

A clinical study of foreign bodies in air passages

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ABSTRACT

Background: Foreign body in the airways is a serious event and fatal if not managed properly in time. Accident resulting from the inhalation of the foreign body continues to take formidable toll of lives every year. **Objective:** This study was undertaken to find out the incidence of foreign bodies in air passages in this part of the country and types of foreign bodies, to establish the role of radiological investigations, and to find out the effective measures which are valuable in decreasing the post endoscopic complications and morbidity. **Methods:** This retrospective study was conducted in all suspected cases of foreign body in the air passages attending as well as referred to the Department of Otolaryngology of a Medical College of Rajasthan from January 2014 to December 2015. In each case, a procedure like direct laryngoscopy or bronchoscopy was done depending on the site of the foreign body. **Results:** Out of 100 cases, 58 were males and 42 were females. 88% of the patients were children below the age of 12 years. The most common foreign body extracted was betel nut in 47% of the cases. Commonest sign observed was decreased air entry in the lung (83%). Commonest radiological finding was obstructive collapse (37%). 48% of the total foreign bodies were present in right bronchus while 32% were lodged in the left bronchus and 3% at the carina. **Conclusion:** A diagnostic bronchoscopy should always be done in refractory cases of chronic respiratory infection, allergy or pneumonia. A negative radiological examination does not exclude a foreign body.

Key words: Bikaner, Brochoscopy, Children, Foreign body, Laryngoscope

Foreign body is an object or a substance that is foreign to the location where it is found. Foreign body in the airways is a serious event and on occasions, fatal if not managed properly in time. Accident resulting in death from the inhalation of the foreign body continues to take a formidable toll of the life every year [1]. The problems associated with the inhaled foreign bodies receive little attention. This is a very serious life-endangering emergency, which is quite frequently encountered [2]. In 1936, death rate related to foreign body inhalation was 24% worldwide. Using endoscope to remove foreign bodies lowered the mortality rate to 2%. Foreign body accidents in the air and food passages occur without discrimination of age, sex or nationality. The most common etiological factor of foreign body inhalation is carelessness on the part of the patient or the parent in the case of children. The peak incidence of inhalation of foreign body in the early childhood is related to the habit of children putting small objects into their mouth to determine their taste and texture and chew while teething [3]. The management of foreign body in tracheobronchial tree is endoscopic removal, laryngoscopy in the case of laryngeal foreign body and bronchoscopy in the tracheobronchial foreign body.

The signs and symptoms vary according to the site of lodgment of the foreign body. The signs and symptoms can be

confused with asthma, pneumonia, and bronchiectasis and lung abscess leaving the true condition unsuspected [4,5]. The foreign bodies in the airways are very frequently encountered in this part of the Rajasthan (Bikaner), which is due to a common habit of taking areca nuts, by persons of all age groups. Another common foreign body bhurant is being inhaled by persons working in the field while taking water directly into the mouth. Hence, it is worthwhile to conduct a systematic study on foreign bodies of airways.

MATERIALS AND METHODS

The present retrospective study was conducted in all suspected cases of foreign body in the air passages attending as well as referred to the Department of Otolaryngology of teaching hospital of Rajasthan from January 2014 to December 2015. Ethical committee approved our study. All the relevant data were collected from the medical records of the included patients in a predesigned proforma. All children with clinical diagnosis of the foreign body in the respiratory passages were included in the study. The diagnosis was made in patients who had a history of aspiration of some foreign body accidentally, or presented with symptoms and signs suggestive of foreign body or presented as

a case of chronic respiratory tract disease resistant to antibiotic therapy or patients referred by the Pediatric Department for susceptible foreign body. If no foreign body was detected after bronchoscopy, then they were excluded from the study.

In each case procedure, direct laryngoscopy or bronchoscopy was done depending on the basis of the site of the foreign body. Direct laryngoscopy was done by Jackson Hollinger laryngoscope with fiberoptic light system incorporated. Ventilating bronchoscope with fiber optic light was used for bronchoscopy under general anesthesia. For children, we used the rigid bronchoscope of lumen 3-6 mm depending on the age. Informed consent was taken from the parents or legal guardians before procedure. Before anesthesia, thorough pre-anesthetic checkup was done. Vital parameters and SPO₂ were monitored throughout the procedure and postoperatively. In some difficult cases, 60-100 mg of xylocaine was given by intravenous route to dilate the bronchi and to allow complete and easy removal of foreign body. Post-operative care was given to each patient under supervision until complete recovery. In cases of the laryngeal foreign body, we only observed the patient for 6 h and did not give any antibiotic or steroid. In case of the bronchial foreign body, antibiotic (ceftriaxone) was given to all patients and steroid was given if bronchoscopy findings suggested the presence of granulation tissue. Close checks of vitals of the patient were recorded with particular emphasis on the respiratory distress for the first 12 h after bronchoscopy. X-ray of the chest was done 48-72 h after bronchoscopy. Each patient was examined after 5 days and after 1 month to detect any complication.

