

Study of tracheo-bronchial foreign bodies presentation, diagnosis and management at tertiary care center

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Abstract

Background: Tracheobronchial foreign body (TFB) aspiration is a serious medical problem associated with significant morbidity and mortality. Tracheobronchial foreign body (TFB) may lead to serious complications such as airway inflammation, hemoptysis, bronchiectasis, pulmonary atelectasis, and even asphyxia and death. Present study was aimed to study tracheobronchial foreign bodies presentation, diagnosis and management at tertiary care center. **Material and Methods:** Present study was single-center, retrospective study, conducted in cases with history of aspiration, sudden onset of breathlessness or choking sensation in a healthy person, recurrent respiratory infections with clinical or radiological evidence, and suspicion of foreign body and later had confirmed evidence of TFB. **Results:** 52 cases satisfying study criteria were studied. Majority were children below 2 years of age (40.38 %), followed by 3-4 years age group (30.77 %). Majority of cases were male (59.62 %) as compared to female (40.38 %). Majority of cases had symptoms or history of dry cough (63.46 %), noisy breathing (51.92 %), respiratory distress (46.15 %) and witnessed choking (26.92 %). While among signs majority of cases had unilateral reduced air entry (53.85 %), unilateral wheeze (40.38 %), whistling and clicking sounds (21.15 %) and no signs (17.31 %). Chest X-Ray findings were consolidation (61.54 %), lobar collapse (55.77 %), hyperinflation (51.92 %), ipsilateral emphysema (40.38 %) and normal (15.38 %). CT Bronchogram was not done in 44.23 %, while in cases underwent CT were findings of ? foreign body/mucus plug (30.77 %) and foreign body (25 %). Location of foreign body was left main bronchus (53.85 %) followed by right main bronchus (34.62 %), carina (7.69 %) and left main and secondary bronchus (3.85 %). Supari/betel nut (30.77 %) was most common foreign body observed followed by peanut (28.85 %), ground nut (25 %), plumseed (1.92 %), coconut (1.92 %) and non-organic (11.54 %). Intra operative granulations were present in 30.77 % cases. **Conclusion:** High suspicion in patients presenting with raspy respiration, wheezing, or coughing for tracheobronchial foreign body followed by early diagnosis as well as therapeutic measures with help of rigid/flexible bronchoscopy under expert supervision can prevent morbidity and mortality related to tracheobronchial foreign body aspiration.

Keywords: bronchoscopy, foreign body, bronchial, trachea.

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INTRODUCTION

Tracheobronchial foreign body (TFB) aspiration is a serious medical problem associated with significant morbidity and mortality. Adults account for only about 20% of the reported cases. Leading causes of TFB aspiration in adults are altered mental status from alcohol or sedative use, trauma with a decreased level of consciousness, impaired airway reflexes associated with neurological disease, and dental procedures.¹ Symptoms can vary considerably according to the site of the foreign body in the airways. When the foreign body is trapped in the larynx or trachea, respiratory distress or stridor are immediately suggestive of the diagnosis. However, in the

great majority of cases (75 to 94% of cases), the foreign body migrates to the bronchi and clinical signs are much less constant.^{2,3,4} Tracheobronchial foreign body (TFB) may lead to serious complications such as airway inflammation, hemoptysis, bronchiectasis, pulmonary atelectasis, and even asphyxia and death. Delayed diagnosis can lead to complications such as recurrent pneumonia, bronchiectasis, emphysema and even death.^{5,6} As technology advanced, technique spread, and practitioners became more experienced, flexible bronchoscopy gradually supplanted rigid bronchoscopy as the most commonly used technique in adults and has de facto become the modality of choice for a majority of patients.⁷ Albeit rigid bronchoscopy remains the traditional gold standard, particularly in children.⁸ Present study was aimed to study tracheobronchial foreign bodies presentation, diagnosis and management at tertiary care center.

MATERIAL AND METHODS

Present study was single-center, retrospective study, conducted in Department of otorhinolaryngology, at District Civil Hospital, Sindhudurg, India. Medical records of patients with suspected tracheobronchial foreign body (TFB) aspiration from January 2015 to January 2020 (5 years). Study approval was taken from institutional ethical committee. Cases with history of aspiration, sudden onset of breathlessness or choking sensation in a healthy person, recurrent respiratory infections with clinical or radiological evidence, and suspicion of foreign body and later had confirmed evidence of TFB were considered for present study. Patients with bronchial asthma, acute laryngo-tracheobronchitis, COPD, bronchiectasis were not considered for present study. Clinical details (age, sex, nature, site of foreign body lodgement, duration between inhalation or symptoms and admission in a hospital), clinical signs and symptoms, investigations (X- ray chest, CT scan chest), findings of rigid/flexible bronchoscopy were noted. Data was collected and compiled using Microsoft Excel, statistical analysis was done using descriptive statistics.

