

Original article:

Study of management of foreign body aspiration

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Abstract:

Introduction: Foreign body aspiration claims many lives per year because patients rarely reach in time for intervention. Paediatric age group are particularly at risk. Delay in diagnosis leads to a series of chronic pulmonary pathologic conditions. The type of foreign body inhaled depends upon the nature of environment in which the child finds itself. Vegetative foreign bodies like seeds and nuts predominate rural areas, whereas pins and coins in urban population. Rigid bronchoscopy under general anaesthesia is gold standard treatment for removal of tracheobronchial foreign bodies.

Material and methods: All patients presenting to outpatient department or casualty, with history and clinical suspicion of foreign body aspiration were included in this study. Few patients were also referred from paediatric ward, those who were admitted for pneumonitis or bronchopneumonia, failed to respond with antibiotics and steroids. Such patients were posted for bronchoscopy to rule out an aspirated foreign body.

Results: In present study 15% of the patients of foreign body aspiration, underwent bronchoscopy within 6 hours of admission, 65% patients underwent bronchoscopy within a period of 6-24 hours after admission. In 20% patients, bronchoscopy was done after 24 hours of their admission.

Conclusion: The time of presentation, early diagnosis, and early treatment help in reducing the complications of foreign body aspiration. Rigid bronchoscopy is gold standard for removal of tracheobronchial foreign bodies.

Introduction:

Foreign body aspiration mostly presents as acute emergency with cough, choking and dyspnea. It is a serious medical condition which demands timely recognition and prompt action.⁽¹⁾ In rare cases it can present with chronic symptoms like non resolving lower respiratory tract infection.

Delay in diagnosis leads to a series of chronic pulmonary pathologic conditions.⁽²⁾ The type of foreign body inhaled depends upon the nature of environment in which the child finds itself. Vegetative foreign body predominate rural areas, whereas pins and coins in urban population^[3]. Among vegetative foreign body commonest are seeds and nuts.^[4] Non organic materials include toys, pen caps, stone, marbles, balloons. Surprisingly, however, plastic toys are not a frequent cause of foreign body aspiration in series from developing countries but they represent more than 10% of those identified in the developed world.^(5,6)

In most cases of inhaled foreign bodies, there is definite history of choking followed by paroxysmal coughing which eventually subsides. This is followed by asymptomatic period, which is responsible for delay in diagnosis. The classical symptom triad of choking, coughing and unilateral wheeze is present in most cases. Acute respiratory distress is fortunately uncommon but the most alarming presentation of inhaled foreign body^[5]. Long standing airway foreign bodies can result in spectrum of changes ranging from symptoms of cough and wheeze to recurrent or non resolving respiratory sequel. The symptoms mimic other respiratory conditions like asthma, pneumonia or tracheobronchitis, which may be wrongly diagnosed and treated.^[4] The diagnosis of tracheobronchial foreign body requires high index of suspicion by the otolaryngologists, even in absence of a positive history to prevent morbidity and mortality due to delayed diagnosis or misdiagnosis.

So, any child with history suggestive or suspicious of foreign body aspiration or with clinical or radiographic evidence of tracheobronchial foreign body is considered an emergency and should be treated immediately. Rigid bronchoscopy under general anaesthesia is gold standard treatment of choice for removal of tracheobronchial foreign body. Rigid bronchoscopy should be considered the definitive diagnostic and therapeutic intervention in all cases where history and physical examination is suggestive or suspicious of foreign body aspiration.

Material and methods:

All patients presenting to outpatient department or casualty, with history and clinical suspicions of foreign body aspiration were included in this study. Few patients were also referred from paediatric ward, those who were admitted for pneumonitis or bronchopneumonia, failed to respond with antibiotics and steroids. Such patients were posted for bronchoscopy to rule out an aspirated foreign body. In a period of two and half years of this study, 40 patients of foreign body aspiration were managed.

On admission a detailed history was recorded. The informant was asked to describe chain of events as accurately as possible. In most of the cases there was a definite history of choking followed by paroxysmal coughing. History of repeated chest infections was taken. A thorough clinical examination was carried out. Examination of respiratory system was carried out in details.

