

Coal As An Unusual Trachea-Bronchial Foreign Body In A Child

J S Gulia, S P Yadav, K Pal, P Raghove

Citation

J S Gulia, S P Yadav, K Pal, P Raghove. *Coal As An Unusual Trachea-Bronchial Foreign Body In A Child*. The Internet Journal of Otorhinolaryngology. 2013 Volume 15 Number 1.

DOI: [10.5580/IJORL.1609](https://doi.org/10.5580/IJORL.1609)

Abstract

Foreign body in paediatric airway is a potentially life threatening situation, which requires emergency endoscopic removal. The removal of foreign body presents considerable problems, both to the endoscopist and the anesthesiologist. It is a challenging procedure for the anesthesiologist to maintain airway for adequate ventilation and oxygenation in patients whose pulmonary gas exchange is already compromised. We report a case of eighteen month old child who aspirated lump of coal while playing and was managed by emergency bronchoscopy.

INTRODUCTION

Accidental inhalation of both organic and non-organic foreign bodies continues to be a cause of childhood morbidity and mortality, requiring prompt recognition and early treatment to minimize the potentially serious and sometimes fatal consequences¹. In the United States of America, the presence of a foreign body in the respiratory tract constitutes a direct cause of approximately 3,000 deaths an year, while in the children below 3 years of age, it accounts for 7% of sudden deaths^{2,3}. The diagnosis and treatment of children with a foreign body in the respiratory tract is a complex process, which requires close cooperation of a pediatric, pulmonological and surgical team⁴.

CASE REPORT

An 18 months old female baby weighing eight kilogram, presented to the emergency department with a history of breathing difficulty and weak cry for last three hours. She was brought by her parents who told that she developed respiratory difficulty while playing at the construction site, where her parents were working. On examination the baby was tachypnoeic and restless. She was found to have chest retraction, wheeze and decreased air entry on the both sides of chest. On basis of history and physical examination foreign body aspiration was suspected and she was immediately shifted to operation table for emergency bronchoscopy. On operation table her room air saturation was 84%.

An intravenous catheter was inserted in the hand. She was pre-oxygenated with 100% oxygen and her SpO₂ improved to 92% with oxygen. Inj. atropine sulphate 0.02 mg/kg-1 was administered IV to decrease secretions and to obtund autonomic reflexes during airway instrumentation. She was induced with ketamine hydrochloride one mg/kg-1 intravenously and oxygen in halothane 2-3% by face mask. Monitoring included ECG, SpO₂, precordial stethoscope, ETCO₂ and noninvasive blood pressure (NIBP). After achieving adequate depth, laryngoscopy was done and the vocal cords were sprayed with 20 mg of lignocaine (1ml of 2% lignocaine). A 5 mm rigid bronchoscope was introduced into the trachea when anesthesia seemed adequate. Maintenance of anaesthesia was achieved with O₂ and halothane (1-2%), which was delivered through the side port of the rigid bronchoscope using Jackson Rees modification of Ayre's T- piece. Intermittent boluses of ketamine in 5 mg supplements were given if there was any sign of a light plane of anaesthesia.

Rigid bronchoscopy revealed a large coal piece in the trachea which was blocking the airways. Because of the large size of the FB, removal through the bronchoscope became difficult. The surgeon was able to grasp the FB with forceps and bronchoscope, forceps and foreign body were removed together. After removal of this large piece of coal, ventilation and oxygen saturation improved. Bronchoscope was introduced again and 3-4 small pieces of coal were removed from trachea and right bronchus. Inj.

Dexamethasone (0.4 mg/kg-1) IV and bronchodilators were given prophylactically. Patient was monitored continuously by pulse oximetry and ECG. The child was shifted to the ward when awake and comfortable. A chest X-ray was taken at 6-8 hours post bronchoscopy to assess lung expansion.