RESULTS

52 cases satisfying study criteria were studied. Majority were children below 2 years of age (40.38 %), followed by 3-4 years age group (30.77 %). Majority of cases were male (59.62 %) as compared to female (40.38 %).

Table 1: General characteristics

Characteristics	No. of cases	Percentages
Age (years)		
0-2	21	40.38
3-4	16	30.77
5-6	7	13.46

7-15	5	9.62
>15	3	5.77
Gender		
Male	31	59.62
Female	21	40.38

Majority of cases had symptoms or history of dry cough (63.46 %), noisy breathing (51.92 %), respiratory distress (46.15 %) and witnessed choking (26.92 %). While among signs majority of cases had unilateral reduced air entry (53.85 %), unilateral wheeze (40.38 %), whistling and clicking sounds (21.15 %) and no signs (17.31 %).

Table 2: Symptoms and Signs

	No. of cases	Percentages
Symptoms		
Dry cough	33	63.46
Noisy Breathing	27	51.92
Respiratory Distress	24	46.15
Witnessed choking	14	26.92
Fever	11	21.15
Lethargy	5	9.62
Signs		
Unilateral reduced Air Entry	28	53.85
Unilateral Wheeze	21	40.38
Whistling and Clicking sounds	11	21.15
No Signs	9	17.31

In present study Chest X-Ray findings were consolidation (61.54 %), lobar collapse (55.77 %), hyperinflation (51.92 %), ipsilateral emphysema (40.38 %) and normal (15.38 %). CT Bronchogram was not done in 44.23 %, while in cases underwent CT were findings of ? foreign body/mucus plug (30.77 %) and foreign body (25 %).

Table 3: Radiological findings

Radiological findings	No. of cases	Percentages
Chest X-Ray Findings		
Consolidation	32	61.54
Lobar Collapse	29	55.77
Hyper inflation	27	51.92
Ipsilateral Emphysema	21	40.38
Normal	8	15.38
CT Bronchogram Findings		
Not Done	23	44.23
? Foreign Body/Mucus Plug	16	30.77
Foreign Body	13	25.00

In present study, location of foreign body was left main bronchus (53.85 %) followed by right main bronchus (34.62 %), carina (7.69 %) and left main and secondary bronchus (3.85 %). Supari/betel nut (30.77 %) was most common foreign body observed followed by peanut (28.85 %), ground nut (25 %), plumseed (1.92 %), coconut (1.92 %) and non-organic (11.54 %). Intra operative granulations were present in 30.77 % cases.

Table 4: Intraoperative findings

Intraoperative findings	No. of cases	Percentages
Location		
Carina	4	7.69
Left Main and Secondary Bronchus	2	3.85
Right Main Bronchus	18	34.62
Foreign body		
Supari/betel nut	16	30.77
Peanut	15	28.85
Ground nut	13	25.00
Plumseed	1	1.92
Coconut	1	1.92
Non-Organic	6	11.54
Intra operative granulations	52	
Present	16	30.77
Absent	36	69.23

DISCUSSION

In children, tracheobronchial FBA is a potentially life-threatening accident that may be suspected on the basis of a choking episode, if such an episode is witnessed by an adult or remembered by the child. In contrast, the clinical presentation of FBA in adults is often more subtle, and diagnosis requires careful clinical assessment and judicious use of bronchoscopy. Imaging plays an important role in the diagnosis of ingested and aspirated foreign bodies in children and can be crucial to guiding the clinical management of these patients. Prompt identification and localization of ingested foreign bodies is essential to determining the appropriate treatment, as several types of commonly ingested foreign bodies require urgent removal and others can be managed conservatively. Chest radiographs are helpful in confirming the presence of airway FBs but cannot be used to exclude the diagnosis because plain chest radiographs are normal in >50% of tracheal FBs and one-fourth of bronchial FBs. More than 75% of airway FBs in children <3 years of age are radiolucent. Indirect radiological signs of radiolucent airway FBs include unilateral hyperinflation, atelectasis, consolidation, and bronchiectasis in delayed presentation.^{9,10} A computed tomography (CT) scan is a possible diagnostic option for patients who are asymptomatic, or symptomatic but stable, and who have normal or inconclusive plain radiographs but an ongoing clinical suspicion of FB aspiration.⁶ The sensitivity of CT scans for FBA is almost 100% and specificity is 66.7% to 100%. Unlike plain radiography, CT scans can usually detect radiolucent FBs such as vegetables. A clinically suspected FBA should ultimately be ruled out by bronchoscopy regardless of radiographic findings.¹¹ The anatomical structure of the right main bronchi makes foreign bodies more likely to be incarcerated. Right bronchus is straighter and broader than the left bronchus,

