

Case Report

Spontaneous cutaneous emphysema due to bronchial foreign body

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Abstract: Purpose: This study aims to understand the diagnosis and treatment of bronchial foreign bodies (BFBs). Methods and material: We reported a case of BFB that led to severe spontaneous subcutaneous emphysema, and present a general review of the literature on the special clinical features of BFBs. Results: This case characterized by the spontaneous subcutaneous emphysema factor, illustrates that agnogenic subcutaneous emphysema should be considered as a clinical feature of BFBs. Conclusions: Radiologic findings such as obstructive emphysema and aeration within an area of atelectasis confirm the diagnosis of BFB. Early intervention in the form of bronchoscopy should be performed to arrest the progressive nature of the condition.

Keywords: Spontaneous cutaneous emphysema, bronchial foreign body, case report

Introduction

Bronchial foreign bodies (BFBs) are a phenomenon associated with children. Foreign body aspiration is a common problem in children, in which approximately 75% of cases are younger than three years old [1, 2]. In China, vegetable matter, such as peanuts and sunflower seeds, are commonly inhaled into the airway. BFB clinically presents with severe coughing, choking, hoarseness, cyanosis, stridor, and/or dyspnea, depending on the site of occlusion and the size of the foreign body [3, 4]. Due to the consideration of the absence or non-specificity of symptoms, as well as the absence of a history suggestive of an aspiration event, BFB is generally misdiagnosed. This error delays proper diagnosis and, subsequently, the treatment of asymptomatic BFB. In this article, we report a case of BFB that led to severe spontaneous subcutaneous emphysema. The patient suffered from long-standing foreign body injuries with severe complications. A review of the literature on the special clinical features of BFBs was conducted.

Case report

A two-year-old boy was admitted to our Emergency Department for coughing, which persist-

ed for one month. One day before hospitalization, the boy suddenly presented with subcutaneous emphysema. His parents did not witness the inhalation of a foreign body or injury. Clinical examination revealed severe subcutaneous emphysema involving the neck, chest and abdomen. The boy had stable vital signs with normal neurological examination without obvious concave signs. Auscultation revealed decreased right breath sounds. A chest X-ray was subsequently performed.

Radiologic imaging revealed the widespread subcutaneous emphysema and obstructive emphysema of the right lung. No obvious widening of the mediastinum was observed in the images (**Figure 1**). We performed a rigid bronchoscope examination under general anesthesia and found granulation tissues and a quarter of a peanut impacted in the right bronchus. After successfully removing the impaction, we did not observe any visible perforation and fistula in both of the bronchi. At the same time, anti-inflammatory medication was provided to eliminate phlegm and for atomization treatment. At 24 hours after removal of the foreign body, subcutaneous emphysema progressed slightly progressed and disappeared in a week. There were no markedly abnormal findings in the chest X-ray after treatment, and no compli-

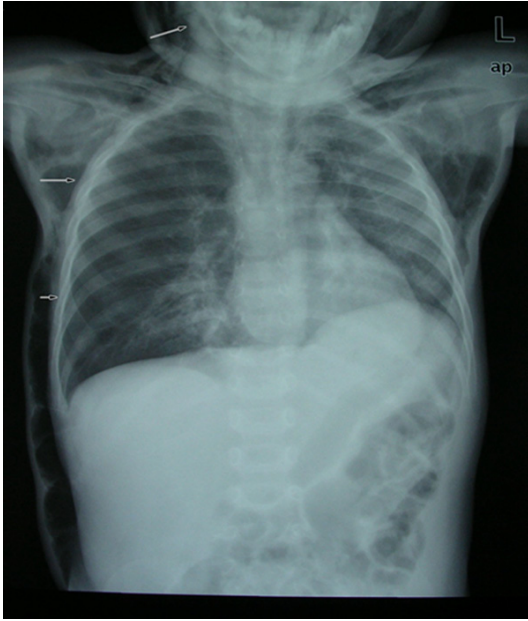


Figure 1. Chest x-ray revealed the widespread subcutaneous emphysema (arrows) and obstructive emphysema in the right lung, no an obviously widen mediastinum in the images.

cations occurred within the two-month follow-up.

Discussion

Over the past century, BFBs remains as a cause of injury and hazard to young children [5]. Foreign-body aspiration, which can be a serious concern in children, accounts for 7% of all accidental deaths among children younger than four years [6]. The clinical presentation of BFB, which is dependent on the site of object impaction, includes severe coughing, choking, hoarseness, cyanosis and gagging. It causes serious complications such as asphyxia, recurrent pneumonia, atelectasis, pneumothorax, granulation tissue and lung abscess. Hsu et al. reported 459 cases of successful BFB removal, with only a 0.2% rate of complications and a mortality rate of less than 0.1% [2]. However, subcutaneous emphysema, which presented as the primary symptom, is rarely reported in literature. A computer-aided search of the MEDLINE database from 1950 to 2007 revealed 17 articles that discussed 18 cases of subcutaneous emphysema caused by BFB. By reviewing both Chinese and English literatures, we found special aspects in these subcutaneous emphysema cases. The reports revealed a prevalence of male patients and the predomina-

tion of foreign bodies in the right bronchus. Moreover, pneumothorax did not develop in every patient. In most cases, the subcutaneous emphysema was spontaneously absorbed as presented. If the patient has severe mediastinal emphysema and pneumothorax, thoracic closed drainage relieves their condition.

The development of subcutaneous emphysema after foreign body aspiration is related to the Macklin effect. Post obstructive overinflation may produce a high-pressure gradient between intraalveolar air and perivascular interstitial connective tissues. The rupture of the bullae or bronchioles followed by coughing and wheezing allows the escape of air into the perivascular tissue that communicates with the mediastinum. Thus, air may ascend into the neck and chest wall [7, 8]. At the same time, the possible inflammation and necrosis of the bronchial wall caused by a long-standing foreign body injury are important contributors to the formation of subcutaneous emphysema in the cases we presented [9].

When severe complications present as primary symptoms, they could be a diagnostic dilemma with increased complexity. Radiologic diagnosis of foreign body aspiration is challenging due to its complexity. The sensitivity and specificity of chest radiography for foreign body detection are less than 70% [10]. However, specific to our cases, commonalities in clinical features were found, especially in the radiologic evaluations. Excluding special signs such as subcutaneous emphysema, mediastinal emphysema, and pneumothorax, obstructive emphysema and aeration within an area of atelectasis are common findings in the radiologic images. Incorporating these special radiologic aspects with traditional clinical features is helpful in improving the early diagnosis of BFB [11]. Three-dimensional reconstruction is possible with multidetector-row CT (MDCT), which provides an endoscopic view of the trachea and bronchi [12, 13]. However, life-threatening cases such as laryngemphraxis remains challenging to clinicians. In our opinion, a history and meticulous clinical examination is the first step in the diagnosis of possible foreign body aspiration.

Conclusion

Agnogenic subcutaneous emphysema should be considered a clinical feature of BFBs. A high index of suspicion for tracheobronchial foreign

bodies is required in this rare presentation. Radiologic findings such as obstructive emphysema and aeration within an area of atelectasis confirm the diagnosis of BFB. Based on our experience, early intervention in the form of bronchoscopy should be performed to arrest the progressive nature of the condition.

Disclosure of conflict of interest

None.

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