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Original Research Article

Clinical profile and immediate outcome of children admitted with foreign body aspiration: experience at Dr. Vaishampayan Memorial Government Medical College, Solapur, Maharashtra

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ABSTRACT

Background: Foreign body (FB) aspiration is an uncommon but potentially life-threatening situation that requires urgent intervention. It occurs more commonly among children than in adults. The clinical presentation varies depending on the location of FB in the airway. Patients may be asymptomatic, but when present, symptoms range from acute onset of cough, shortness of breath and at times, asphyxiation. Objective of the research was to study the clinical pattern and immediate outcome of children admitted with foreign body aspiration (FBA).
Methods: Descriptive observational study was carried out at department of paediatrics at Dr. VMGMC Solapur during the study period of September 2019 to October 2021. Statistical analysis was done using statistical package for the social sciences (SPSS) 24.0 version.
Results: Mean age of the study population was 4.16±2.74 years. Males were 26 (52%) and females were 24 (48%) in our study. Males were predominant in our study with male to female ratio as 1.08:1. Groundnut was commonest FB seen in 34%. Commonest location of FB was right nose in 18 (36%), left nose in 12 (24%). Commonly seen symptoms were irritability in 58%, fever in 40%, vomiting in 40% and cough in 38%. Mortality rate was 2% in our study.
Conclusions: Commonly observed aspiration of suspected FB was groundnut in 34% and chana in 20% cases. Most common symptom after aspiration revealed that the irritability in 29 (58%), fever 20 (40%) and vomiting in 20 (40%) cases. Mortality rate was 2% in our study.

Keywords: Foreign body aspiration, Clinical profile, Outcome, Symptoms

INTRODUCTION

A foreign body (FB) is any internal or external substance, incompatible with the anatomy of the site where it is found or located. Jackson defined a FB as "an object or a substance that is foreign to its location".[1]

Foreign body aspiration (FBA) is a major preventable cause of morbidity and mortality in children, being the fourth leading cause of accidental death in children younger than 3 years and the third in infants under 1 year.[2]

Foreign bodies and its sources are different among populations, although in most of the cases in paediatric age group are organic sources.[3-8] FBA was prevalent in preschool age, especially in children below three years age.[3,6,9,10]

Due to adults' inadequate observation skills and kids' propensity to investigate their surroundings through their mouths, little objects might be accessed, which can occasionally lead to aspiration.[3] Inability to properly chew food, an underdeveloped posterior tooth, and immature

neuromuscular airway protection mechanisms are further contributing reasons.[9,11] The primary respiratory symptoms and signs of FBA might mimic illnesses like croup or asthma, delaying proper diagnosis and increasing morbidity and death.[8] Most studies of FBA focused on children under age 3 and did not evaluate babies under the age of 1 year.

Aspiration of a FB is a rare but possibly fatal circumstance that needs immediate attention. Children are more likely than adults to experience it. Depending on where FB is located in the airway, the clinical appearance changes. Patients may not have any symptoms, but when they do, they can include acute onset cough, shortness of breath, and occasionally asphyxiation. Patients may appear sub acutely with haemoptysis, post-obstructive pneumonia, and the development of lung abscesses. Patients who require intensive care unit (ICU) admission owing to severe respiratory failure may also have significant airway blockage, pre-existing co-morbidities, large volume haemoptysis, sepsis from post-obstructive pneumonia, or gas exchange abnormalities. In order to ease their symptoms, these individuals need prompt procedures to remove the FB. [11]

Hence the present descriptive observational study was conducted amongst the of children admitted having FBA with the objective to study the clinical pattern and immediate outcome at our tertiary care centre.

Objectives

Objective of the research was to study the clinical pattern and immediate outcome of children admitted with FBA.

METHODS

Study type

It was a descriptive observational study.

Study place

The study was conducted at the department of paediatrics in tertiary care centre at Dr. Vaishampayan Memorial Government Medical College, Solapur, Maharashtra involving 50 patients with upper aerodigestive tract FB inhalation reported at department of paediatrics in tertiary care centre.

