

Subcutaneous Emphysema in a Healthy Child: An Unusual Clue for the Diagnosis of Foreign Body Aspiration

Seied Mohsen Emami¹, Mohammad Shurideh Yazdi², Reza Jafarzadeh Esfehani^{3,4*}

1. Sabzevar University of Medical Sciences, Sabzevar, Iran

2. Department of Otorhinolaryngology, Sabzevar University of Medical Sciences, Sabzevar, Iran

3. Department of Medical Genetics, Mashhad University of Medical Sciences, Mashhad, Iran

4. Medical Genetics Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

ABSTRACT

Background: Spontaneous pneumomediastinum (SPM) and subcutaneous emphysema are rare findings in children. Various etiologies have been reported for SPM, such as foreign body aspiration in infants, especially in those aged less than three years. In addition to the complications associated with foreign body aspiration, SPM may also become a life-threatening condition if left untreated. In the present report, we discussed a case of subcutaneous emphysema, pneumothorax, and pneumomediastinum in a 13-month-old infant previously treated for pneumonia.

Case report: The infant was initially presented with subcutaneous emphysema of the neck, without respiratory distress following pneumonia. In the chest radiography, mediastinal shift and possible pneumothorax were reported, and a chest tube was inserted as the respiratory condition deteriorated. Emergency bronchoscopy showed a foreign body lodged in the left respiratory tract, which was removed. Three days later, the chest tube was detached, and the patient was discharged in healthy conditions within the next two days.

Conclusion: Pediatricians constantly need to consider the risk of foreign body aspiration, particularly in the presence of respiratory complications, such as SPM, even in the infants with an unreliable history of foreign body aspiration.

Keywords: Foreign Bodies, Pneumothorax, Subcutaneous Emphysema

Introduction

Foreign body aspiration is a common cause of respiratory distress in children. While foreign body aspiration may present with few symptoms, some of its main presentations include choking, wheezing, cough, and respiratory distress (1). It is notable that other presentations have also been reported in this regard.

Spontaneous pneumomediastinum (SPM) is defined as the mediastinal air leak that is not caused by mechanical ventilation or trauma. SPM is an uncommon finding in children and might rarely occur due to foreign body aspiration (2, 3). Other causes of SPM include infections, asthma, and esophageal rupture (4, 5). In the children aged less than seven years, occurrence of SPM is most likely due to respiratory tract infections. Foreign body aspiration is also a rare, possible cause of SPM in this age range, especially in the infants aged less than three years (4, 6).

In the current study, we aimed to discuss a case of foreign body aspiration with subcutaneous emphysema and SPM in an infant.

Case report

A 13-month-old male infant was referred to the pediatric clinic due to a sudden bulging on the right side of his neck. The infant was not in poor health and had stable vital signs (heart rate: 90 beat/min, respiratory rate: 26 breath/min, systolic blood pressure: 90 mmHg, diastolic blood pressure: 60 mmHg, body temperature: 37.5°C) and 96% oxygen saturation. In the physical examination, a significant bulging was observed on the right side of the infant's neck with crepitation. Moreover, the patient had reduced respiratory sounds on the left side, as well as positive Hamman's crunch.

The infant had been hospitalized in the past

* Corresponding author: Reza Jafarzadeh Esfehani, Department of Medical Genetics, Faculty of Medicine, Mashhad, Iran. Tel: +989155082272; Email: drrezajafarzadeh@yahoo.com

Please cite this paper as:

Emami SM, Shurideh Yazdi M, Jafarzadeh Esfehani R. Subcutaneous Emphysema in a Healthy Child: An Unusual Clue for the Diagnosis of Foreign Body Aspiration. Iranian Journal of Neonatology. 2017 Sep; 8(3). DOI: [10.22038/ijn.2017.15072.1164](https://doi.org/10.22038/ijn.2017.15072.1164)



Figure 1. First Chest Radiograph of Patient Showing Mediastinal Shift and Subcutaneous Emphysema

two weeks and discharged in healthy conditions, with the final diagnosis of pneumonia. He had no history of asthma or trauma. After admission, anterior-posterior chest radiography was performed on the patient, which showed pneumothorax on the left side and subcutaneous emphysema and mediastinal shift toward the right side of the neck (Figure 1).

