



ORIGINAL RESEARCH PAPER

Medical Science

SURGICAL EMPHYSEMA AND PNEUMOMEDIASTINUM AFTER FOREIGN BODY INHALATION, A RARE ENTITY – A CASE SERIES

KEY WORDS: Bronchial foreign body, Subcutaneous Emphysema, Pneumomediastinum

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ABSTRACT

Foreign body aspiration is very common in the children. Variable presentation makes it difficult to diagnose, especially, when no definite history of aspiration is available. Vegetable matter mostly peanuts and beetle nuts are the commonest bronchial foreign bodies. These foreign bodies become lodged in the bronchus because of their size and shape which allows their passage through the larynx and trachea but not through the bronchi. The usual symptoms are choking, gagging followed by wheezing and respiratory distress. Subcutaneous emphysema and pneumomediastinum are rare presentations. Although it is mainly benign, some cases may be fatal. Due to the rare nature of this clinical entity, proper assessment and management have been poorly studied so far. A good clinical suspicion of paediatricians and otolaryngologists with early intervention in such cases could avoid fatal outcomes. We report five cases of bronchial foreign body with an unusual feature of subcutaneous emphysema and pneumomediastinum.

Introduction : Foreign body aspiration is very common in children. It must be suspected when a child is presented with sudden onset of respiratory distress,[1] particularly, when presentation is unique even without a history of aspiration. Subcutaneous emphysema and pneumomediastinum are rare presentations; only few cases have been reported so far.[2,3,4]

Methods: We retrospectively reviewed 5 children with pneumomediastinum secondary to foreign body aspiration, who were treated in MDM Hospital, Jodhpur from January 2010 to December 2015. There were various presentations of such cases which were recorded.

Case 1 A three year old male child presented with cough, unexplained increasing breathlessness respiratory distress with unexplained subcutaneous emphysema without any definitive history of foreign body ingestion. (fig 1) Chest skiagram showed hyper aeration on right side of lung with pneumonia of left upper lobe. Computed tomography of thorax suggested ill defined soft tissue material (10 mm x6 mm) in left main bronchus 13.6 mm from carina with obstructive collapse of entire left lower lobe, anterior lobe and lingual segment of upper lobe with mild left pneumothorax and pneumomediastinum extending in neck. Rigid bronchoscope was done under general anaesthesia. On rigid bronchoscopy, a 10 cm bronchial cast was taken out which was resembling wax model of bronchial tree. (fig. 2)

febrile having temperature of 101° F, pulse rate was 90/minute and respiratory rate 20 /minute. There was no stridor. A definite crepitus was palpable in neck. The air entry to left lung was reduced. Other systemic examination was normal. He was diagnosed as a case of pneumothorax (left) with subcutaneous surgical emphysema (Fig. 3).



Figure 3

The rapid and sudden progression of symptoms and unusual presentation of surgical emphysema without any history of trauma suggested rupture of a hollow viscus. The child gave history of eating beetle nut 2 days back which was followed by a bout of coughing. Thereafter he was asymptomatic until he presented with respiratory discomfort and emphysema. At this stage computed tomography (CT) scan of thorax was done which showed diffuse emphysema involving the neck spaces and lateral chest wall, pneumomediastinum with left pneumothorax, collapse of left lung, abrupt narrowing of left main bronchus in its distal part, right lung shows compensatory

hyperinflation with left mediastinal shift.(Fig. 4).'



Emergency bronchoscopy under general anaesthesia using rigid bronchoscope revealed pieces of beetle nut in left main bronchus which was removed. Antibiotics and bronchodilators were continued. The patient showed good recovery and subcutaneous emphysema gradually subsided with normal lung expansion.