Study period

The duration of the study was from September 2019 to October 2021.

Inclusion criteria

All children between 6 months to 14 years of age group with history of FBA/ingestion with the signs and symptoms suggestive of FBA were included.

Exclusion criteria

Patients not willing to participate in the study with age less than 6 months and more than 14 months were excluded.

Statistical analysis

Data was collected by using a structure proforma. Data entered in Microsoft excel sheet and analysed by using statistical package for the social sciences (SPSS) 24.0 version IBM USA. Qualitative data was expressed in terms of proportions. Quantitative data was expressed in terms of mean and standard deviation.

Methods of data collection

This study was conducted at the department of anaesthesia and intensive care and department of paediatrics at our tertiary care centre. After approval by our institutional ethics committee and obtaining informed consent of the parents, this study was conducted to evaluate the clinical presentation in children with FBA. History of witnessed choking, chronic cough, dyspnea, and stridor were recorded. Signs of inhalation included decreased breath sounds, cyanosis, chest wall retraction, and temperature were documented. The cause of delay in presentation was searched for in every case. Radiological investigation included plain chest radiography, expiration/inspiration films, lateral decubitus in younger children, computed tomography (CT) scan, ventilation perfusion (V/Q) scan, and chest fluoroscopy.

Bronchoscopy was performed in the operating room under general anesthesia and using a ventilating bronchoscope. A rigid pediatric bronchoscopic system with optical telescope (Storz, Germany) was used in all cases. Once the FB was removed completely, the telescope was reinserted to check the retained FB, to take secretions for culture, and to assess the severity of mucosal reaction and damage. All patients required chest physiotherapy postoperatively.

RESULTS

We included total 50 patients with upper aerodigestive tract FB inhalation reported at department of Paediatrics in tertiary care centre. Out of 50 patients, majority were from 1-3 years age group i.e. 19 (38%) followed by 16 (32%) from 3-6 years, 9 (18%) from 6-12 years age group and 6 patients i.e. 12% from 6-12 months. Mean age of the study population was 4.16±2.74 years (Table 1).

Males were 26 (52%) and females were 24 (48%) in our study. Males were predominant in our study with male to female ratio as 1.08:1 (Figure 1).

Aspiration of suspected FB revealed groundnut in majority of the cases i.e. 17 (34%). This is followed by chana in 10 (20%), coin in 9 (18%), battery cell in 5 (10%), almond in 4 (8%), shirt button in 4 (8%) and mica plate in 1 (2%) (Table 2).

Table 1: Distribution according to age.

Age group in years	Frequency	Percent
6-12 months	6	12.0
1 to 3	19	38.0
3 to 6	16	32.0
6 to 12	9	18.0
12 to 14	0	0.0
Total	50	100.0

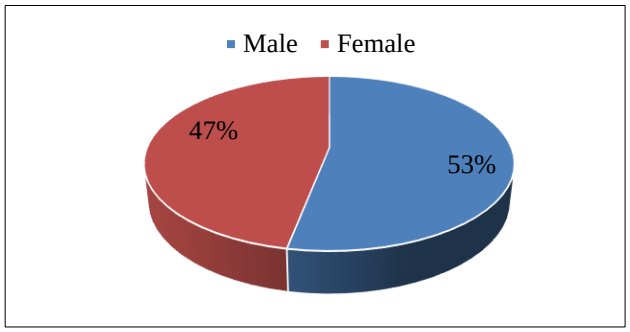

Figure 1: Pie diagram showing distribution according to gender.

Table 2: Distribution according to type of suspected foreign body.