DISCUSSION

Foreign body aspiration occurs commonly in children between one and three years of age and consists most frequently of peanuts, seeds and other food particles and less frequently of plastic and metal particles. The natural urge to explore the objects by mouth, lack of molar teeth, crying and playing while eating and lack of parental supervision contributes to this hazard in this age group.⁵

Aspirated foreign body can lodge in the larynx, trachea, or bronchus and 80 to 90% are located in the bronchi. In adults, bronchial foreign bodies tend to get lodged in the right main bronchus because of its lesser angle of convergence compared with the left bronchus and because of the location of the carina left of the midline. Because the angles made by the main stem bronchi with the trachea are identical until age 15 years, foreign bodies are found on either side with equal frequency in patients in this age group (< 15 years).⁶

The main symptoms associated with aspiration are suffocation, cough, stupor, excessive sputum production, cyanosis or difficulty in breathing. These symptoms develop immediately after the aspiration^{7,8}. Management of inhaled foreign body depends on the site of impaction of foreign body. Laryngeal and subglottic foreign bodies need urgent intervention in the form of tracheostomy or urgent bronchoscopy, whereas foreign bodies in the right or left main bronchus cause comparatively less airway problem.^{9,10}

Since clinical and radiological findings of FB inhalation, in delayed cases, may mimic other disorders, the clinician must be aware of the likelihood of foreign body aspiration especially in the presence of unilateral wheezing and decreased breath sounds.¹¹

As most inhaled foreign bodies are radiolucent, clues as to their location on radiographs depends on secondary signs of complete or partial airway obstruction. The plain chest X-ray reveal radio-opaque FBs in 23.56% of all patients with FB inhalation and many chest radiographs may have completely negative findings, especially within the first 24 hours following aspiration.¹¹ A positive history and clinical symptoms of aspiration are sufficient to justify endoscopy for diagnosis and retrieval of the foreign body. A child, with aspiration, who is presenting with respiratory distress and

hypoxemia should receive 100% oxygen and should be taken directly to the operating room for immediate bronchoscopy.¹²

Bronchoscopy is indicated with an appropriate history and when a FB is suspected. To prevent delayed diagnosis, characteristic symptoms, and clinical and radiological signs of FB inhalation should be checked in all suspected cases. Since clinical and radiological findings of FB inhalation, in delayed cases, may mimic other disorders, the clinician must be aware of the likelihood of FB. The ideal means of FB removal is rigid bronchoscopy under general anaesthesia¹³ with the removal rate of in 97.2% of patients with trachea-bronchial foreign bodies.¹⁴

The technique of anesthesia for foreign body removal in children is influenced by the general condition of the patient, the preference and experience of the anesthesiologist and the surgeon, and the type and location of the foreign body. A T-piece circuit is attached to the sidearm of the bronchoscope to allow delivery of oxygen and anaesthetic gases during the procedure. The presence of the telescope, with the viewing end occluded, results in a closed system, through which spontaneous or controlled ventilation may occur. There are advocates for both spontaneous and controlled ventilation. We preferred spontaneous ventilation as positive-pressure ventilation may cause dislodgment of the foreign body further distally into the bronchial tree, thus making retrieval more difficult or, worse, creating a "ball-valve" obstruction with clinical deterioration¹⁵. The other major advantage of spontaneous ventilation is the lack of a disruption of ventilation when the surgeon is attempting to retrieve the foreign body with the bronchoscope's ocular piece open¹⁶. Sevoflurane is inhalational agent of choice in such situation because when halothane is used as the primary anesthetic during this procedure, concentrations that obliterate airway reflexes may cause decreased myocardial contractility, but its unavailability was our limitation. We decreased the concentration of halothane to safe level by using ketamine and use of topical lignocaine. After the bronchoscopy, the child should be observed in an anesthesia recovery room for stridor, respiratory distress or other signs suggestive of subglottic edema, damaged teeth, hemorrhage, bronchospasm and airway perforation. A chest radiograph should be obtained following bronchoscopy to exclude the presence of pneumothorax or mediastinal emphysema.