RESULTS

The foreign bodies in the respiratory passages are common in this part of the Rajasthan. Out of 100 cases, 58 were males and 42 were females with M: F ratio of 1.38:1. The age of patients ranged from 6 months to 18 years, youngest being of 6 months and oldest of 18 years. 44% of the patients were children below the age of 2 years, 38% were between 2 to 5 years of age, and 88% below 12 years of age. Hindu patients were more than the Muslims. The commonest sign observed was decreased air entry in the lungs (83%). Commonest radiological finding encountered was absorption collapse (37%) due to obstruction by foreign body. In foreign body bronchus, radio-opaque foreign body was seen in only one case. In 33% cases, chest X-ray was normal. Vegetative foreign body presenting late were more liable for changes in the chest X-ray.

Around 48% of the total foreign bodies were present in the right bronchus while 32% in the left bronchus and 3% at the carina. Among laryngeal foreign bodies, the bhurant was the only foreign body seen, various type of foreign body detected in the tracheobronchial tree. The most common foreign body extracted was betel nut in 47% of the cases. Some unusual foreign bodies were also detected which come in contact in daily life. These were rapper of the tablet, toffee cover, whistle, stone, and nasal ornament. The commonest local pathological tissue reaction encountered was granulations, which was present in 15% of the cases.

DISCUSSION

In this study, the most common age group affected was children below the age of 2 years (44%). This is much lower than those reported by Hollinger et al. where the common age group was between 5 months to 5 years [6]. This study revealed that foreign bodies are quite rare below the age of 10 months. The male outnumbered the females which are similar to a study done by Ono et al. where out of 7536 cases of foreign body in air and food passages, 56% were males and 44% were females [7]. The Hindus were affected almost seven times more commonly than the Muslims. The cause for this dissimilarity could not be ascertained but possible cause might be the difference in the population statistics in this part of the state.

In this study, a history of aspiration of foreign body was present in 75 cases (75%) while no history was elicited in 25 cases (25%) who presented as cases of chronic respiratory infection resistant to antibiotic therapy. Most of these cases were referred from medical and pediatric wards after being treated with antibiotics for a prolonged period without any improvement. In these cases, the possibility of a foreign body was not thought initially as there was no history of aspiration of foreign body and the widespread use of antibiotics had masked the classical physical findings. Kim et al. also reported the absence of history of foreign body inhalation in 15% of their cases [5]. In the present series, majority (100%) of the cases of foreign body in the larynx had a history of foreign body aspiration, however, in tracheal foreign body, history was found in 6 out of 8 cases. The patients presenting with chronic respiratory infection had foreign body in trachea in 2 cases and in rest 23 cases, foreign bodies were found in the bronchus and subglottic region.

In 23 cases, the time elapsed between the inhalation of foreign body and arrival to the hospital was less than 24 h. Among these, majority of the cases were having the foreign body in the larynx. In a series of 202 cases, Kim et al. found a time lapse of 24 h in 45% of the cases [5]. In 77% cases, the diagnosis was made within 1 month in our study while in 22 cases diagnosis of was made after 1 month. It is certainly incredible to find that 22 cases were so late in seeking medical attention and all these cases had the foreign body in bronchus and were being treated in medical and pediatric wards as cases of chronic respiratory infections. The patients with foreign body in the trachea (8 cases) had attended hospital within a few hours to few days of aspiration. The explanation of this time lag rests with the severity of symptoms, which is caused according to the site of foreign body in the respiratory passages.

In our study, the commonest symptoms were dyspnea (82%) and cough (68%). The rare complaints were hemoptysis, dysphagia, and chest pain (Table 1). Kim et al. also observed cough to be the common symptom in 59% of cases followed by wheezing in 57% of the cases, but in the present series, wheezing was uncommon and seen only in 26% of the cases [5]. Symptoms of foreign body depend on the size, site of lodgment, duration of lodgment, nature of the foreign body, and amount of obstruction produced. In majority of the cases of laryngeal foreign body, cough, hoarseness of voice, pain in throat, and foreign body sensation

Table 1: Presenting complaints in cases of foreign body in airways

Symptoms	Number (%)
Dyspnea	82 (82)
Cough	68 (68)
Fever	31 (31)
Hoarseness of voice	8 (8)
Wheezing	6 (6)
Pain in throat	3 (3)
Vomiting	2 (2)
Convulsion	2 (2)
Swelling (Surgical emphysema)	2 (2)

Table 2: Variety of foreign bodies removed from airways

Varieties of foreign body	Number (%)
Endogenous (crust)	1 (1)
Exogenous	
Areca nut	47 (47)
Ground nut	18 (18)
Gram seed	10 (10)
Bhurant	9 (9)
Tablet rapper	3 (3)
Plum seed	2 (2)
Watermelon seed	2 (2)
Tamarind seed	1 (1)
Peanut	1 (1)
Food particle	1 (1)
Whistle	1 (1)
Pencil cap	1 (1)
Nasal ornament	1 (1)
Toffee cover	1 (1)
Stone	1 (1)

were the common symptoms; similar findings have also been observed by Soni and Chatterji in 18 cases of laryngeal foreign body [8]. The lodgment of foreign body on the vocal cord did not cause laryngeal spasm; this might be due to the phenomenon of fatigue. Foreign bodies embedded in subglottic space and trachea caused alarming symptoms. In our study, the main symptoms of tracheal foreign bodies were dyspnea (8 cases), cough (3 cases), and wheezing (2 cases) out of total 8 cases. The symptomatology in cases of tracheal foreign body also varied with size and nature of foreign body. The most important symptoms of tracheal foreign body are initial choking, gagging, symptomless interval and then cough, expectoration, fever and pain in the chest on the affected side. In cases of bronchial foreign body, vomiting and pain chest were rarely encountered symptoms. Similar findings have also been reported by Kim et al. [5].

