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Management of Tracheobronchial Foreign Bodies in Adults and Children: 117 Cases

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Abstract

*Objective:*Tracheobronchial foreign body is commonly seen in children compared to adults. Accidental aspiration is the commonest cause .If not treated by timely intervention, leads to death and severe respiratory complications. Duration of presentation varies with size of the foreign body, age of the patient and symptoms. This study is conducted to know the nature of foreign body, symptoms, duration and age at presentation, diagnosis, complication and mode of removal of foreign body.

Patients and methods: 117 patients between 6 months to 70 yrs of age with Tracheobronchial aspiration of foreign body were evaluated and treated in tertiary care referral hospital for respiratory and chest diseases over a period of 17 years. All patients were evaluated with Chest X-ray, bronchoscopy and relevant investigations. Both flexible and rigid bronchoscope was used for diagnosis. Rigid bronchoscope is used in all cases for removal of foreign body.

Results: Out of 117 patients, 87 males (74%) out numbered 30 females (27%). More commonly seen in children less than 5 yrs of age. Half of the patients (50%) presented within 24 hours of ingestion. Only a few patients presented within 2 hours (5%) and some presented more than a year (7%) after the ingestion. Major symptoms were cough (39%), dyspnoea (24%) and wheezing (13%). Chest X-Ray showed visible foreign body in 30% and features of consolidation, collapse, hyperinflation in 53% of patients and normal chest radiograph in 17% patients. Organic Food items mainly various seeds, were the commonly ingested Tracheobronchial foreign body(TBFB) (47%) followed by plastic (30%) toy items and metallic items (21%). More than half of ingested TBFB were removed from right side (56%), more commonly from intermediate bronchus. In 111 patients (95%) bronchoscopic removal was successful and 6 patients (4%) required surgical intervention who presented late with complications.

Conclusion: Accidental aspiration is the commonest cause of TBFB in children as well as adults. High index of suspicion is required in all cases and subjected to diagnostic bronchoscopy even though the radiological signs are negative for foreign bodies. Early diagnosis and intervention are at most priority to avoid further complications. In paediatric patients with recurrent, non-resolving lung infections, it should be evaluated for TBFB. Rigid bronchoscopy is an essential prerequisite in majority cases of foreign body removal, complimented by flexible bronchoscopy. Only a few patients required surgery, who presented with complications who were mis-diagnosed with fewer symptoms during initial period due to small size of TBFB.

Keywords: Foreign Body; Tracheobronchial Foreign Body; TBFB.

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Introduction

Tracheobronchial foreign body (TBFB) is defined as any solid object aspirated below the level of the vocal cords [1]. Accidental aspiration of TBFB is one of the commonest cause of respiratory emergencies

and leads to life threatening complications and death if not treated by timely intervention [2]. However, symptoms can also go unnoticed for years with serious sequelae [3]. Other precipitating factors include CNS dysfunction, psychiatric disorders, trauma, alcohol addiction, etc. TBFB are more common in infants and toddlers [4,5,6].

Major issue involves the accurate early diagnosis, timely intervention and safe removal to reduce the complications and mortality [7]. Common complications are airway injury, inflammation, hemoptysis, bronchiectasis, atelectasis, abscess formation, asphyxia and death [7]. Trend in the nature and type of material aspirated is being changed over the years in accordance to changes in life style of the population studied. Duration of presentation from time of aspiration varies from hours to years depending on the severity of symptoms. Nonspecific symptoms and absence of symptoms is not unusual, justifying mistaken and delayed diagnosis [8].

A large sized foreign body occluding the common air way may lead to sudden death and small foreign body lodged in the bronchial tree causes less severe symptoms. Commonly used diagnostic tools are Chest X-ray, Computed Tomography (CT-Thorax), bronchoscopy [2,6,7]. Management of foreign body aspiration depends on the size, type (organic/inorganic/sharp) and location inside the tracheobronchial tree and also duration of presentation after the incident [9]. Bronchoscopic removal is the commonest mode of treatment and rarely requires tracheotomy and thoracotomy.

This study was conducted from the year 2000 to 2017, who were treated in our hospital for TBFB removal. The aim of this study is to know the incidence in age group, clinical presentation, the trend in the type of TBFB according to change in life style, habits, duration of presentation, signs and symptoms, complications, location of the TBFB and the choice of management.

Patients and methods

A total of 117 patients admitted with foreign body aspiration were evaluated and treated from Jan 2000 to Dec 2017, irrespective of age in this study. All patients underwent Plain X–Ray Chest and neck initially before bronchoscopic evaluation. Those who were in respiratory distress and critically ill were taken for immediate intervention,without further investigations. In few patients who were stable were further subjected for CT-thorax for further evaluation All patients were subjected to bronchoscopy (rigid/flexible) even though the radiological findings were negative for foreign body. Patients with endoluminal growth with foreign body sensation were excluded from the study. All patients were pre-treated with high flow oxygen and nebulised with bronchodilators before the procedure and subjected to bronchoscopy (flexible/rigid) initially. Rigid bronchoscope was used in all cases to remove TBFB in view of ease of ventilation and to avoid hypoxia.