While the neck subcutaneous emphysema progressed rapidly to the whole neck and upper thorax, respiratory distress gradually developed in the infant. A right-sided chest tube was inserted, and the patient was scheduled for an emergency bronchoscopy in order to evaluate the airway. No pathological findings were observed in the trachea and right bronchial tree. However, a black delta-shaped foreign body was detected on the left side of the chest after observing the origination of the upper lobe bronchus. Furthermore, the middle and lower lobe bronchi were obstructed.

The foreign body was successfully removed using forceps, with minimal trauma and hemorrhage. After bronchoscopy, the chest tube malfunctioned, and the patient underwent high-resolution computed tomography (HRCT) before reinserting the chest tube. HRCT was indicative of possible pneumomediastinum, as well as pneumothorax and subcutaneous emphysema (Figure 2).

After resolving the emphysema and improvement of the clinical respiratory symptoms, resolving of the pneumothorax was evaluated by chest radiographs. The chest tube was removed after three days, and oxygen therapy with oxyhood was discontinued. The patient was discharged within the next two days in healthy conditions, with no respiratory distress.

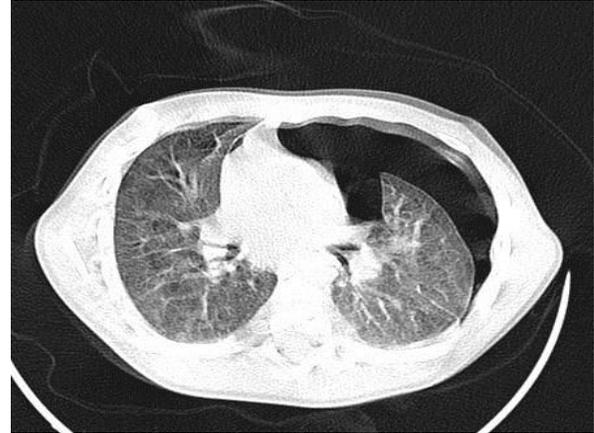


Figure 2. Computed Tomography Scan Showing Left-Sided Pneumothorax with Mediastinal Shift and A Small Air Density in Anterior Aspect of Heart Resembling Possible Pneumomediastinum

Discussion

Tracheobronchial foreign body aspiration is an important, preventable cause of mortality and morbidity among children (7). Approximately 10% of the infants with nonfatal choking are hospitalized, while the others are immediately treated and discharged. The majority of the food-related choking cases are caused by eating hard candies, candies, meat, and bones (8). Fatal complications of foreign body aspiration include esophageal perforation, pneumothorax, pneumomediastinum, mediastinitis, and subcutaneous emphysema (9).

With the possible history, a high index of suspicion must be considered, and diagnostic procedures should be performed, even in the infants with no symptoms or complications associated with foreign body aspiration (10). Chest radiography is an effective tool for the diagnosis of foreign body aspiration. However, these modalities might lack diagnostic accuracy and show normal results despite the presence of a foreign body (11).

Obstructive emphysema and atelectasis are common radiographic findings in the children with foreign body aspiration (11). Subcutaneous emphysema is a rare finding, which is only presented in less than 1% of the patients (11). Moreover, SPM should be considered in the children presenting with cough, chest pain, and dyspnea with neck or throat pain. Therefore, careful physical examination for Hamman's crunch and neck crepitus is mandatory, while posterior-anterior and lateral chest radiography are required as well (3).

