

Case Report

Subcutaneous emphysema due to bronchial foreign body demonstrated by multidetector-row computed tomography

Nisar Ahmad Wani, Umar A. Qureshi¹, Tasleem Kosar, Mushtaq A. Iqbal²

Department of Radiodiagnosis and Imaging, ¹Pediatrics, ²Cardiovascular and Thoracic Surgery, Sher-I- Kashmir Institute of Medical Sciences (SKIMS), Srinagar, Jammu and Kashmir, India

ABSTRACT

Foreign body aspiration is an important cause of emergency hospital admissions in young children less than 3 years of age. It may manifest with acute respiratory difficulty, choking and wheeze acutely or may be asymptomatic. Surgical emphysema is an unusual presentation of bronchial foreign body aspiration in young children. We describe an infant with bronchial foreign body aspiration that manifested with subcutaneous emphysema and pneumomediastinum. Multidetector-row CT with virtual bronchoscopy helped in the diagnosis by detecting and localizing the intraluminal foreign body in the right main bronchus that was removed with rigid bronchoscopy.

KEY WORDS: Foreign body aspiration, multidetector-row CT (MDCT), virtual bronchoscopy

Address for correspondence: Dr. Nisar A. Wani, Department of Radiodiagnosis and Imaging, Sher-I-Kashmir Institute of Medical sciences, Srinagar 190 011, India. E-mail: ahmad77chinar@rediffmail.com

INTRODUCTION

Foreign body aspiration is common in children from 1 to 3 years of age. Commonly vegetable matter such as seeds are accidentally inhaled into the airway. If foreign body lodges in the region of larynx immediate stridor or choking results; impaction lower down in the bronchial lumen may be less dramatic or even asymptomatic.^[1] As the history and physical examination findings are not yielding many times, diagnosis may be difficult without bronchoscopy. This emphasizes the importance of radiological investigations in the diagnosis. X-ray is negative in a large number of cases with nonradiopaque foreign bodies.^[2,3] Cross-sectional imaging with computed tomography (CT) helps in evaluation lungs, bronchi and mediastinum. Three dimensional reconstructions with endoluminal navigation is possible with recently developed multidetector-row CT (MDCT) which gives endoscopic view of trachea and bronchi.^[2,4] This enhances the diagnosis of intraluminal obstructing lesions noninvasively and planning of

definitive intervention.^[2]

CASE REPORT

A 12-month-old male child presented with respiratory distress, cough and swelling of the neck for 12 h. On examination he had a temperature of 101° F, pulse rate of 110/min and respiratory rate of 42/min. Suprasternal retractions were evident; there was no stridor. Diffuse swelling over the neck, upper part of chest and left axilla was visible. The swelling was soft, non tender with a palpable crepitus. There was decrease air entry with wheeze on right side of chest on auscultation. Other systemic examination was normal. There was no history suggestive of foreign body inhalation, bronchial asthma or prior respiratory tract infection. At admission he had oxygen saturation of 95%. Arterial blood gases were within normal limits. Chest radiograph showed subcutaneous emphysema and hyperlucent right hemithorax. CT scan of chest was performed on a 64 slice MDCT scanner without injection of contrast medium. Scanning parameters used for the noncontrast CT chest were as following: slice thickness 5 mm; pitch factor 1.4; tube voltage-120 kV; tube current- 45 mA, with an estimated radiation dose of 3.03 mSv.

Transverse plane CT images in lung window showed gas within mediastinum and extending into neck and chest wall on both sides [Figure 1a]. Lower down

Access this article online	
Quick Response Code: 	Website: www.lungindia.com
	DOI: 10.4103/0970-2113.85693

