



ORIGINAL RESEARCH PAPER

Cardiothoracic

AIRWAY FOREIGN BODIES IN CHILDREN

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Dr. Bhabatosh Biswas	RG Kar Medical College and Hospital, Cardio Thoracic Surgery Kolkata, West Bengal, IN
Dr. Rajarshi Basu	RG Kar Medical College and Hospital, Cardio Thoracic Surgery Kolkata, West Bengal, IN
Dr. Manaswita Biswas	Vivekananda Institute of Medical Sciences, Anaesthesiology Kolkata, West Bengal, IN
Mr. Abhisek Mandal	RG Kar Medical College and Hospital, Cardio Thoracic Surgery Kolkata, West Bengal, IN

ABSTRACT

Accidental inhalation of foreign bodies in the trachea-bronchial tree is a serious clinical emergency specially in children. This condition is not uncommon and may often escape the attention of parents. Due to ignorance of common man, this condition may remain unrecognized at times. Absence of proper history and inconclusive imaging findings may also make the diagnosis of 'airway foreign body' difficult at times leading to delay in therapy. Retrieval of foreign body with Rigid Bronchoscope under general anesthesia is the treatment of choice and has been established as a safe and invaluable therapeutic option. We have studied a series of 112 cases of Trachea-Bronchial foreign bodies in children. Rigid Bronchoscopy under general anesthesia was done in all the cases. Retrieval of foreign bodies were successful in 107 children. Out of remaining 5 children, retrieval was done by bronchotomy in 2 and with tracheostomy in 1. Other 2 cases already had bronchiectasis resulting from retained foreign bodies of long duration. Lung resection was required for those 2 cases only. There was no mortality in this series of cases and morbidity was minimal.

INTRODUCTION

Foreign body aspiration into the airway is not uncommon in children.

Though most airway foreign body aspirations occur in children younger than 15 years, children aged 1-3 years are most susceptible.

Young children are susceptible because, they lack molars for proper grinding of food and tend to be running or playing at the time of feeding.

They also lack coordination of swallowing and glottis closure. Putting objects in their mouth more frequently make them vulnerable for this condition at times.

After aspiration, 'Foreign Bodies' usually settle at 3 anatomic sites viz Larynx, Trachea or Bronchus.

In the initial phase majority of the children present with choking, coughing or in a state of gasping due to airway obstruction.

Thereafter asymptomatic phase follows due to subsequent lodging of the object and relaxation of reflexes.

This phase, often results in a reduction or cessation of symptoms lasting for hours to weeks.

If the Foreign Body is not retrieved during this period, a phase of complications sets in due to obstruction of the airway leading to Pneumonia, Atelectasis or Lung Abscess.

Absence of proper history and delayed presentation often makes diagnosis difficult.

Chest skiagraphy may not be contributory excepting in cases of metallic foreign bodies or airway obstruction.

CT scan, however gives detailed information about the foreign body as well as the condition of the lung distal to the foreign body.

Different types of foreign bodies, both metallic as well as organic materials may enter into the tracheo-bronchial tree of the children.

Food items, specially 'Peanuts' are aspirated most commonly in children.

Retained foreign bodies may cause accumulation of secretion, as well as infection of distal lung parenchyma in addition to oedema and infection of the local site. If the foreign body is retained for longer period, lung parenchyma may undergo consolidation finally resulting in bronchiectatic damage of a segment, lobe or even the whole lung.

Retrieval of the foreign body with 'Rigid Bronchoscope' under General Anaesthesia is the treatment of choice and is successful in the majority. In delayed cases bronchoscopic retrieval may not be successful.

Retrieval of delayed impacted foreign bodies may require Bronchotomy or Tracheostomy at times.

Lung resection may be required in those patients only, where the lung parenchyma drained by the bronchus is irreversibly damaged due to retained foreign body of long duration resulting in consolidation, infection and finally bronchiectasis.

Bronchoscopic retrieval of trachea-bronchial foreign body is a safe therapeutic option with minimal morbidity and mortality.

MATERIALS AND METHODS

This retrospective study was conducted from March 2006 to August 2017. Records of all the patients admitted with airway foreign bodies were studied. Detailed history regarding accidental aspiration of any foreign body, as well as other clinical parameters were reviewed. Chest X ray was done in all the children and CT scan of thorax was done in some of them.