Type of FB (suspected)	Frequency	Percent
Almond	4	8.0
Battery cell	5	10.0
Chana	10	20.0
Coin	9	18.0
Groundnut	17	34.0
Mica plate	1	2.0
Shirt button	4	8.0
Total	50	100.0

In majority of the cases, time between aspiration and admission to our centre was less than 24 hours i.e. 33 (66%) followed by 1 to 7 days in 16 (32%). Only one patient reported after 7 days in our study i.e. 2% (Figure 2).

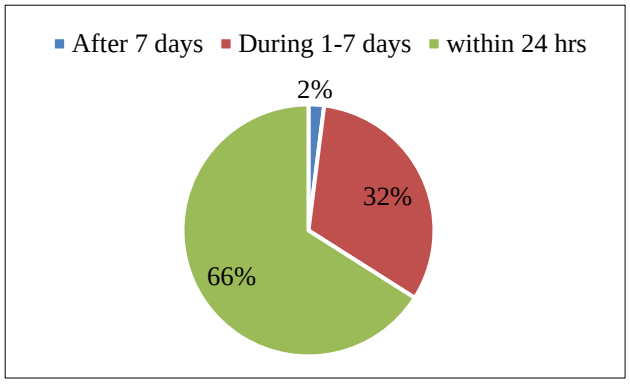

Figure 2: Pie diagram showing distribution according to time between aspiration and admission.

Suspected location of FB revealed right nose in 18 (36%), left nose in 12 (24%), cricopharynx in 7 (14%), oropharynx in 3 (6%), right bronchus in 3 (6%), upper oesophagus 3 (6%), lower oesophagus in 2 (4%), left bronchus in 1 (2%) and trachea in 1 (2%) case (Table 3).

Table 3: Distribution according to suspected location of foreign body.

Suspected location of FB	Frequency	Percent
Cricopharynx	7	14.0
Left nose	12	24.0
Left bronchus	1	2.0
Lower oesophagus	2	4.0
Oropharynx	3	6.0
Right nose	18	36.0
Right bronchus	3	6.0
Trachea	1	2.0
Upper oesophagus	3	6.0
Total	50	100.0

Most common symptom after aspiration revealed that the irritability in 29 (58%), fever in 20 (40%), vomiting in 20 (40%), cough in 19 (38%), noisy breathing/wheeze in 11 (22%), h/o choking in 11 (22%), cyanosis in 4 (8%) and excessive cry 30 (60%) (Table 4).

Table 4: Distribution according to symptoms.

Symptoms	Frequency	Percent
Cough	19	38.0
Noisy breathing/wheeze	11	22.0
Fever	20	40.0
H/o choking	11	22.0
Irritable	29	58.0
Cyanosis	4	8.0
Vomiting	20	40.0
Excessive cry	30	60.0

Subcostal retraction and nasal flaring were commonly observed signs in 9 (18%) cases followed by increased work of breathing in 8 (16%) cases. 5 (10%) had intercostal retraction and accessory muscle use each (Figure 3).

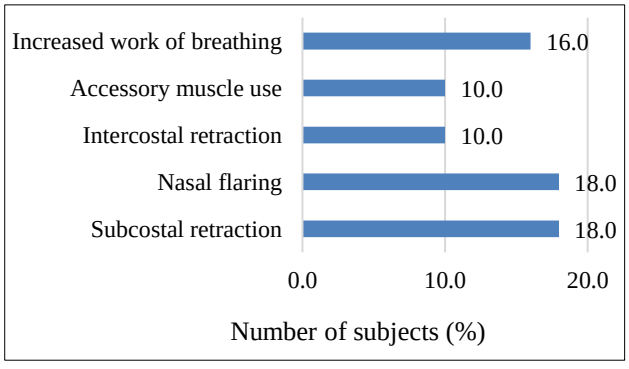

Figure 3: Distribution according to signs.

Single death was observed in our study. So, mortality rate was 2% in our study (Figure 4).

