergency room due to respiratory distress and abrupt onset of painful swelling on the right side of the neck. No history of trauma, choking, or foreign body aspiration was reported. Since the age of 2 months he had infrequent respiratory symptoms and was treated with bronchodilators as needed and daily inhaled corticosteroids (budesonide 200 µg bid via aerochamber) in the last 6 months. No identifiable asthma triggers (viral infection or environmental tobacco smoke exposure) or

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change in asthma medications were reported by his parents prior to his admission. His physical examination revealed: temperature of 37.2, respiratory rate of 50/min, oxygen saturation of 96% in room air, and a visible swelling and crepitations on the right side of the neck along with decreased air entry to the left lung. Chest X-ray revealed SCE, PM, and hyperinflation of the left lung. No radio-opaque foreign body was identified (Fig. 1). Since neither history of foreign body aspiration nor witnessed choking episodes were reported by the parents, the child was initially treated with intravenous steroids and nebulized salbutamol. Because of poor clinical and radiographic improvement, a flexible fiber-optic bronchoscopy was performed on the second day of hospitalization. Thirty-minutes before induction of anesthesia, albuterol, and 2% lidocaine were administered via nebuliser. The bronchoscopy was performed under general anesthesia carried out by a pediatric anesthesiology using propofol. Bronchoscopy was performed by a pediatric pulmonologist, lasted 5 min, and went uneventfully. Bronchoscopy revealed a small piece of almond lodged at the entry of the left main bronchus and was ultimately extracted by rigid bronchoscopy. Complete resolution of clinical and radiographic signs was observed within 2 days after removal of the foreign body.

CASE 2: DESCRIPTION

A 16-month-old asthmatic girl presented to our emergency room due to cervical swelling. Three days prior to her admission she had fever and cough and was

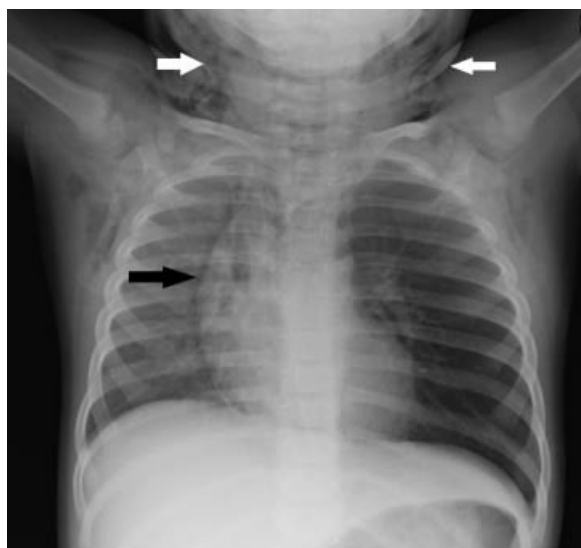


Fig 1. Anteroposterior radiograph of the chest shows subcutaneous emphysema of the neck (white arrows) and pneumomediastinum (black arrow). The left lung is hyperinflated with mediastinal shift to the right.

treated with oral antibiotics and nebulized salbutamol. Since the onset of asthma at 5 months of age, she had recurrent afebrile wheezing episodes around once a month. She was treated with anti-asthma medications (budesonide 200 µg bid via aerochamber). She had a history of atopic dermatitis and had a maternal family history of asthma. No history of a choking episode was reported initially by the parents. Her physical examination revealed: temperature of 36.5, respiratory rate of 56/min, oxygen saturation of 94% in room air, decreased air entry to the left lung field along with bilateral rales, and a swelling with crepitations on the neck. Chest X-ray showed SCE, PM, and hyperinflation of the left lung. The child was initially treated with steroids, nebulized salbutamol, and amoxicillin-clavulanate. Based upon our previous experience with the first case and the slow clinical improvement, we considered other etiologies. We again asked the mother about the possibility of foreign body aspiration and she surprisingly recalled a choking episode while eating cookies 3 days ago. Flexible fiber-optic bronchoscopy was performed as described for the previous patient and revealed a foreign body in the left main bronchus. A small piece of nut was removed by rigid bronchoscopy under general anesthesia. Clinical and radiographic improvement was achieved after removal of the foreign body.

CASE 3: DESCRIPTION

A 21-month-old asthmatic child presented to the emergency room due to bilateral cervical swelling and respiratory distress. Five days prior to his admission he was seen by his pediatrician due to cough, runny nose, and a short episode of wheezing immediately after eating peanuts. A small piece of peanut was removed manually from his mouth by his mother. He was treated then with nebulized salbutamol with poor clinical improvement. The child had previous recurrent episodes of wheezing that were treated with anti-asthmatic medication (nebulized salbutamol as needed, and for the last 9 months montelukast granules 4 mg daily). No recent viral infection or other triggers of asthma exacerbation were reported. Physical examination on admission revealed bilateral cervical swelling, desaturation on room air with oxygen saturation of 88%, fever, and decreased air entry to right basal lung field. Chest X-ray showed SCE over the neck and PM, and overinflation of the lung with left side mediastinal shifting. He was treated with antibiotics, nebulized salbutamol, and systemic corticosteroid. Due to lack of clinical improvement, a rigid bronchoscopy was performed (as previously described), which revealed a small piece of peanut lodged in the right bronchus intermedius that was completely removed. A complete clinical and

radiographic recovery was achieved after foreign body removal.

DISCUSSION

Asthma exacerbation is the most common cause of PM in otherwise healthy children and teenagers.^{6,7} However, it should be emphasized that in asthmatic children presenting with PM and SCE, other less common etiologies, such as foreign body aspiration, must be excluded, because both asthma attack and foreign body aspiration can potentially co-exist in the same child. Particularly, a very high index of suspicion should be practiced in cases with slow or poor response to conventional asthma medications and localized clinical signs. A timely diagnosis and treatment of foreign body aspiration in children is important to prevent life-threatening and long-term complications.⁸

Herein we described three cases of PM and SCE caused by foreign body aspiration in young asthmatic children. The three children presented here were initially misdiagnosed and treated as having acute asthma exacerbation. However, due to lack of improvement and localized signs, searching for other etiologies such as foreign body aspiration was clinically indicated. In our cases bronchoscopy procedure was safely tolerated in each of the children. But physicians dealing with asthmatic children must be aware of the fact that bronchoscopy in a child with active asthma exacerbation is fraught with hazard from worsening bronchospasm. However, it was shown to be performed safely even in children with difficult asthma, when the bronchoscopist and anesthetist are suitably trained.⁹

To our knowledge this is the first case series describing PM and SCE due to foreign body aspiration in

children with asthma. In the light of these cases we recommend that foreign body aspiration should be considered in every child presenting with PM and SCE along with respiratory distress, even in asthmatic children with no history of choking episodes. In conclusion, while asthma is the most frequent underlying condition leading to PM and SCE, it is important to remember foreign body aspiration as a possible etiology in children with asthma.

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