All the Chest X rays as well as CT Chest images were reviewed.

All the patients with diagnosed or suspected foreign bodies in the airways were planned for Rigid Bronchoscopy under General anaesthesia for retrieval of those foreign bodies.

Rigid Bronchoscopy was done in all the patients under general anaesthesia. Thorough tracheo bronchial suction was done to visualize the entire airway properly and to locate the foreign body. 0 degree telescope was used at times to localize the foreign bodies accurately. The foreign bodies were localized and were retrieved with suitable grasping forceps. The bronchoscope and the grasping forceps holding the foreign body were removed from the airway as a single unit.

The bronchoscope was reintroduced and thorough trachea bronchial suction was done. The whole tracheo -bronchial tree was thoroughly sucked and cleaned. Airway was checked carefully with the telescope to find out any other foreign body or any remnant of the retrieved foreign body. Any left out foreign body or pieces were retrieved with suitable grasping forceps.

Thorough trachea bronchial suction with normal saline lavage was done in all the cases.

Complete lung inflation was achieved in the majority of the patients with continued efforts of the anesthesiologists.

In some cases of retained foreign bodies of longer duration, bronchoscopic retrieval failed. Foreign bodies retained in trachea were retrieved through tracheostomy after holding properly with suitable grasping forceps.

In some other cases, thoracotomy was required for retrieval of the retained foreign bodies from bronchi. After opening the chest, bronchotomy was done on appropriate site and the impacted foreign bodies were retrieved through the bronchotomy. Thorough bronchial suction was done in all the cases to remove retained secretions and to help full inflation of the consolidated lungs.

Cases with impacted retained foreign bodies with irreversible bronchiectatic changes of lung parenchyma, required lung resection.

Post-operative nebulisation, spirometry as well as chest physiotherapy were essential exercises and were practiced meticulously in all the cases.

RESULTS

Out of 112 children admitted with airway foreign bodies, 67 were males and 45 were females.

72 children of the series were between 1 to 5 years of age. Youngest patient of the series was 6 months old and the oldest was 12 years.

History suggestive of foreign body aspiration was available in 86 children.

16 patients were asymptomatic. 94 patients had various symptoms including cough, throat discomfort, respiratory distress, fever etc in different combinations. 2 patients presented at 10th and 12th years of life with recurrent chest infection for several years without any history of foreign body inhalation.

While 73 patients presented urgently, 39 were delayed.

Chest X ray was suggestive of foreign body aspiration in 76 children. Majority of them had hyperlucent lung fields and the others had evidences of complications like pneumonia or consolidation. Chest X ray was inconclusive in the remaining 36 patients.

CT scan of Chest was done in 52 children. CT images

confirmed Chest X ray findings and showed the pathological details of lungs.

Site of impaction of foreign body as well as nature of foreign body was also confirmed by CT images.

2 patients presenting at 10 and 12 years of age, were diagnosed as 'Bronchiectasis' of right lower lobe in CT scan.

The foreign bodies were lodged in right bronchial tree in 63 cases, left bronchial tree in 43 cases and in trachea in the remaining 6 cases.

Rigid Bronchoscopy under general anesthesia was done in all the cases. Retrieval of foreign body was successful in 107 children. Thoracotomy was required for retrieval of foreign bodies by bronchotomy in 2 cases of impacted bronchial foreign bodies.

Emergency tracheostomy was necessary as life saving measure for one cyanosed gasping patient having a foreign body occluding the trachea completely. The impacted foreign body was retrieved with suitable grasping forceps through the tracheostomy.

In the remaining 2 cases of bronchiectasis resulting from the impacted retained foreign bodies of long duration, lung resections were required.

77 of the retrieved foreign bodies were organic in nature with peanuts, sun flower seeds, wheat grains, rice grains, ground nuts etc. 35 foreign bodies were inorganic in nature and included plastic pen caps, safety pins, plastic beads, metal beads etc.

All the children survived and morbidity was minimal.

DISCUSSION

Accidental aspiration of foreign bodies are not uncommon in children.

This clinical condition remains a common unintentional childhood injury due to improper exposure of young children to otherwise innocuous looking nuts and other small objects¹. Both boys and girls of younger age group are more frequent victims of airway foreign bodies.

In our series of 112 cases, 67 (59.82%) were males and 45 (40.18%) were females.