Routine hematological investigations were carried out. Important investigation was radiological evaluation. X-ray neck (AP and Lateral) and chest x-rays with postero-anterior views in expiration and inspiration were obtained, although these views were sometimes difficult to obtain in very young children. All the patients were subsequently posted for bronchoscopy. Written and informed consent was taken for rigid bronchoscopy under general anaesthesia. Patients who presented with severe respiratory distress, stridor and tachypnea due to foreign body aspiration, underwent rigid bronchoscopy as soon as possible. Whereas patients who had mild respiratory symptoms were posted for bronchoscopy after all necessary investigations were done.

Results:

Table 1: Distribution of cases according to their radiological findings.

Radiological findings	No. of cases (n =40)	Percentage (%)
Emphysema	16	40
Bronchopneumonia	06	15
Pneumonitis	04	10
Opaque foreign body	03	7.5
Collapse	02	5
Shift of mediastinum	02	5
Normal	16	40

Most of the patients presented with more than one radiological findings of FB aspiration.

Emphysema (40%) was the commonest radiological finding. 40% cases had normal X rays. 15% showed bronchopneumonia, 10% pneumonitis, 5% showed collapse of lung. Shift of mediastinum was seen in 5% cases. 7.5% cases showed radio-opaque foreign bodies

Table 2: Management of patients with aspirated foreign bodies

Timing of rigid Bronchoscopy after admission	No. of cases (n =40)	Percentage (%)
0-6 hours	6	15
6 – 24 hours	26	65
More than 24 hours	08	20
Total	40	100

In present study 15% of the patients of foreign body aspiration, underwent bronchoscopy within 6 hours of admission, 65% patients underwent bronchoscopy within a period of 6-24 hours after admission. In 20% patients, bronchoscopy was done after 24 hours of their admission.

Table 3: Distribution of cases according to post bronchoscopy complications.

Complications	Number of cases (n =40)	Percentage (%)
Laryngospasm	03	7.5
Laryngeal edema	01	2.5
Cardiac arrest	0	0
Uneventful	36	90
Total	40	100



Photograph 1) X ray chest (PA view) of a 1 year 8 months old male child with stone (radio-opaque FB) seen in right bronchus with right lung hyperinflation. Patient presented in 18 hours of FB aspiration.



Photograph 2) Chest X ray (PA view) showing homogenous radio opacity involving the left lung with absent air bronchograms, suggestive of left lung collapse in a 2 year 6 month old female child, presenting after 10 days of FB aspiration.

Discussion:

Radiological investigations like chest x ray are important for diagnosis of foreign body aspiration though not conclusive. Commonest radiological finding in our study was emphysema (40%) whereas 40% showed normal chest x ray. Wolach B et⁽⁷⁾ al observed that clinical and radiological studies were pathognomonic in most cases, but sometimes not conclusive. Pinto et al⁽⁸⁾ mentioned in his study that plain chest x-ray should remain the initial imaging modality of the patients with clinically suspected foreign body aspiration. Nevertheless, in cases with negative chest x ray and clinical suspicion of aspiration, a multi slice CT with virtual bronchoscopy may be considered where the facilities are available. In present study, all patients underwent rigid bronchoscopy under general anaesthesia. Rigid bronchoscopy is the first line option in children, because it allows for better general anaesthesia and ventilation control during the procedure.

According to Kozielski et al⁽⁹⁾, the ventilating bronchoscope remains the gold standard for safe removal of tracheobronchial foreign bodies. The familiarity and experience of the surgeon with the wide variety of available foreign body extraction forceps facilitate safe and smooth retrieval. The optical forceps have markedly improved visualization, providing excellent illumination and magnification.

Patients presenting with acute respiratory symptoms, with obvious respiratory obstruction due to FB aspiration, underwent bronchoscopy as soon as possible after admission. 6 cases underwent bronchoscopy within 6 hours. Patients having mild symptoms of respiratory obstruction by foreign body aspiration underwent bronchoscopy within a period of 6-24 hours after admission. 26 cases underwent bronchoscopy between 6 to 24 hours.