References

1. Mani N, Soma M, Massey S, Albert D, Bailey CM. Removal of inhaled foreign bodies- middle of the night or the next morning? *Int J Pediatr Otorhinolaryngol.* 2009;73:1085-9.

2. Zerella JT, Dimler M, McGill LC, Pippus KJ. Foreign body aspiration in children: value of radiography and complications of bronchoscopy. *J Pediatr Surg*. 1998;33:1651-4.
3. Baharloo F, Veyckemans F, Francis C, Bietlot MP, Rodenstein DO. Tracheobronchial foreign bodies: presentation and management in children and adults. *Chest*. 1999; 115:1357-62.
4. Das S, Basu SR, Mandal M, Lahiri S. *J Anesthesiol Clin Pharmacol* 2011; 27: 144-5.
5. Saki N, Nikalhlagh S, Rahim F, Abshirini H. Foreign body aspirations in infancy: a 20-year experience. *Int J Med Sci* 2009; 6: 322-8.
6. Cleveland RH. Symmetry of bronchial angles in children. *Radiology* 1979;133:89-93.
7. Kiyan G, Gocmen B, Tugtepe H, Karakoc F, Dagli E, Dagli TE. Foreign body aspiration in children: The value of diagnostic criteria. *Int J Pediatr Otorhinolaryngol*. 2009;73:963-7.
8. Tomaske M, Gerber AC, Stocker S, Weiss M. Tracheobronchial foreign body aspiration in children - diagnostic value of symptoms and signs. *Swiss Med Wkly* 2006; 136:533-8.
9. Zaupa P, Saxena AK, Barounig A, Höllwarth ME. Management strategies in foreign-body aspiration. *Indian J Pediatr*. 2009; 76:157-61.
10. Dunn GR, Wardrop P, Lo S, Cowan DL. Management of suspected foreign body aspiration in children. *Clin Otolaryngol Allied Sci*. 2004; 29:286.
11. Passali D, Lauriello M, Bellussi L, Passali GC, Passali FM, Gregori D. Foreign body inhalation in children: an update. *Acta Otorhinolaryngol Ital*. 2010; 30: 27-32.
12. Kim IG, Brummitt WM, Humphry A, Siomra SW, Wallace WB. Foreign body in the airway: a review of 202 cases. *Laryngoscope* 1973; 83: 347-54.
13. Pinzoni F, Boniotti C, Molinaro SM, Baraldi A, Berlucchi M. Inhaled foreign bodies in pediatric patients: review of personal experience. *Int J Pediatr Otorhinolaryngol* 2007;71:1897-903.
14. Divisi D, Di Tommaso S, Garramone M, Di Francesantonio W, Crisci RM, Gravina GL et al. Foreign bodies aspirated in children: role of bronchoscopy. *Thorac Cardiovasc Surg* 2007;55:249-52.
15. Chatterji S, Chatterji P. The management of foreign bodies in air passages. *Anaesthesia* 1972; 27: 390-5.
16. Brown TC, Clark CM. Inhaled foreign bodies in children. *Med J Aust* 1983; 2: 322-6.

Author Information

J Professor S Gulia, Dr, M.S, Professor

Department of Otolaryngology, Pt. B.D Sharma University of Health Sciences Rohtak Haryana, India

jsgulia@hotmail.com

S P S Yadav, Dr, M.S, MNAMS, FAMS, Senior Professor

Department of Otolaryngology, Pt. B.D Sharma University of Health Sciences Rohtak Haryana, India

Karam Pal, Dr, M.D., Associate Professor

Department of Anesthesiology, Pt. B.D Sharma University of Health Sciences Rohtak Haryana, India

Punam Raghove, Dr, M.D, Associate Professor

Department of Otolaryngology, Pt. B.D Sharma University of Health Sciences Rohtak Haryana, India