A MISSED BRONCHIAL FOREIGN BODY PRESENTING WITH PNEUMOMEDIASTINUM AND SUBCUTANEOUS EMPHYSEMA

Ofoegbu Chike V[1], Umeh Ugochukwu S[2], Afiadigwe Evaristus E[2].

Abstract:

Background: Pnemomediastinum with subcutaneous emphysema is a rare but potentially fatal sequalae of bronchial foreign body aspiration.

An 18-month-old female presented to the Accident and Emergency (A&E) department with a 28-hour history of sudden onset choking, cough, shortness of breath and fever. At the onset of symptom, some pieces of groundnut seed were found in her immediate surroundings, but no eyewitness accounted of what transpired. Oxygen saturation was 64% on intranasal Oxygen support.

The child had cardiac arrest twice and was resuscitated; first at presentation and then on the theatre table, during induction of anaesthesia. Bronchoscopy revealed edematous bronchus; secretions were suctioned, and the visible groundnut seeds lodged within the bronchial lumen retrieved. Further careful search revealed no other obvious remnant. Symptoms improved immediate post-op but deteriorated about 12 hours later, with worsening dyspnoea, fever, pneumomediastinum and subcutaneous emphysema. She had a revision bronchoscopy, and another piece of ground-nut seed was identified and retrieved. All respiratory symptoms gradually resolved within the next 48hours, and she was discharged home.

Conclusion: Though an uncommon mode of presentation, foreign body aspiration should be ruled out in any child with unexplained subcutaneous emphysema around the lower neck and upper chest region in the presence of other acute lower respiratory tract symptoms. Emergency bronchoscopy remains the gold standard of treatment.

Keywords: Pneumomediastinum, subcutaneous emphysema, foreign body aspiration, bronchoscopy.

This paper was presented at the 30th Scientific Conference and 31st Annual General meeting of Otorhinolaryngological Society of Nigeria (ORLSON) "UYO 2023".

Cite this article as: Ofoegbu Chike V, Umeh Ugochukwu S, Afiadigwe Evaristus E. A Missed Bronchial Foreign Body Presenting with Pneumomediastinum and Subcutaneous Emphysema.
Afrimedic Journal 2024; 10(1): 1-4.

Introduction:

Foreign body aspiration is a life-threatening otolaryngological emergency that is common amongst children.[1,2] Absence of eye-witness by an adult could result in delayed or even misdiagnosis as it could mimic several airway conditions such as bronchial asthma, bronchopneumonia, croup etc.[3]

An aspirated object may be trapped at any point within the lower airway depending on its size and shape.[1,4,5] Smaller and smooth foreign bodies can migrate distally beyond the carina and present less acutely.[6] When a FB is hygroscopic or big, there may be no air admission or outflow (stop valve mechanism), resulting in lung collapse. In other forms of bronchial foreign bodies, during inspiration, the bronchioles dilate and may allow ingress of air, but narrowed during expiration, and egress is not possible (ball valve mechanism), causing air entrapment in the distal alveoli. If it persists, the alveoli will subsequently rupture and air will escape through the fascial planes into the mediastinum and from here tracks up into subcutaneous planes of the neck and chest to present as pneumomediastinum and subcutaneous emphysema.[4,7,8]In a multicenter Turkish study of 1660 children managed for foreign body aspiration, non was reported to present with pneumo-mediastinum or subcutaneous emphysema, thus depicting the rarity of this mode of presentation in patients with FB aspiration.[4]

Vegetables, unlike inert FB could absorb moisture and swell over time, aggravating the obstruction.[3,9]They cause local inflammation, oedema, cellular infiltration, ulceration, and granulation tissue formation, further complicating bronchoscopic identification and retrieval.[10,11] We hereby report a case of a bronchial foreign body which was missed on initial bronchoscopy in the face of an overt pulmonary oedema and subsequently presented with pneumomediastinum and subcutaneous emphysema. This is to highlight the need for high index of suspicion and prompt intervention.