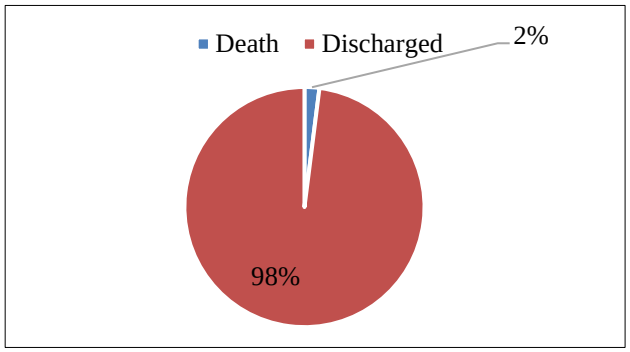

Figure 4: Distribution according to outcome.

DISCUSSION

Sociodemographic information

We included total 50 patients with upper aerodigestive tract FB inhalation reported at department of paediatrics in tertiary care centre. Out of 50 patients, majority were from 1-5 years age group i.e. 39 (78%) followed by 8 (16%) from 6-10 years and remaining 3 (6%) from 11-15 years age group. Mean age of the study population was 4.16±2.74 years.

Males were 26 (52%) and females were 24 (48%) in our study. Males were predominant in our study with male to female ratio as 1.08:1.

Karakoç et al reviewed a total of 174 children with FBA.[12] Long-term follow-up was available for 110 patients for a mean duration of 37.8±23.7 months (range, 1–88 months). Swanson et al included total of 94 children (62 boys and 32 girls; mean age, 46.5±45.9 months) were evaluated for suspected TFB aspiration.[13] Chiu et al reported total of 53 patients (27 boys, 26 girls) that were recruited with a median age of 25.4±21.3 months.[14] Mallick et al included sixteen children that were male and 12 were female.[15] Their age ranged from 1 to 11 years (mean 3.28 years) and more than half of them (n¼15) were younger than 2 years of age.

Our findings are almost comparable with the findings of the above-mentioned authors.

Clinical presentation/symptoms

Most common symptom after aspiration revealed that the irritability in 29 (58%), fever in 20 (40%), vomiting in 20 (40%), cough in 19 (38%), noisy breathing/wheeze in 11 (22%), h/o choking in 11 (22%), cyanosis in 4 (8%) and excessive cry 30 (60%). Subcostal retraction and nasal flaring were commonly observed signs in 9 (18%) cases followed by increased work of breathing in 8 (16%) cases. 5 (10%) had intercostal retraction and accessory muscle use each (Table 4).

Swanson et al reported that wheezing was present in 59% of children in the TFB group and in 47% of children in the NTFB group (OR, 1.6; p=0.26), tachypnea in 38% and 31% respectively (OR, 1.4; p=0.45), fever in 28% and 16% respectively (OR, 2; p=0.17), and stridor in 10% and 11% respectively (OR, 0.9; p=0.92).[12]

Chiu et al reported sudden onset of cough (72%), dyspnea (64%), and wheeze (60%) were the predominant symptoms and signs.[14]

Mahajan et al reported that cough was the most common presenting symptom in 49 (68.1%) cases, followed by noisy breathing/wheezing in 26 (36.1%) children.[16] Air entry was decreased in 53 (73.6%) children, tachypnoea (increased respiratory rate according to age) was present in 36 (50.0%) children and tachycardia (increased heart rate according to age) was present in 50 (69.4%) children.

Naara et al reported that in the infants' group, the most prevalent symptoms were cough (48%) and dyspnea (22%).[17] Rales on auscultation were the most common physical signs, followed by decreased breath sounds. In contrast, in the older group, decreased breath sounds were the most prevalent sign, followed by wheezing.

Our findings are almost comparable with the findings of the above-mentioned authors.

Naragund et al found cough in 90.9% cases, wheeze in 90.9% and respiratory distress in 72.7% cases.[18] Similarly, Kaur et al observed cough in 92% cases, respiratory distress in 80% cases and wheeze in 64% cases.[19] A history of cough is highly sensitive but not very specific for aspiration of FB as observed by Fidkowski et al.[20]

Type of foreign body

Aspiration of suspected FB revealed groundnut in majority of the cases i.e. 17 (34%). This is followed by chana in 10 (20%), coin in 9 (18%), battery cell in 5 (10%), almond in 4 (8%), shirt button in 4 (8%) and mica plate in 1 (2%) (Table 2).