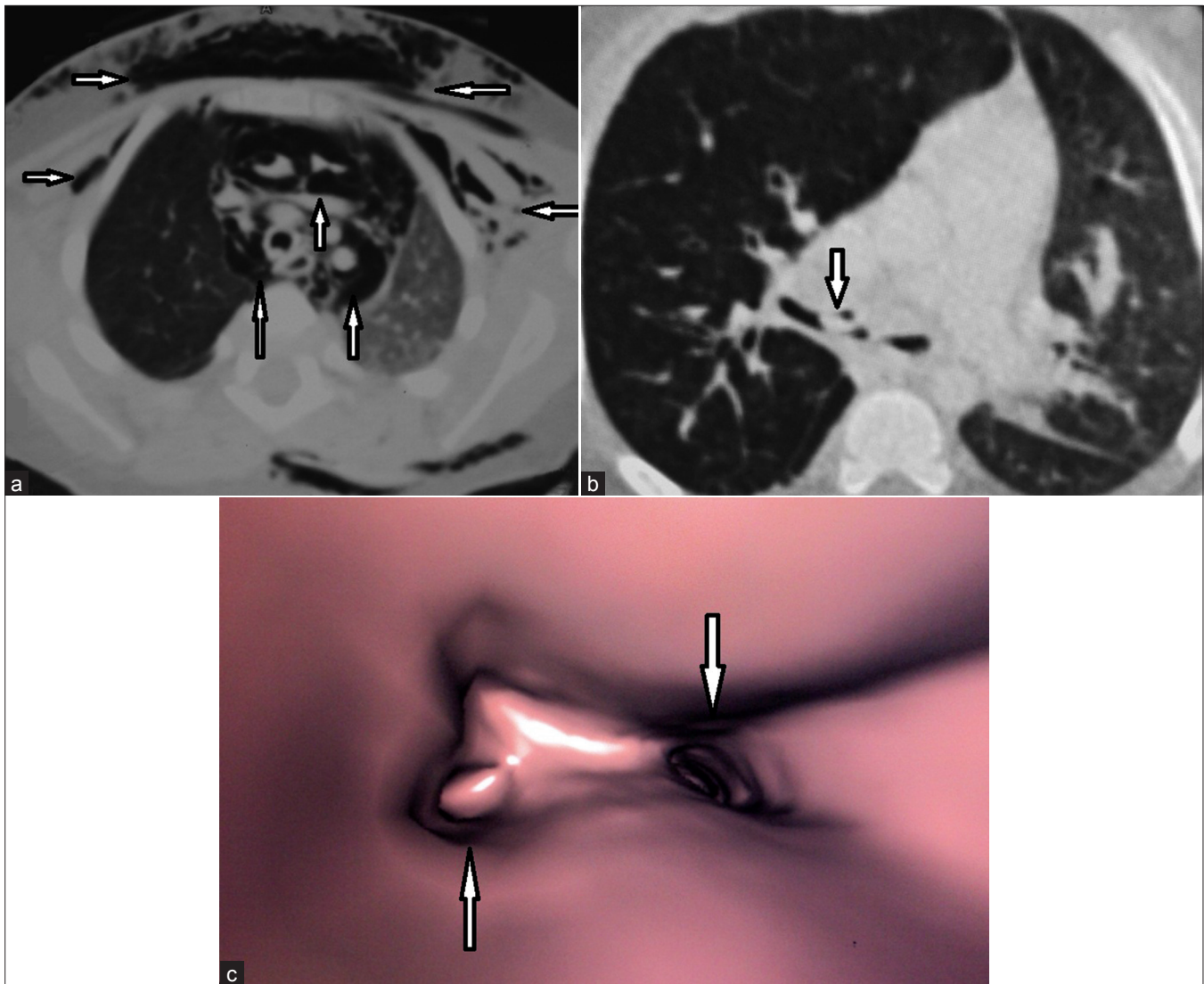


Figure 1: (a) Transverse lung window CT image through the upper lobes showing mediastinal gas (upward arrows) and gas in the chest wall (right and leftward arrows) on both sides (pneumomediastinum with subcutaneous emphysema). (b) Transverse lung window CT image through main bronchi shows soft tissue attenuation structure within the lumen of right main bronchus (arrow); right lung appears more lucent as compared to left due to hyperinflation. (c) Virtual bronchoscopy image through the carina shows an occluding lesion within right main bronchus compatible with a foreign body (upward arrow); left main bronchus is patent (downward arrow).

at the level of tracheal bifurcation an intraluminal soft-tissue attenuation structure was seen within right main bronchus [Figure 1b]. Three-dimensional reconstruction of thin (sub millimeter) slices with endoluminal navigation of tracheobronchial tree called virtual bronchoscopy (VB), was performed which delineated intraluminal obstructing lesion in the right main bronchus just beyond tracheal bifurcation [Figure 1c]. A diagnosis of foreign body in right main bronchus with pneumomediastinum and subcutaneous emphysema was made. Emergency bronchoscopy using rigid bronchoscope revealed a vegetable foreign body (peanut) in right main bronchus which was removed. The patient showed good recovery and subcutaneous emphysema gradually subsided.