In patients who presented with fever, radiological signs of pneumonitis, and prolonged history were considered for bronchoscopy after 24 hours of their admission. 8 cases underwent bronchoscopy after 24 hours of admission. In case with foreign body aspiration with severe tachypnea, stridor, there is chance of complete obstruction.

Evans JNG⁽¹⁰⁾ recommends that in the absence of respiratory distress the operation should be performed as an elective procedure by the surgical team that are used to working together in their accustomed operating theatre. There is no place for endoscopy for a foreign body aspiration being performed in an infant by inexperienced personal in unfamiliar surrounding. Evans JNG mentioned that rigid bronchoscopy, using rigid ventilating bronchoscope, is a life saving procedure for removal of foreign body in emergency situation. The patient's management by ventilating bronchoscope reduces the mortality rate from 24% to 2% and even less, provided the patient comes to the department with available facilities.

In the present study, FBs were more commonly located in the right bronchi (65%) followed by left bronchi (35%). Vegetative foreign bodies constituted the majority (92.5%) of which groundnut was most common. Non vegetative foreign bodies were 7.5%. Jianmin Liang et al⁽¹¹⁾ in his study encountered FBs most commonly in right main bronchus (52.17%) followed by left main bronchus (39.17%) in subglottic larynx (7.4%) and bilateral bronchus in 1.4% cases. Cantaneo AJ⁽¹²⁾ et al in their studies of 74 patients suffering FBA, reported that the FB was lodged in the right bronchus is 50% and in the left bronchus is 35% and in trachea in 15% cases.

Analysis by Shivkumar et al⁽¹³⁾ revealed that the majority of foreign bodies were organic in nature (91.43%). Sersar et al⁽¹⁴⁾ reported foreign bodies mostly of vegetative origin. In our present study, the incidence of post bronchoscopic complications was 10% of which laryngospasm (7.5%) was the most commonly encountered complications which was treated by re-intubation and by giving positive pressure ventilation and 100% oxygen. Laryngeal oedema was seen in 1 case (2.5%) which was treated by (mild, not associated with stridor) antibiotics, steroids and nebulization. There was no mortality in present study. Soudabeh Haddadi et al⁽¹⁵⁾ in his study stated the condition of the patients after bronchoscopy & removal of the foreign body - 68 cases (91.9%) were conscious & stable; six children needed intensive care.

Presence of granulations around the FB in long standing cases and vegetative FBs which are hygroscopic in nature are the reasons for prolonged bronchoscopy. Boorish contact of the bronchoscope or forceps with the bronchial wall, and the prolongation of bronchoscopy can be considered to be factors which contribute to spasm. It has been reported that a bronchoscope with appropriate diameter should be chosen and the procedure should be limited to 20 min in order to avoid possible subglottic and laryngeal edema and bronchospasm after bronchoscopy.⁽¹⁶⁾

The possibility of complications is increased when removing a retained FB. Removal may be hampered by poor visualization associated with swelling, granulations or bleeding. The long duration of the procedure, presence of dense granulation tissue, and type of FB are important predictors of complications.⁽¹⁷⁾ The foreign bodies may get slipped off at the level of the glottis in some cases leading to repeated attempts and catastrophic sequelae such as respiratory difficult syndrome, massive bleeding and choking. An accurate pre-operative diagnosis is most important in operative management of irregularly shaped foreign bodies. If the foreign body is too big to pass through the glottis, removing by tracheostomy, intercostal drainage, thoracotomy and bronchotomy may be required to rescue from catastrophic complications such as airway obstruction, pneumothorax and bleeding.⁽¹⁸⁾

Conclusion:

Foreign body inhalation is a preventable accident. Education of parents and public at large will help in reducing these preventable mishaps. High index of suspicion is needed for diagnosis of foreign body aspiration. The time of presentation, early diagnosis, and early treatment help in reducing the complications of foreign body aspiration. Rigid bronchoscopy is gold standard of treatment with relatively less complications in experienced hands.