In this study, the common signs of foreign body in the airways were decreased air entry (83%), restricted chest movements (Table 2) (57%), indrawing of the chest wall (26%), tracheal shift (19%), rhonchi and crepitation (16%). Cyanosis was rare (3%) and encountered more commonly in tracheal foreign bodies. Kim et al. reported that the most common sign was decreased air

Table 3: Various signs in 100 cases of foreign body in respiratory passage

Signs	Number (%)
Decrease air entry in the lung	83 (83)
Restricted chest movements	57 (57)
Indrawing of chest wall	22 (22)
Tracheal shift	19 (19)
Rhonchi and crepitation	14 (14)
Wheezing	5 (5)
Bronchial breathing	3 (3)
Dull percussion note	3 (3)
Surgical emphysema	2 (2)
Hyper-resonant note	1 (1)

Table 4: Various radiographic findings of chest

Radiographic findings	Number (%)
Obstructive collapse	37 (37)
Mediastinal shift	20 (20)
Obstructive emphysema	17 (17)
Consolidation	6 (6)
Radio-opaque shadow of foreign body	1 (1)
Normal chest	33 (33)
Pleural effusion	1 (1)

entry in 60% cases followed by rhonchi (38%), wheezing (17%), and stridor (13%) [5]. In the cases of laryngeal foreign body, the common signs were dyspnea and wheezing, while in cases of tracheal foreign body, stridor and wheezing were the commonest sign. The common signs in cases of bronchial foreign body were decreased air entry (76%), restricted movement of the chest wall (54%), chest indrawing (22%), and shifting of the trachea (19%).

The commonest foreign body in the present series was areca nuts (betel nuts) in because of habit of chewing it by local persons in this part of Rajasthan (Table 3). Other foreign bodies found in the present series are groundnuts (18%) and gram seeds (10%). Areca nut as the most common inhaled foreign body was also reported by Gupta et al. [9]. In our study, there was only one case of endogenous mucous plugs and only one metallic foreign body. The difference in the nature of foreign body in various countries is explained by different kind of food, the difference in toys and increased parental attention to metallic and sharp objects and local eating habits, custom and culture, environment and region in which they live. Kim et al., in a series of 200 cases, reported 99 (50%) foreign bodies in the right main bronchus [5].

The commonest radiological finding reported by Kim et al. was localized emphysema. On the contrary, the commonest finding, in our study, was absorption collapse due to obstruction by foreign body (Table 4). In this study, the most frequent tissue reaction found was granulations in the area surrounding the foreign body in 15 cases followed by the mucosal edema in 10, mucosal congestion in 6 and bronchial stenosis in 2 cases. Mucosal edema and granulation were noted with vegetative foreign bodies particularly areca nut and groundnut. The presence of the associated pathology was found mostly in the longstanding cases

of foreign body, which present as a case of chronic respiratory infections.

In this study, all 100 cases required endoscopy for the removal of the foreign body. The management of the foreign bodies was planned depending on their sites of lodgment. Laryngoscopy was performed in 12 cases of laryngeal foreign body and subglottic foreign body under general anesthesia. Bronchoscopy was performed in 88 cases of tracheobronchial foreign body. Out of these 88 cases, history of foreign body aspiration was present in only 33 cases while in the rest 55 cases; bronchoscopy was done for diagnostic purpose and foreign body was visualized and removed. Thus, this study revealed that diagnostic bronchoscopy should be considered when there is a suspicion of foreign body in the airways. Similar observations have also been reported by Daniilidis et al. [10].

In this study, 10 cases required an emergency endoscopic removal of foreign body while in rest 90 cases endoscopic removal of foreign body was done within 24 h. A dramatic immediate improvement was observed after removal of foreign body in all 9 cases of laryngeal foreign bodies. Cases of bronchial foreign body showed complete improvement after removal of foreign body. Post-endoscopic chest X-ray was clear in 63 cases and partly clear in 3 cases. Five cases were subjected to repeat bronchoscopy where X-ray chest showed some residual findings. In these cases, residual fragments of foreign body were visualized and removed on repeat bronchoscopy. This occurred only with vegetative foreign body particularly areca nuts.

CONCLUSION

Accidents from foreign body in airways are not rare in this part of Rajasthan, and a negative history of foreign body does

not exclude the diagnosis. If positive finding is present in chest like emphysema, collapse, diminished air entry in one side, then diagnostic bronchoscopy should be done to rule out the foreign body in the airways. A diagnostic bronchoscopy should always be done in refractory cases of chronic respiratory infection, allergy or pneumonia.

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