A Cross-Sectional Study of Clinical Profile and Outcome in Children with Foreign Body Aspiration at a Tertiary Care Centre in Telangana

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ABSTRACT

BACKGROUND

Foreign body aspiration (FBA) in children is one of the major causes of death in developing countries, the diagnosis of which can be missed due to varied presentation. It is one of the causes of choking among children which, if not recognized early may lead to fatal consequences. Early recognition and prompt intervention may reduce the mortality and morbidity. In this study, we wanted to assess the clinical profile of children with foreign body aspiration/ingestion, determine the nature and location of foreign body and also determine the outcome among children with foreign body aspiration at a tertiary care centre.

METHODS

This cross-sectional study was taken up to analyse the clinical profile, to study the types, location and the outcome of children with foreign body aspiration. All children in the age group of 2 months to 12 years admitted to Niloufer hospital, Hyderabad from January 2018 to December 2019 with either history of FBA or clinical features suggestive of FBA even in the absence of history were included in the study. Age, sex, clinical features (C/F), duration of illness were noted. A chest X-ray was done in all cases, whereas a computed tomography (CT) scan was done in children where clinical features & chest X-rays were inconclusive. All children fulfilling the inclusion criteria were subjected to bronchoscopy under general anaesthesia by ENT surgeons. The findings like type and location of the foreign bodies were noted. Statistical analysis was done by statistical package for social sciences (SPSS) software version 10.0.

RESULTS

Of 108 children studied, 60 % of cases were males and 40 % were females. 55 % of cases were below the age of 3 years. Common symptoms were rapid breathing (68 %) and cough (38.8 %). Nuts & seeds were the common foreign bodies seen in 47.30 %, out of which groundnuts were the most common. Organic foreign bodies accounted for 58.11 % while inorganic was 41.89 %. The common site of lodgement of foreign body was right main bronchus (35.59 %), followed by left main bronchus (27.11 %) and sub-glottis (8.47 %).

CONCLUSIONS

Foreign body aspiration is difficult to diagnose in children and a delay in diagnosis can lead to mortality and morbidity. Early intervention by bronchoscopy goes a long way in improving survival. Clinical suspicion is the key to the diagnosis.

KEYWORDS

Foreign Body, Bronchoscopy, Children

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BACKGROUND

Foreign body aspiration is an important cause of paediatric morbidity and mortality particularly in the age group between 6 months and 4 years.[1] Foreign body aspiration into the tracheobronchial tree results in a wide spectrum of presentations ranging from asymptomatic to death.[2] The life-threatening consequence is acute respiratory distress, an uncommon presentation. Delayed/non-removal of foreign bodies may have clinical features like coughing and wheezing to recurrent or non-resolving respiratory sequelae like chronic pulmonary infections, bronchiectasis, and lung abscess in later life. These presentations may mimic other respiratory illnesses like asthma, pneumonia, or tracheobronchitis. The diagnosis requires a high index of suspicion and early intervention to prevent morbidity and mortality due to delayed or inappropriate diagnosis.[3,4] Clinical features that help in the diagnosis are, history of foreign body aspiration, which may be positive in up to 80 % of cases and the common triad of coughing, choking, and wheezing.[2-4]

METHODS

This is a hospital based cross sectional study. The children in the age group of 2 months to 12 years admitted in Niloufer hospital, Hyderabad, with history of foreign body aspiration as well as those with clinical features suggestive of foreign body aspiration, even in the absence of history were included in the study. The period of study was from January 2018 to December 2019. The following data was collected- age, gender, presenting complaint, duration of illness, relevant history suggestive of foreign body aspiration/ingestion.

The children were stabilized initially with airway, breathing and circulation. They were subjected to imaging studies which included chest X-ray (in all cases) and CT scan chest (where chest X-ray findings were inconclusive).

All children fulfilling the inclusion criteria were subjected to bronchoscopy under general anaesthesia by ENT surgeons. The nature and location of foreign body were identified and removed. Children were monitored in paediatric intensive care unit (PICU) for the post bronchoscopy care. The duration of hospital stay and outcome were noted.

Inclusion Criteria

Children in the age group of 2 months to 12 years admitted in hospital with

1. Clinical features suggestive of suspected foreign body aspiration.
2. History of foreign body aspiration.
3. Acute onset of respiratory distress.

Exclusion Criteria

Children with

1. Diagnosed bronchial asthma.
2. Past history of chronic lung disease/pulmonary tuberculosis.
3. Immunodeficiency disease / cystic fibrosis.
4. Trauma.

Statistical Analysis

The statistical analysis was done using SPSS 10.0 software. Demographic data of age, gender etc… were analysed using proportions.

RESULTS

The total number of children with foreign body inhalation was 108. The most common age group was between 7 months to 3 years accounting for 45.37 %. 25 % of children were between 3 to 5 years. About 21.3 % were above the age of 5 years, while 8.33 % were infants between 2 to 6 months of age. (Table. 1)

Age Group	Number (N = 108)	Percentage (%)
2 - 6 months	9	8.33 %
7 - 36 months	49	45.37 %
3 - 5 years	27	25 %
> 5 years	23	21.3 %

Table 1. Age Group of Children with Foreign Body Aspiration

The gender wise distribution of children showed that 60.19 % were boys while 39.81 % were girls (Table 2).