facilitating the deposit of foreign body on right side.^{12,13} Overall, food items are more commonly seen in infants and toddlers whereas older children more commonly aspirate nonorganic material (coins, pins, pieces of toys).^{14,15} In adults, the nature of the FB is highly variable. Nail or pin aspiration occurs primarily in young or middle-aged adults during do-it-yourself activities. Aspiration of dental debris, appliances, or prostheses can complicate facial trauma or dental procedures.¹⁶ Neurological disorders, loss of consciousness, and alcohol or sedative abuse predispose to FBA in adults as well as older children and adolescents.¹⁷ In the study by Darwin Kaushal *et al.*,¹⁸ 44.4% of the patients had delayed presentation (> 1 month). The majority of the patients had an organic foreign body (Supari or betel nut). All patients underwent rigid bronchoscopy, followed by optical forceps-assisted removal of the foreign body. A total of 82% of the patients had granulations around the foreign body. Management of delayed presentation tracheobronchial foreign body is a big challenge for Otorhinolaryngologists. The key factors for preventing complications in the definitive management of tracheobronchial foreign bodies are preoperative planning, multi-discipline teamwork, surgeon expertise and technique. In a retrospective study¹⁹ of 2,000 TFB patients (1,260 males and 740 females), 72.5% of our patients with TFB were aged between 1-3 years. Plant-based FBs are the most common FB type, accounting for 91.5%. Almost 52.1% of the FBs were encountered in the right bronchus. The coincidence rate for computed tomography-based three-dimensional reconstruction was significantly greater than that for chest X-ray examination (98.7% vs 82.0%, P,0.01). Under general anesthesia, the FBs were removed by rigid bronchoscopy. There were seven deaths from acute obstructive asphyxia and eight from residual FB-induced chronic asphyxia and respiration-circulation failure. In conclusion, early diagnosis and prompt treatment of TFBs with rigid bronchoscopy under general anesthesia is effective in reducing complications and mortality in affected children. Aram Baram *et al.*,²⁰ studied 83 patients between 6 months and 15 years age and most affected was the 1-5 year age group. There was a slight female predominance (male to female ratio 0.93:1). The most common FB was sunflower seed (49.4%). History of choking was present in 92.8% of patients; 55.4% had normal air entry, and 37.3% had no added sound on chest auscultation. Normal chest X-ray (CXR) was found in 40% of patients. The most common site was the right bronchial tree (39.8%). Two patients needed mechanical ventilation; both of them died. There was a significant relationship between the type of FB (P = .013, .000, respectively). Medical history is the most important factor for reaching the diagnosis; bronchoscopy is mandatory if choking was witnessed, even if examination and CXR are normal.

Organic material causes more local reaction than nonorganic material. Diagnostic fiberoptic bronchoscopy in the setting of a suspected FBA is not technically different from diagnostic bronchoscopy performed for other indications. Fiberoptic bronchoscopy allows precise identification and localization of FBs, facilitates the choice of rigid bronchoscope and type of forceps, and may shorten the duration of the rigid bronchoscopy procedure. According to various authors, the complication rate related to rigid bronchoscopy ranges between 2 and 22%. The most frequent complications are laryngeal oedema and pneumothorax, but more serious complications such as tracheal tear, bronchial tear, hypoxia and cardiorespiratory arrest can also occur.²¹ Flexible bronchoscopy can be performed in children under simple sedation associated with upper airway local anaesthesia in a room equipped with resuscitation equipment, but is usually performed in the operating room under general anaesthesia. When it confirms the presence of a foreign body, extraction can be performed during the same procedure with a flexible fibroscope in the case of a small foreign body, or with a rigid bronchoscope.

CONCLUSION

High suspicion in patients presenting with raspy respiration, wheezing, or coughing for tracheobronchial foreign body followed by early diagnosis as well as therapeutic measures with help of rigid/flexible bronchoscopy under expert supervision can prevent morbidity and mortality related to tracheobronchial foreign body aspiration.

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