72 (64.29%) of our patients were in the age group of 1 to 5 years.

Boufersaoui A et al in their study of 2624 cases found 62.34% males and 37.65% females. They also observed that 66% of their patients were between 1 to 3 years of age².

History of foreign body aspiration is an important criteria for diagnosis and helps to plan appropriate therapy in time.

16 (14.29%) of our patients were asymptomatic, 2 (1.79%) presented with recurrent chest infection and remaining 94 (83.92%) had nonspecific pulmonary symptoms.

Foltran F et al observed that non-specific symptoms or complete absence of symptoms are not unusual, justifying mistaken or delayed diagnosis³.

73 (65.18%) of our patients reported urgently within 24 hours of aspiration, while the remaining 39 (34.82%) children reached our hospital later.

In a study of 165 cases of suspected airway foreign bodies, only 99(60%) patients presented within 24 hours after aspiration⁴.

Chest X ray as well as CT scan of Chest are invaluable diagnostic tools.

These two imaging modalities were useful for confirming the diagnosis of 'Airway foreign bodies' as well for planning therapy based on the indirect information suggestive of airway obstruction as well as details regarding the site of impaction, lung infection, consolidation, bronchiectasis etc.

In 76 (67.85%) of our cases, findings of chest x-ray were obstructive emphysema, lung infection, consolidation etc suggestive of airway obstruction and resultant lung complication.

In another 36 (32.15%) cases x-ray findings were inconclusive.

CT scan of chest was done in cases presenting late, having suspicion of airway foreign bodies or lung complications. In our series CT scan was done in 46 (41.07%) cases only.

The side as well as site of impaction of the foreign bodies in 32 (28.57%) and bronchiectasis of right lower lobe in 2 (1.79%) patients were confirmed in CT scan of the chest. In remaining 12 patients, CT reports were inconclusive regarding the details of the foreign body as well as the condition of the lungs.

In a study of 165 paediatric cases of suspected airway foreign bodies, 49.5% had evidences of obstructive emphysema. From the study, the authors concluded that tracheo bronchial foreign bodies should be suspected with suggestive history, even without radiological evidences⁴.

In our series, the foreign bodies were lodged in right bronchial tree in 63 (56.25%) cases, in the left bronchial tree in 43 (38.39%) cases and in the trachea in the remaining 5 (4.46%) cases.

It was observed by Zhijun C et al that foreign bodies were located in trachea in 5.25% cases, right bronchial tree in 54.62% cases, left bronchial tree in 39.71% cases and in bilateral bronchial tree in .42% cases⁵.

Yadav SP et al in a study of 132 cases in children found 62 airway foreign bodies in right main bronchus, 46 in left main bronchus and 7 at the level of vocal chords. Chest radiographs were found to be normal in 46 cases of their series⁶.

Bronchoscopic evaluation, localization of the foreign body as well as retrieval after holding properly with a suitable grasping forceps has been established as the standard therapy.

Rigid bronchoscopy under general anesthesia has been widely used for this procedure.

Several workers have published their experiences of rigid bronchoscopy for retrieval of foreign bodies in children.

Divisi D et al commented that rigid bronchoscopy was the main technique, permitting the removal of the trachea-bronchial foreign body in 97.2% of patients⁷.

It was also observed by Pinzoni F et al that the ideal means of foreign body removal was rigid bronchoscopy under general anaesthesia⁸.

In another study of 132 cases of airway foreign bodies in children, rigid bronchoscopy was done in 129 cases under general anaesthesia⁹.

In very late cases unrecognized impacted foreign bodies may present with total occlusion of the airways leading to 'Lobar

Bronchiectasis' requiring lung resection.

In our series, rigid bronchoscopic, retrieval of foreign bodies were successful in 107 (95.54%) and unsuccessful in 5 (4.46%) patients. These 5 cases were delayed presenters.

2 (1.79%) of them needed 'Thoracotomy with bronchotomy' for retrieval of their impacted bronchial foreign bodies and in 1 (0.89%) case, the impacted foreign body from the trachea could be retrieved through tracheostomy.

However, 2 (1.79%) of our patients had established and symptomatic 'right lower lobe bronchiectasis'. Thoracotomy with right lower lobectomy was done in these 2 cases. Section of the resected bronchiectatic lung lobes revealed foreign bodies totally occluding the lobar bronchi in these 2 cases.