Figure 1 showing the child with subcutaneous emphysema Figure 2 showing the bronchial cast

Case 2 A twelve year old male child presented in an emergency room with complaints of mild respiratory distress, cough of 48 hours duration. Clinical examination revealed that the child was

case 3 A one year old female child presented with history of pneumonia getting treated since last one - one and a half month. She was not relieved inspite of treatment given by paediatrician. Five days prior she developed pneumothorax for which inter costal drain on left side was inserted. She did not get relieved a bit but then developed subcutaneous emphysema on her left side extending upto her left upper eyelid.(fig. 5)



Figure 5

Contrast Enhanced CT scan Thorax was suggestive of non enhancing soft tissue density measuring 12x4 mm in left main bronchus along with left pneumothorax. (fig.6 & 7)

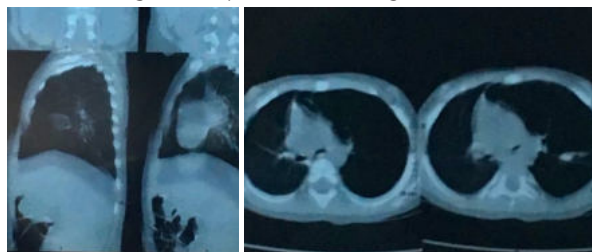


Figure 6

Figure 7

Then she was planned for rigid bronchoscopy in which peanut was taken out of left main bronchus. Post operative recovery was uneventful implying her subcutaneous emphysema, pneumothorax and pneumonia subsided.

Case 4 A three and a half year old female was referred from paediatrician in which there was history of a choking episode while eating chana four days back. Her parents made her vomit out the food stuff. But since then she was coughing continuously. She also developed subcutaneous emphysema over her left eye, face and neck though she was not in any respiratory stridor. A chana was found in her left main bronchus during rigid bronchoscopy. Postoperatively her emphysema regressed gradually and she became asymptomatic.

Case 5 A one and a half year old female child presented with a history of recurrent pneumonia since last three – three and a month. Since last six days she developed mild respiratory distress with gradually progressive subcutaneous emphysema over her right side of the body.

On auscultation, there was decreased air entry on the left side of chest. Chest X-ray showed left side pneumothorax. On rigid bronchoscopy, betel nut was found in left bronchus which was removed. Postoperative recovery was uneventful.



Figure 7



Figure 8



Figure 9 showing foreign body

Discussion: Foreign body aspiration is very common in children of less than three years of age as they have inadequately developed protective respiratory reflexes.[5]. Pneumomediastinum and subcutaneous emphysema with or without pneumothorax are uncommon presentation with foreign body in the airway. Only few such cases have been reported in the literature.[2,3,4,6] Ramodan et al [7] and Valdorino et al [8], have both reported a single case of a two years old child who presented with pneumomediastinum and subcutaneous emphysema following foreign body aspiration. There are two mechanisms of development of such a phenomena. First is related with the foreign body behaving as a "one-way valve" allowing air to enter but not to exit out of the affected part of the lung causing trapping of air, thus gradually increasing the distal volume and pressure. This forms a sufficient pressure gradient across the alveoli causing the alveolar membrane rupture through which air travels along the blood vessels to the mediastinum.[9,10]

Second mechanism is due to mechanical disruption of the mucosal membrane of bronchus or airway through which air enters in the tissue under pressure. During the cough or respiratory distress, high pressure gradient is generated to push the air through disrupted mucosal membrane which travels along perivascular and peribronchial interstitial tissue to the mediastinum resulting in pneumomediastinum.[11]

Air in the mediastinum moves to the subcutaneous tissue under pressure gradient through a peculiar arrangement of fascial planes in the neck, chest and abdomen which result in the development of subcutaneous emphysema.[10] Coughing, valsalva manoeuvre, high airway pressure, positive end expiratory pressure (PEEP) etc. are the risk factors for subcutaneous emphysema.[12]

Also there was a typical finding in this study that all the patients had foreign body on their left bronchi and then had subsequent development of subcutaneous emphysema. There is a high possibility that angulation of the left bronchi increases the chances of either of the two mechanisms to occur. There was no other documented proof but it seems that foreign body if impacted in the left bronchi are more susceptible for developing further complications like subcutaneous emphysema and pneumomediastinum. So a high suspicion can decrease the morbidity due to this illness. Also the foreign bodies found during the procedures were round, smooth and atraumatic. So it may be concluded that the type of foreign body does not make any difference.

Footnotes

Source of Support: Nil

Conflict of Interest: None declared.

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