During rigid bronchoscopy oxygen saturation (SpO_2) was maintained above 80% with high flow jet ventilation. Thorough saline bronchial wash was given and secretions were suctioned out pre and post bronchoscopic procedures. Short duration of steroids and bronchodilators were continued. In long standing cases with infection, secretions were sent for culture and sensitivity and antibiotics were started accordingly. Patients, in whome bronchoscopic removal was failed, were evaluated further with CT imaging and subjected for surgical procedure.Surgical procedures were either thoracotomy and lobectomy or tracheotomy and removal of the TBFB.

Results

All 117 patients were diagnosed as TBFB aspiration with youngest being 6 months of age and eldest being 73 yrs old.There were 87 male patients (74%) and 30 female patients (26%) spread across in all age group. Majority of them were paediatric patients, more commonly, less than 5 yrs (infants, toddlers and preschool) and rarely seen in above 50 yrs of age (Table 1).

Table 1: Age and sex distribution

Age (yrs)	No.	(%)	Male	Female
0-1	14	12	10	4
1-5	47	40	35	12
5-10	22	19	16	6
10-15	11	9	8	3
15-20	4	3	4	0
20-50	15	13	10	5
>50	4	3	4	0

Total=117, Male-87 (74%), female-30 (26%).

Half of the patients (50%) presented within 24 hours of ingestion. Majority of them (30%) were brought to the hospital at the interval of 5 to 24 hours after ingestion of TBFB. Only a few patients presented within 2 hours (5%) and some presented more than a year (7%) after the ingestion(Table 2).

Table 2: Duration since the aspiration

Duration	No.	(%)
<2 hour	06	05
02-05 hour	17	15
05-24 hour	35	30
01- 07 days	26	22
07- 14 days	11	09
15-30 days	05	04
30 -90 days	06	05
3months- 01 yr	03	03
01yr- 2yrs	04	03
02yrs -05 yrs	02	02
> 05 yrs	02	02

Major symptoms were cough (39%), dyspnoea (24%) and wheezing (13%), followed by fever, chest pain, haemoptysis, choking sensation and few of them had multiple symptoms (Table 3).

Table 3: Symptoms at the time of presentation

Symptom	No.	(%)
Cough	45	39%
Dyspnea	28	24%
Wheeze	15	13%
Fever	09	07%
Hemoptysis	07	06%
Chest pain	07	06%
Choking	06	05%

Chest X-Ray done initially at the time of presentation showed normal chest radiograph in 17% patients. Visible foreign body in 30% and features of consolidation, collapse, hyperinflation in 53% of patients (Table 4).

Table 4: Initial X-RAY findings of chest

Findings	N	%
Visible foreign body	35	30
Collapse/consolidation	34	29
Obstructive hyperinflation	28	24
Normal	20	17

More than half of the aspirated TBFB were removed from right side (56%), more commonly from intermediate bronchus, followed by left side (35%), commonly from left main bronchus (20%). Six patients (5%) required surgical intervention in view of failed bronchoscopic removal.

Table 5: Location and frequency of TBFB

Location	N	(%)
Trachea	10(8+2) *	8
Right Main Bronchus	11	9
Right .Upper lobe	05	4
Intermediate bronchus	29	25
Right midlobe	01	1
Right lower lobe	20(18+2)#	18
Left main bronchus	23	20
Left upper lobe	03	2
Left lower lobe	15(13+2)**	13

* two cases required tracheotomy
#twocases required right thoracotomy and lobectomy
** Twocases required left thoracotomy and lobectomy.

Organic Food items were the commonly ingested TBFB (47%), followed by plastic toy items (30%) and metallic items (21%). Organic food items were exclusively seen in infants 6 months to 1 year of age and less common after 15 yrs of age. Plastic toy items seen in toddler and preschool age group and pen cap being commonly removed in school going kids. (Table 6).

Table 6: Types of TBFB removed

Organic	Plastc	Metalic	Miscelleneous
55(47%)	35 (30%)	21(18%)	6(5%)
Ground nut seed =19 Tamarind seed =11 Beetle nut seed =08 Custered apple seed=03 Chikku /sappota seed=03 Pea nut=02 Maize/corn=02 Jack fruit seed=01 Black pepper seed=01 Melon seed =01 Ragi husk stick=01 Coconut piece=01 Green chilly =01 Cotton piece =01	Pen cap =15 Whistle=13 Plastic pieces=04 Button=01 Plastic Tube=01 Tooth paste cap=01	Screw=05 Metal piece=05 Coin=04 Ball Pen spring=03 Drawing pin=02 Ear ring=01 Pencil sharpener=01	Tooth=02 Stone=02 Laryngoscope bulb =01 Sim card =01

Two cases required right lower lobectomy, two required left lower lobectomy due to tight impaction of foreign body closing the lobar bronchus and destruction of lung parenchyma.