[1]*Department of ENT, University of Nigeria Teaching Hospital, Itukku-Ozalla, Enugu State.,*
[2]*Department of ENT, Nnamdi Azikiwe University Teaching Hospital, Nnewi, Anambra State.*
**Corresponding Author: Umehstan1@gmail.com +2347039506526*

Case presentation:

An 18-month-old female who was brought to the Accident and Emergency (A&E) department of St. Charles Borromeo Specialist Hospital, Onitsha Anambra State with a 28-hour history of sudden onset choking cough, shortness of breath and fever. Some pieces of groundnut seeds were found in patients immediate surrounding but there was no eye-witness account of what transpired. On presentation at the A&E, she had an episode of cardiac arrest and was resuscitated via cardiopulmonary resuscitation (CPR) and intravenous adrenalin. She was in severe respiratory distress with respiratory rate of 68 c/min, Temperature = 38.9, and pulse rate = 182b/min and Oxygen saturation of 64% on intranasal Oxygen. Chest Examination showed absent air entry on the left lung zones and widespread crepitations on the right lung zones. On chest radiograph, there was no identifiable foreign body but there were pneumonic changes on the left mid-lung zone (fig. 1).

Intra-operatively, the child arrested a second time on theatre table during induction of anaesthesia and was resuscitated as above. She had an emergency rigid bronchoscopy and intra-operative findings were edematous left bronchial lumen with copious frothy secretions, mucus plugs and fragments of groundnut seed. The secretions were suctioned, and the visible seeds (fig. 3) retrieved. Further careful search revealed no obvious remnant. The initial bronchoscopy was atraumatic, and secretions suctioned from the lower airway was not blood stained.

The child's symptoms improved immediate post-operative and she was commenced on intravenous antibiotics, steroids and analgesics.

However, approximately 12hours later, child deteriorated again with worsening dyspnoea, intermittent coughing spells and swelling of the neck and upper chest region with palpable crepitus (fig 2). Chest auscultation showed markedly reduced breath sound on the left lung zones and these findings raised our index of suspicion of a residual foreign body in the lower airway. She had a revision bronchoscopy; this time oedema has resolved following doses of intravenous steroids and visibility was better. Another piece of groundnut seed (fig. 3), which was missed at the initial bronchoscopy was found within the left main bronchus and was retrieved. All respiratory symptoms including the subcutaneous emphysema gradually resolved within the next 48hours on hospital admission, chest tube drainage was not indicated, and patient was subsequently discharged home on oral medications.