Pneumothorax may coexist with pneumomediastinum, even as a separate entity or result of the air track between the visceral and parietal pleura (12). Although the detection and treatment of the

precipitating factors are the cornerstone of therapy, SPM may resolve spontaneously within days with conservative management, including adequate bed rest, oxygen therapy, and using analgesics (3).

Whether the imaging results are normal or abnormal, a history of foreign body aspiration is considered a strong indication for bronchoscopy (13). Rigid bronchoscopy can be performed by experienced healthcare professionals on all the suspected cases of foreign body aspiration (7). While bronchoscopy is the preferred approach in the treatment of airway foreign bodies, the associated complications are inevitable even in well-equipped care centers with experienced staff (14).

Conclusion

Foreign body aspiration is a common, preventable condition in children. Despite well-known presentations, physicians should be aware of the unnoticed presentations or complications associated with foreign body aspiration, such as subcutaneous emphysema and SPM, which are relatively rare in this regard. Furthermore, a high suspicion index must be considered in all the infants and children with and without the history of foreign body aspiration, who present with subcutaneous emphysema and SPM.

Conflicts of interests

None declared.

References

- Moghadam HM, Jafarzadeh M, Meimaneh A. Foreign body aspiration in children. *Iran J Pediatr*. 2007; 17(Suppl 2):281-4.
- Anantasit N, Manuyakorn W, Anantasit N, Choong K, Preuthipan A. Spontaneous pneumomediastinum in non-asthmatic children with exercise-induced bronchoconstriction. *Am J Case Rep*. 2015; 16:648-51.
- Chiu CY, Wong KS, Yao TC, Huang JL. Asthmatic versus non-asthmatic spontaneous pneumomediastinum in children. *Asian Pac J Allergy Immunol*. 2005; 23(1):19-22.
- Lee CY, Wu CC, Lin CY. Etiologies of spontaneous pneumomediastinum in children in middle Taiwan. *Pediatr Pulmonol*. 2010; 45(9):869-73.
- Lee CY, Wu CC, Lin CY. Etiologies of spontaneous pneumomediastinum in children of different ages. *Pediatr Neonatol*. 2009; 50(5):190-5.
- Hu M, Green R, Gungor A. Pneumomediastinum and subcutaneous emphysema from bronchial foreign body aspiration. *Am J Otolaryngol*. 2013; 34(1):85-8.
- Oncel M, Sunam GS, Ceran S. Tracheobronchial aspiration of foreign bodies and rigid bronchoscopy in children. *Pediatr Int*. 2012; 54(4):532-5.
- Chapin MM, Rochette LM, Annest JL, Haileyesus T, Conner KA, Smith GA. Nonfatal choking on food among children 14 years or younger in the United States, 2001-2009. *Pediatrics*. 2013; 132(2):275-81.
- Mirza B, Saleem M, Sheikh A. Broken piece of silicone suction catheter in upper alimentary tract of a neonate. *APSP J Case Rep*. 2010; 1(1):8.
- Pokharel R, Adhikari P, Bhusal CL, Guragain RP. Oesophageal foreign bodies in children. *JNMA J Nepal Med Assoc*. 2008; 47(172):186-8.
- Boufersaoui A, Smati L, Benhalla KN, Boukari R, Smail S, Anik K, et al. Foreign body aspiration in children: experience from 2624 patients. *Int J Pediatr Otorhinolaryngol*. 2013; 77(10):1683-8.
- Bonin MM. Hamman's syndrome (spontaneous pneumomediastinum) in a parturient: a case report. *J Obstet Gynaecol Can*. 2006; 28(2):128-31.
- Soysal O, Kuzucu A, Ulutas H. Tracheobronchial foreign body aspiration: a continuing challenge. *Otolaryngol Head Neck Surg*. 2006; 135(2):223-6.
- Zerella JT, Dimler M, McGill LC, Pippus KJ. Foreign body aspiration in children: value of radiography and complications of bronchoscopy. *J Pediatr Surg*. 1998; 33(11):1651-4.