References:

1. Tokar B, Ozkan R, Ilhan H. Tracheobronchial foreign bodies in children: Importance of accurate history and plain chest radiography in delayed presentation. *Clin Radiol.* 2004;59:609-15.
2. Nandi PL. Foreign body in the bronchus. *J Hong Kong Med Assoc.* 1989;41(2):187-190.
3. Weissberg D, Schwartz I. Foreign bodies in the tracheobronchial tree. *Chest.* 1987;91(5):730-733. doi: 10.1378/chest.91.5.730.
4. Brkić F, Delibegović-Dedić S, Hajdarović D. Bronchoscopic removal of foreign bodies from children in Bosnia and Herzegovina: experience with 230 patients. *Int J Pediatr Otorhinolaryngol.* 2001 Sep 28;60(3):193-6.

[PubMed]

5. Oğuz F, Citak A, Ünüvar E, Sidal M. Airway foreign bodies in childhood. *Int J Pediatr Otorhinolaryngol.* 2000 Jan 30;52(1):11–6.
6. Skoulakis CE, Doxas PG, Papadakis CE, Proimos E, Christodoulou P, Bizakis JG, Velegrakis GA, Mamoulakis D, Helidonis ES. Bronchoscopy for foreign body removal in children. A review and analysis of 210 cases. *Int J Pediatr Otorhinolaryngol.* 2000 Jun 30;53(2):143–8.
7. Wolach B, Raz A, Weinberg J. Aspirated FB in the respiratory tract of children:eleven years of experience with 127 patients. *Int J Pediatr Otorhinolaryngol.* 1994;30(1):1-10.
8. Pinto A, Scaglione M, Pinto F, et al. Tracheobronchial aspiration of foreign bodies: current indications for emergency plain chest radiography. *Radiol Med (Torino)* 2006;111:497-506.
9. Kozielski J., Okelek, K., Krzywiecki, A. et al. (2000): Selection of bronchoscope type for removal of foreign bodies from the lower respiratory tract based on personal experience. *Wiad. Lek.* 53(11-12) : 623-628.
10. Gregori D, Salerni L, Scarinzi C, et al; ESFBI Study Group. Foreign bodies in the upper airways causing complications and requiring hospitalization in children aged 0–14 years: results from the ESFBI study. *Eur Arch Otorhinolaryngol.* 2008;265:971–978.
11. Jianmin Liang, Juan Hu, Huimin Chang, Ying Gao, Huanan Luo, Zhenghui Wang, Guoxi Zheng, Fang Chen, Ting Wang, Yeye Yang, Xiaohui, and Min Xu. Tracheobronchial foreign bodies in children – a retrospective study of 2,000 cases in Northwestern China.
12. Cataneo AJ, Reibscheid SM, Ruiz Júnior RL, Ferrari GF. Foreign body in the tracheobronchial tree. *Clin Pediatr (Phila).* 1997;36(12):701-6.
13. Shivakumar AM, Naik AS, Prashanth KB, et al. Tracheobronchial foreign bodies. *Indian J Pediatr* 2003;70:793-7.
14. Sersar SI, Rizk WH, Bilal M, et al. Inhaled foreign bodies: presentation, management and value of history and plain chest radiography in delayed presentation. *Otolaryngol Head Neck Surg* 2006;134:92-9.
15. Soudabeh Haddadi, Shidesh Marzban, Shadman Nemati, Sepideh Ranjbar kiakalayeh, Arman Parvizi and Abtin Heidarzadeh. Tracheobronchial foreign-bodies in children; A 7 year retrospective studies. *Iran J Otorhinolaryngol.* 2015 Sep; 27(82): 377-385.
16. 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 Dec;71(12):1897–903.
17. Ciftci AO, Bingol-Kologlu M, Senocak ME, Tanyel FC, Buyukpamukcu N. Bronchoscopy for evaluation of foreign body aspiration in children. *J Pediatr Surg* 2003;38(8):1170-6.
18. Gibson SE. Myer's Pediatric otolaryngology. Vol. 34. Lippincot; 1999. Aerodigestive tract Foreign bodies Cotton; p. 562.

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