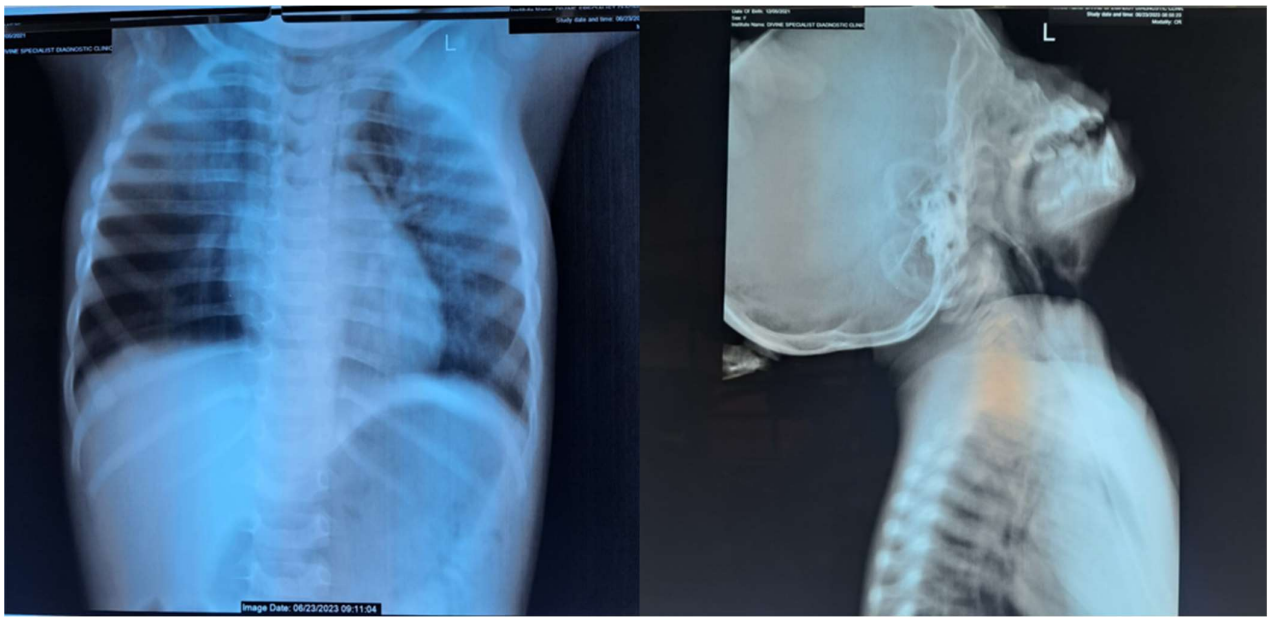

Figure 1:
Chest Radiograph done prior to presentation showed pneumonic changes on left mid-lung zone but no obvious FB.

Figure 2:
swelling of the neck and upper chest wall with subcutaneous emphysema.

Figure 3*:*
Foreign bodies retrieved after the first (Right) and second (Left) bronchoscopy

Discussion:

Coughing, choking episodes, and dyspnea are common presentations of FB aspiration. Vegetables unlike inert FBs over time will absorb moisture, swell, and secrete pro-inflammatory substances that induce local and systemic reactions as seen in the index patient.[9–11] The delay of about 28hours prior to presentation allowed time for the body to elicit so much local and systemic inflammatory responses to the aspirated FB which obscured and made its retrieval very difficult. Anoxia from lower airway obstruction causes bradycardia, arrhythmia and subsequently cardiac arrest if unaddressed.[1,8] Early identification including high index of suspicion and prompt intervention is paramount in management of paediatrics FB aspiration to forestall potential complications and even death.[3,10,11]

Chest radiograph may not visualize vegetable foreign bodies as most of them are not radio-opaque; however, it can show secondary features such as pneumonic changes, adaptive emphysema, atelectasis, and bronchiectasis which may mislead an unsuspecting physician.[11,12] It is thought that this may have contributed to the delay in referring this patient. Bronchoscopy remains the gold standard for management of airway foreign bodies as it is both diagnostic and therapeutic. Subcutaneous emphysema is an extremely rare presentation of bronchial FB and is often indicative of delayed or missed diagnosis as it develops over time.[5,7]

The "ball valve effect" is responsible for the pathophysiology of subcutaneous emphysema and pneumomediastinum following foreign body aspiration.[1,4]Air is continuously trapped beyond the FB causing hyperinflation and subsequent rupture of the alveoli, it further escapes into the mediastinum and migrates up to the subcutaneous tissues of the neck and upper chest wall.[1,4,5] Most of the cases would resolve after the offending foreign body has been removed as seen in the patient above, a handful others would however require chest tube thoracostomy drainage to achieve a symptomatic relief.[4]

Conclusion:

Pneumomediastinum with subcutaneous emphysema is a rare pattern for the presentation of foreign body aspiration, commonly due to missed or delayed diagnosis or intervention. A high index of suspicion is necessary to avoid this potentially obnoxious and fatal sequalae. Bronchoscopy remains the gold standard for both diagnostic and therapeutic interventions of foreign body aspiration, radiologic investigation is only supportive and should not be used alone to rule it out.

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