DISCUSSION

Foreign body aspiration into tracheobronchial tree is commonly seen in young children less than three years due to incomplete laryngeal closure and inadequate swallowing reflex in this age. This incident could be life threatening particularly in infants due to small caliber of the airway. Initially an incident of choking or gagging is reported followed by cough and wheezing when foreign body crosses larynx and enters trachea and bronchi. Besides manifesting with respiratory distress of variable degree, bronchial occlusion may result in pneumonia, lung abscess, bronchiectasis, and rarely pneumomediastinum.^[1-3] Development of pneumomediastinum after foreign body aspiration is related to a ball valve mechanism set up due

to bronchial occlusion. Post obstructive overinflation may result in development of high pressure gradient between intraalveolar air and perivascular interstitial connective tissue.^[1-3] Alveolar or airway breach allows escape of air into the perivascular tissue around the pulmonary arteries which communicates with mediastinum from which air may ascend into the neck and chest wall. Air may extend into retroperitoneum and epidural space also.^[1,3]

Because of the risks and complications with neglected tracheobronchial foreign bodies, early diagnosis and prompt removal is warranted. However, the condition is often not diagnosed immediately because there are no specific clinical manifestations and the classic clinical presentation, with coughing, wheezing, and diminished air inflow, is seen in less than 2/5th of the patients.^[2-4] After history and meticulous clinical examination, radiological evaluation is the first step in the investigation of possible foreign body aspiration. Direct identification of tracheobronchial foreign bodies on chest radiographs is possible in case of metallic objects. However, most inhaled foreign bodies are nonradiopaque and their presence is suggested only by secondary changes including segmental or lobar collapse, air trapping in unilateral hyperlucent lung, and postobstructive lobar or segmental infiltrates.^[2,4] However, these findings are nonspecific and have low accuracy. CT enhances the detection of intrabronchial foreign body and secondary parenchymal changes; this is particularly true for multidetector-row CT which allows rapid imaging speed and thinner slices with better spatial resolution for three dimensional reconstructions including virtual bronchoscopy.^[2,5]

Virtual endoscopy of the tracheobronchial system is a relatively new postprocessing technique that takes advantage of the natural contrast between the airway and surrounding tissues.^[4-6] VB generated from thin slice axial images provides endoscopist's view of the internal surface of the airway. Endoluminal abnormalities depicted with VB show an excellent correlation with fiberoptic bronchoscopy results regarding the location, severity, and shape of airway narrowing.^[5,6] VB can thus demonstrate the presence and location of foreign body without need for anesthesia, avoiding complications associated with

bronchoscopy for diagnosing a suspected tracheobronchial foreign body.^[7,8] Use of rigid bronchoscopy can be restricted to the removal of foreign body thus identified. Exposure factors need to be altered in children to achieve as low as possible radiation exposure.^[7]

CONCLUSION

Diffuse neck swelling in an infant associated with cough may be due to subcutaneous emphysema as part of pneumomediastinum. Unilateral wheeze in such a case should give rise to a strong suspicion of foreign body inhalation into the bronchus. Virtual bronchoscopy using MDCT enhances the detection and helps in localization of bronchial foreign body and hence expedites proper management. Radiation dose needs to be kept at minimum during such an examination for young children.

REFERENCES

1. Findlay CA, Morrissey S, Paton JY. Subcutaneous emphysema secondary to foreign-body aspiration. *Pediatr Pulmonol* 2003;36:81-2.
2. Sodhi KS, Saxena AK, Singh M, Rao KL, Khandelwal N. CT virtual bronchoscopy: New non invasive tool in pediatric patients with foreign body aspiration. *Indian J Pediatr* 2008;75:511-3.
3. Tambe P, Kasat LS, Tambe AP. Epidural emphysema associated with subcutaneous emphysema following foreign body in the airway. *Pediatr Surg Int* 2005;21:721-2.
4. Koşucu P, Ahmetoğlu A, Koramaz I, Orhan F, Ozdemir O, Dinç H, *et al.* Low-dose MDCT and virtual bronchoscopy in pediatric patients with foreign body aspiration. *AJR Am J Roentgenol* 2004;183:1771-7.
5. Haliloglu M, Ciftci AO, Oto A, Gumus B, Tanyel FC, Senocak ME, *et al.* CT virtual bronchoscopy in the evaluation of children with suspected foreign body aspiration. *Eur J Radiol* 2003;48:188-92.
6. Burke AJ, Vining DJ, McGuirt WF Jr, Postma G, Browne JD. Evaluation of airway obstruction using virtual endoscopy. *Laryngoscope* 2000;110:23-9.
7. Adaletli I, Kurugoglu S, Ulus S, Ozer H, Elicevik M, Kantarci F, *et al.* Utilization of low-dose multidetector CT and virtual bronchoscopy in children with suspected foreign body aspiration. *Pediatr Radiol* 2007;37:33-40.
8. Cevizci N, Dokucu AI, Baskin D, Karadağ CA, Sever N, Yalçın M, *et al.* Virtual bronchoscopy as a dynamic modality in the diagnosis and treatment of suspected foreign body aspiration. *Eur J Pediatr Surg* 2008;18:398-401.

How to cite this article: Wani NA, Qureshi UA, Kosar T, laway MA. Subcutaneous emphysema due to bronchial foreign body demonstrated by multidetector-row computed tomography. *Lung India* 2011;28:291-3.

Source of Support: Nil, **Conflict of Interest:** None declared.