Gender	Number(N = 108)	Percentage (%)
Male	65	60.19 %
Female	43	39.81 %

Table 2. Gender Wise Distribution of Children with Foreign Body Aspiration

The children with foreign body inhalation had varied clinical presentations. 79 children corresponding to 73.15 % had presented with tachypnoea, out of which 68 children had sudden onset and the remaining 11 children had insidious onset. The next most common presentation was paroxysmal cough seen in 42 children (38.8 %) followed by wheezing (35.18 %) and decreased air entry (32.4 %) Choking was an uncommon presentation in our study accounting to only 2.7 %. The remaining children had stridor (9.25 %) and vomiting (4.63 %) respectively (Table. 3).

Features		Number (%)	
Vomiting		5 (4.63 %)	
Paroxysmal cough		42 (38.8 %)	
Tachypnoea	Sudden onset	79 (73.15 %)	68 cases
	Insidious Onset		11 cases
Stridor		10 (9.25 %)	
Decreased air entry		35 (32.4 %)	
Wheezing		38 (35.18 %)	
Choking		3 (2.7 %)	

Table 3. Clinical Features of Children with Foreign Body Aspiration

Out of the total 108 cases, foreign body was found in 74 cases. Out of 74, 43 were of organic nature with 58.11 %, while the remaining 31 were inorganic with 41.89 % (Table 4). Nuts and seeds were common among organic foreign bodies.

Foreign Body			No Foreign Body
Type of FB	**Number (%)**		
Ground nut/Peanut	27 (36.49 %)		
Custard apple seed	5 (6.76 %)		
Tamarind seed	3 (4.05 %)		
Coconut	3 (4.05 %)		
Chicken piece	1 (1.35 %)	Number	Number
Mucus plug	4 (5.41 %)	74	34
Organic	**43 (58.11 %)**	(68.52 %)	(31.48 %)
Pebble	5 (6.76 %)		
Safety pin	7 (9.46 %)		
Plastic objects	6 (8.10 %)		
Metal objects	13 (17.57 %)		
Inorganic	**31 (41.89 %)**		

Table 4. Type of Foreign Body

Out of the 74 cases, in 59 cases the foreign body was located in the respiratory tract, while 15 cases had it in the gastrointestinal tract. Of the 59 cases with inhaled foreign body, about 59.33 % were organic in nature, the rest 40.67 % were inorganic in nature. Out of the total 24 inorganic objects, 3 of them were sharp (image 3, 4) and 21 were non-sharp objects. Of the total 15 ingested foreign body all were inorganic with 4 being sharp and remaining 11 were non sharp objects (Table 5).

Type of Foreign Body	No. of Cases Aspirated N = 59 (%)	No. of Cases Ingested N =15 (%)
Organic	35 (59.33)	nil
Inorganic	24 (40.67)	15 (100 %)
Sharp objects	03	04
Non-sharp objects	21	11

Table 5. Nature of Foreign Body (N = 74)

Image 1. Chest X-Ray of 1 Year Girl with Left Lung Collapse

Image 2. Removed Organic Foreign Body (Chicken Bone Pieces) in the Same Child

Image 3. 11 Month Boy with Radio Opaque FB Sim Pin in Trachea

Image 4. Safety Pin - Sharp Foreign Body in the Oesophagus

Bronchoscopy findings are as follows: In those children with foreign body, the most common location was in the right main bronchus in 35.59 %, followed by left main bronchus in 27.11 % of cases. The next most common locations were oropharynx & subglottis respectively. Of the ingested foreign bodies, oesophagus was the most common location followed by hypopharynx (Table 6).

Location	N = 59 (%)
Right main bronchus	21 (35.59 %)
Left main bronchus	16 (27.11 %)
Bilateral bronchus	3 (5.08 %)
Sub Glottis	5 (8.47 %)
Trachea	1 (1.69 %)
Oesophagus	6 (10.17 %)
Oropharynx	6 (10.17 %)
Hypopharynx	1 (1.69 %)

Table 6. Location of Foreign Body

Total foreign body ingestion cases were 15, natural removal occurred in 9 cases and 5 cases required endoscopic removal and 1 case required surgical removal of metallic needle by exploratory laparotomy. Out of 108 cases, 2 children had cerebral palsy.

Of the total 108 cases, 93 cases had chest X-ray and the remaining had X-Ray abdomen along with chest X-ray, where the history of ingestion and inhalation is not clear. Computed tomography chest was done in only four cases.

The analysis of chest X-ray confirmed that the majority of children (38.7 %) showed signs of hyperinflated lung fields (Table 7) with or without concomitant changes (atelectasis, emphysema).