Chiu et al reported nuts and peanut (59%) were the most common foreign bodies aspirated.[14] Obstructive emphysema (53%) and normal chest radiograph (34%) were the most frequent radiological findings.

Mahajan et al reported vegetable foreign bodies were found in 60 (84.5%) cases, although these were suspected in 53 (74.6%) cases based on history.[16] Peanut was the most common vegetable FB in 42 (59.1%) patients followed by almond in 9.8%, pomegranate seeds in 2.8%, chana in 7%. Non vegetative items were found in 12.7% cases (pen cap-2.8%, plastic whistle-2.8%, soil-2.8%, metal piece-1.4%).

Sersar et al reported that organic FB accounted for 62.6% of the FB removed, with peanuts (n=15) being the most

common type, followed by seeds (n=13) and beans (n=4), pistachios, and other food materials.[21] Eight (8.8%) of the FB were inorganic; most of them were either metal or plastic objects, out of which 4, as stated earlier, were radio-opaque. In the remaining 28.6% cases, the patients' records did not specify the type of FB.

Mallick et al reported that majority of FBs recovered were organic (n¼ 17; 70.8 per cent) and included mainly watermelon seeds, peanuts, and seed shells.[15] Non-organic FBs were found in seven (29.2 per cent) cases that consisted of plastic toy piece, nail, and bone.

Naara et al reported that the majority of the FBs found were from organic origin.[17] Nuts and seeds were found in 26% and 22% of neonatal cases, respectively, compared to 43% and 13% in the older group. In 15% of infants, no FB was retrieved during the bronchoscopy compared to only 8% in the older group.

Our findings are almost comparable with the findings of the above-mentioned authors.

Location of foreign body

Suspected location of FB revealed right nose in 18 (36%), left nose in 12 (24%), cricopharynx in 7 (14%), oropharynx in 3 (6%), right bronchus in 3 (6%), upper oesophagus 3 (6%), lower oesophagus in 2 (4%), left bronchus in 1 (2%) and trachea in 1 (2%) case (Table 3).

Mahajan et al reported suspected location of FB in right bronchus in 54.9%, left bronchus in 25.3% and trachea in 16.9%.[16]

Sersar et al reported that the most common site of FB lodging was the right main stem bronchus (47.3%), followed by the left bronchus (32, 35.2%), bilateral bronchi (5, 5.5%), carina (5, 5.5%) and the trachea (6, 6.6%). The rest were recovered from segmental smaller airways.[17]

Mallick et al reported that in 24 patients, one or more foreign bodies were removed: 13 (54 per cent) were located in the main left bronchus, six (25 per cent) in the main right bronchus, two (8.3 per cent) in the right distal bronchus, one (4.1 per cent) in the carina, one (4.1 per cent) in the trachea, and one (4.1 per cent) in both bronchi.[15]

Kaur et al, Fidkowski et al, Sinha et al, had similar finding, whereas Naragund et al found no significant difference between FB aspiration in right and left bronchus, Liu et al found predominance of FB aspiration in left bronchus in 60% children.[18-20,22,23]

Outcome

Single death was observed in our study. So, mortality rate was 2% in our study.

There was single mortality (1.4%) in the study reported by Mahajan et al which is consistent with our findings.[16]

Kaur et al had observed 2% mortality and Sahin et al found mortality of 0.8%.[19,24]

CONCLUSION

Commonly observed aspiration of suspected FB was groundnut in 34% and chana in 20% cases. Most common symptom after aspiration revealed that the irritability in 29 (58%), fever 20 (40%) and vomiting in 20 (40%) cases. Mortality rate was 2% in our study.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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