In 1 case it was a piece of wood and in the other it was a ground nut with the shell.

These 2 organic foreign bodies were retained in the right lower lobe bronchus for prolonged period, totally occluding the lumen and resulting in bronchiectasis.

77 (68.75%) of the retrieved foreign bodies in our series were organic in nature.

Commonest foreign bodies were peanuts. Other organic foreign bodies like - sun flower seeds, wheat grains, rice grains, ground nuts etc were retrieved less frequently.

35 (31.25%) foreign bodies were inorganic in nature and included plastic pen caps, safety pins, plastic beads, metal beads etc.

It was observed in a study of 1428 paediatric tracheo-bronchial foreign body cases that types of foreign bodies included peanuts (87.12%), Beans (6.51%), and others (6.37%)⁵.

There was no mortality in our series.

All the children survived who were subjected to retrieval of their airway foreign bodies by rigid bronchoscopy or by any other surgical modalities like bronchotomy, tracheostomy or lobectomy.

It was observed by several authors that, retrieval of foreign bodies from the tracheo bronchial trees of the children by all the modalities were safe.

CONCLUSION

Accidental inhalation of varieties of organic as well as inorganic foreign bodies are common surgical emergencies, specially in children.

History of foreign body inhalation remains a major tool for suspicion of such a clinical condition.

Chest X ray as well as CT scans are invaluable tools for the diagnosis of such an emergency.

Delayed cases may end in lobar bronchiectasis.

Rigid bronchoscopy under general anesthesia and retrieval of the foreign body is the treatment of choice in the majority.

Bronchotomy or tracheostomy for retrieval of delayed impacted foreign bodies may be required at times.

Very late cases with unrecognized impacted foreign bodies may present with total occlusion of the airway leading to lobar bronchiectasis requiring lung resection.

Retrieval of airway foreign bodies by rigid bronchoscopy or

by any other surgical modalities like bronchotomy, tracheostomy or lobectomy have been established as safe surgical options.

Careful history and strong suspicion still remains the most valuable tools for the diagnosis of airway Foreign Bodies.

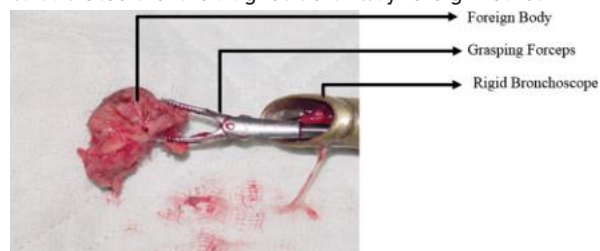


Fig 1: Rigid Bronchoscope with the Grasping Forceps Holding Foreign Body

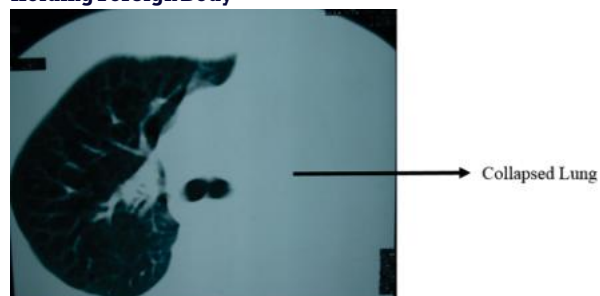


Fig 2: CT Scan of Thorax with Completely Collapsed Lung (Opacity Due to Foreign Body Occluding the Left Main Bronchus).

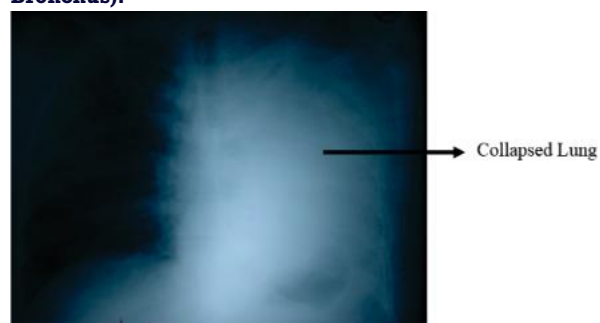


Fig 3: Chest X Ray PA View with Completely Collapsed Lung (Opacity Due to Foreign Body Occluding the Left Main Bronchus).

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