Two cases required tracheotomy, whereas in one case there was a large impacted foreign body and in the other, there was a perforation of trachea with dislodgement of foreign body.

Discussion

Foreign body aspiration was more commonly seen in children then adults [4,5,6]. Nature of foreign body varies with age, sex, life style, occupation, culture, socioeconomic status and eating habits of the population studied [12,13].

In our study, organic food items were exclusively noted in infants up to 1 year [10,11]. This is attributed to weaning from exclusive breast feeding to top up feeds; infant explores all the available surrounding items with hand to mouth, insufficient mastication due to lack of molar teeth, keeping the Objects in mouth while playing, talking, crying and inadequate neuromuscular development to perform multiple task simultaneously [10,11,12,13]. Various types of vegetable seeds were commonly seen in our study. This is because the seeds are smooth surfaced, small, and slippery. Children are not experienced in separating the seeds from pulp. It is also attributable to less common use of processed and packed food in the study population.

In toddlers and preschool age group, it is a mixed picture with predominantly food items followed by small plastic toy items like whistle that were freely available and also given as freebies with eatables promoted by advertisements. In school going age group pen caps and other writing items were commonly encountered. None of our study cases had non vegetarian food items like bone piece, fish bone, which were commonly encountered in other studies due to socioeconomic status, culture and food habits [1,9,12,13,14]. Males were Outnumbered females in all age groups, which was unexplainable.

Cough was the common presenting symptom followed by dyspnoea,wheeze, chest pain, choking and rarely cyanosis. Severity of the symptoms prompted the patient to reach the emergency room [7,10,11,14,17].

Patients who aspirated large sized objects causing respiratory distress and choking presented earlier to the emergency room due to severity of symptoms [7,11]. Small sized objects easily passed down to lower airway tract and were impacted with few initial symptoms. Those patients who ingested small sized objects with fewer symptoms reached the hospital with complications in later stage [7,11, 13].

It was difficult to diagnose a TBFB in children due to lack of adequate history and nonspecific signs and symptoms [4,5,7,11,12]. Only in few patients radiograph showed a visible foreign body [6,7,9,14]. All these lead to mis-diagnosis of foreign body aspiration and later presented with complications and increased morbidity [7,8,17].

Chest X-Ray is recommended in all patients with suspected TBFB, while negative findings and normal chest radiograph does not exclude the diagnosis [6,7,9,11,14,15,17]. In the present series, only 30% patients showed visible TBFB. Indirect radiological signs like collapse, consolidation, obstructive emphysema were predominantly seen.

Bronchoscopic examination is a must for suspected TBFB and initial mode of diagnostic as well as therapeutic option. Rigid as well as flexible bronchoscopy was commonly used. Rigid bronchoscopy is preferred in paediatric and adult patients with respiratory distress. Rigid bronchoscopy allows airway maintenance and ventilation during the procedure without compromising the vision and manoeuvre [2,6,10,11,14,15].

TBFB are often lodged in right bronchial tree in view of anatomical angle, more commonly in intermediate bronchus in view of right main bronchus being shorter,wider and a direct extension of the trachea [1,6,10,11,14].

Many of these patients were treated with multiple course of antibiotics and while being investigated for other causes, found to be TBFB ingestion by bronchoscopic examination and other radiological examinations like CT thorax [7,8,14,17].

There were four patients of TBFB in this study who were treated for long term antitubercular treatment for years elsewhere and ended up in thoracotomy and lobectomy in our study. These patients presented with hemoptysis, fever and bronchiectasis.

Conclusion

Accidental aspiration is the commonest cause of TBFB in children as well as adults. High index of suspicion is required in all cases and should be subjected to diagnostic bronchoscopy even though

the radiological signs are negative for foreign bodies.

Early diagnosis and intervention are at most priority to avoid further complications. Organic (food) items commonly seen in infants and toddlers and plastic (toy) commonly seen in preschool age group. Paediatric patients with recurrent, non resolving lung infections should be evaluated for TBFB.

Rigid bronchoscopy is an essential prerequisite in majority of the cases of foreign body removal, complimented by flexible bronchoscopy in all cases when used judiciously.

Only a few patients require tracheotomy and thoracotomy to remove TBFB. Thoracotomy and lung resection were required in few cases with delayed presentation and Complications, who were mis-diagnosed in view of fewer symptoms during initial period of presentation due to small size of TBFB.

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