CXR findings	N = 93 (%)
Hyper inflation	36 (38.7 %)
Collapse	12 (12.9 %)
Atelectasis	04 (4.3 %)
Consolidation	06 (6.45 %)
Emphysema	02 (2.1 %)
Normal X ray	33 (35.48 %)

Table 7. Chest X Ray Findings (CXR)

Average duration of hospital-stay ranged from 3 to 12 days for foreign body aspirated cases and 1 to 3 days for foreign body ingested cases. One case recovered after 38 days of hospital stay as it developed pneumothorax following bronchoscopy procedure, done for removal of foreign body. It was managed with Intercostal tube placement and drainage.

Out of total 108 cases, 105 (97.22 %) cases were discharged, one case left against medical advice. Mortality occurred in 2 (1.85 %) cases, which presented with respiratory failure and succumbed within 8 hours of admission. One of them is a female child aged 2 years another being 5 months old male infant. Both the cases presented late to emergency room after 7 days of foreign body aspiration (Table 8).

Outcome	N=108	Percentage
Discharge	105	97.22 %
Death	2	1.85 %
LAMA	1	1.08 %

Table 8. Outcome of Children with FB

DISCUSSION

Foreign body aspiration into the tracheobronchial tree is a life-threatening condition in young children, wherein a foreign object gets aspirated into the airways or lung parenchyma. It can occur in all age groups, though common among infants and children less than 3 years. In a study by Shiva Kumar et al.[5] in India children between the ages of 1 and 3 years were found vulnerable for aspiration, and the majority were boys as compared to girls. In our study, the majority were below the age of 3 years which is comparable to studies were done by Shiva Kumar et al. and Fadl FA et al.[5,6] The younger age group is at risk due to the natural urge to explore objects by mouthing, lack of molar teeth to crush nuts, and lack of supervision by adults. The male to female ratio in our study was 3 : 2, whereas the ratio was 2 : 1 in a study done by Weissberg et al.[7]

In our study, the mean duration of symptoms was 1 to 2 days prior to admission with 2 patients reporting as late as 5 to7 days after the aspiration. In a study by Weissberg, et al. 18 % of them were referred after a delay of 1 month.[7] Whenever there was a delay in referral for more than a week, the medical staff often missed the history of choking. Factors contributing to delayed diagnosis are parental negligence, missed diagnosis, asymptomatic after a brief episode of dyspnoea, and varied clinical presentations.[4] Common clinical features included tachypnoea (73.15 %), paroxysmal cough (38.8 %) followed by wheezing (35.1 %), decreased air entry (32.4 %) and stridor (9.25 %). The triad of wheezing, paroxysmal cough, and decreased air entry, considered highly suggestive of foreign body aspiration, was seen in 32 % of our cases as compared to 36 % in a study done by Sehgal A et al.[4]

A chest radiograph is important for diagnosis. Hyperinflation (38.7 %) was the common finding in the present study, whereas other studies have reported as high as 60 %.[8] Chest radiograph can be normal in as many as 9 - 30 % cases as per the study by Weissberg et al.[7] while it was 35.48 % in our study. The ingested foreign body was commonly located in the oesophagus, may present with increased salivation, swallowing difficulties, vomiting, and respiratory distress.[8] To obviate the necessity of endoscopy, an X ray chest to localize the oesophageal foreign body 1 - 2 hours prior to the procedure is suggested.[8] The foreign bodies which lodge in the distal oesophagus require prompt removal to prevent complications like aspiration, oesophageal erosion, and perforation. In the present study, where the history was inconclusive, an X-ray chest and abdomen were done to identify the location of a foreign body.

Shlizerman et al.[11] stated that out of 136 children who had undergone bronchoscopy, foreign bodies were found in 73 % of the cases, which is comparable to our study wherein 68 % of total children who had undergone bronchoscopy had a foreign body. The majority of the foreign bodies were organic in nature, and among them, nuts and seeds are the commonest[5,9-18] which is comparable with our study. Groundnut was the commonest organic foreign body seen in our study.

The common site of the location of a foreign body in the right main bronchus is due to the anatomical structure of the bronchial tree. The right main bronchus is wider, shorter, vertical, and is also closer to the trachea than the left. In our study, the right main bronchus was the common site followed by the left main bronchus, which is comparable with a study done by Yadav et al.[19]

The mortality in our study was 1.85 %, which was less than 1 % in a study by Wiseman NE, with improved instrumentation and anaesthetic techniques.[14] Mortality was observed in patients who had been in distress and respiratory failure for a considerable period of time prior to admission. Early bronchoscopy is done in those with a history or suspected of foreign body aspiration, sudden onset of symptoms of choking, respiratory distress or stridor, recurrent chest infections where other causes are excluded, and where the chest X-ray is suggestive. Rigid bronchoscopy under general anaesthesia is the standard management of such cases.[20]

CONCLUSIONS

To conclude, it is important for the clinician to have a high index of suspicion, especially in those with sudden onset of symptoms of cough, wheeze if unilateral, choking, and respiratory distress. A foreign body aspiration is a dramatic event with potentially lethal consequences. Creating awareness is the best preventive measure for minimizing the incidence of this problem.

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