

FOREIGN BODY INHALATION IN CHILDREN

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Received date: 24 April 2023

Revised date: 14 May 2023

Accepted date: 04 June 2023

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ABSTRACT

Background: Foreign body inhalation in the airway is a universal problem, being still one of the important causes of childhood morbidity and mortality. Socioeconomic-cultural and educational factors are determinants for the frequency and particularities of the foreign body aspirated. **Aim of the study:** To determine the clinical characteristics and the result of the bronchoscopic approach for foreign body aspiration in children's airways referred to the pediatric surgery center. **Patients and Methods:** To achieve the aim of the present study, a prospective study on 315, pediatric patients, on whom bronchoscopy was carried out in the pediatric surgery center at AL- Khansaa Teaching Hospital, due to suspected foreign body inhalation, from January 2002 up to January 2004. **Results:** Total sample size was 315 patients with mean age of (26.0±3.561) months; 196 (62.2%) were males and 119 (37.8%) were females with the male to female ratio was 1.6:1. About 71.1% of the patients were of Arabic race. The most frequent symptom was Penetration Syndrome which found in 262 patients (83.2%). The radiological findings were positive in 290 (92.1%) patients and the collapse consolidation was the most frequent finding in 71(22.5%). Positive bronchoscopy found in 209(66.3%). Foreign bodies were found in the right main bronchus in 94 (45.0%) of the cases and in the main left bronchus in 30.1%. About 22 different types of, the most common foreign bodies found during the bronchoscopy were sun seeds. Successful bronchoscopy was done in 208(99.5%) patients and in only one patient thoracotomy was decided. **Conclusions:** A negative history, clinical examination, and chest X-ray do not necessarily exclude aspirated foreign body material. Bronchoscopy is the most effective diagnostic and therapeutic modality to manage foreign body in the tracheobronchial tree and to prevent complications related to neglected foreign body aspiration.

KEYWORDS: Bronchoscopy, Children, Foreign Body, Inhalation.

INTRODUCTION

Foreign body inhalation in the airway is a universal problem, being still one of the important causes of childhood morbidity and mortality. Socioeconomic-cultural and educational factors are determinants for the frequency and particularities of the foreign body aspirated.^[1]

Children from age 9 to 30 months are more susceptible to airway foreign bodies due to the mobility of these children and their oral orientation.^[2]

Foreign body inhalation is common in children which necessitates immediate attention and proper management because of the small size of tracheobronchial tree.^[3]

Aspirated foreign bodies most commonly are lodged in the right main stem and lower lobe. Aspiration has been documented in all lobes including the upper lobes, though with less frequency. Moreover, Peanuts are by far the most commonly aspirated material in children, followed by sunflower seeds, pieces of vegetables, and the hazelnuts.^[4]

Male predominance is found in most studies, particularly in children, approximately 60.0% of patients were males.^[4]

Male preponderance appears to be one of the fixed mathematical constants of nature and has been observed in many series.^[5] It has been attributed to rougher and more adventurous playing male children as well as the more curious and inquisitive nature of boys as girls.^[6]

The age distribution with the majority of patients between 12 and 48 months has been attributed to poor chewing ability from a lack of posterior dentition and tendency to put things into the mouth.^[7] In addition to the causes related to age,^[1,5,7,8] tendency to have frequent, vigorous, uninhibited inspirations when startled, laughing or coughing were included. A solid object entering the pharynx elicits a startle response permitting the foreign body to enter the open larynx during forced inspiration.

Carelessness that may contribute to foreign body aspiration in many ways, hasty eating and drinking habit, permitting children to play while eating or talking with food in the mouth, giving food such as peanut and watermelon to young children. Lack of coordinating mechanism of swallowing, associated with the elevation of the larynx and to the protective reflex, which is immature in small children.

History of Foreign body aspiration was present in 72 % to 85% of the cases which are confirmed by endoscopy; However, the aspiration episode is often not the main family complaint, but it is very useful and necessary to get a guided history⁽⁹⁾. In nearly one third of the children aspirating foreign bodies, the actual event is not witnessed.^[10]

The clinical feature of children with foreign body in the airways depends on the size and location of the material aspirated, and varies from asymptomatic to severe respiratory failure.^[11] Although the presentation of foreign body aspiration may be variable, the triad of symptoms and signs, comprising of sudden onset of cough, wheezing and decreased air entry should alert the physician to the possibility of foreign body.^[12]

With large foreign bodies, the net result can be acute upper airway obstruction and sudden death.^[13] Most children with foreign body aspiration, however present with respiratory distress followed by cyanosis, cough and wheezing. Sudden appearance of wheeze in a child who has not previously manifested asthma should arouse suspicion of the presence of a foreign body. Neglected foreign bodies result in recurrent attacks of wheezing and may lead to pneumonitis, bronchiectasis and rarely empyema thoraces. Therefore, history of repeated chest infection or persistent lobar or segmental pneumonia not responding to antibiotics, might demand investigation for foreign body.^[13]

The most common presentation was the "penetration syndrome" which defined as the sudden onset of choking and cough with or without vomiting.^[14] In children undergoing treatment of new-onset asthma, bronchitis, or pneumonia that is not responding to appropriate treatment, for example, steroids, bronchodilators antibiotics, consider the possibility of foreign body aspiration, particularly with unilateral wheezing.^[4]

Radiographic findings may be minimal in the early stages of foreign body bronchial occlusion particularly if both inspiration and expiration films are not taken.^[2]

Most foreign bodies in children are radiolucent, but they may be associated with hyperinflation, atelectasis, or consolidation. The unrecognized or missed foreign body is still common and constitutes 25.0% of cases. More recently, computed tomography has been demonstrated to show occult tracheobronchial FB.^[13]

If the child has got coughing or wheezing but maintaining an airway, do not attempt to intervene immediately; the nearest facility where definitive treatment can be provided. If severe airway compromise or total obstruction occurs, attempt chest compression, back and abdominal thrusts, or the heimlich maneuver, these methods depends on the age of the patient.^[4]

Extraction of foreign bodies by bronchoscope is the treatment of choice. Debate exists on whether to use rigid or fiberoptic bronchoscope. The decision depends on the preference, foreign body location and patient size.^[4] With the advent of the pediatric Storz endoscopic equipment, most foreign bodies can be extracted successfully with minimal morbidity and mortality.^[13] Rigid bronchoscopy is the procedure of choice for removal of aspirated foreign bodies and other methods are not encouraged.^[15] Fortunately, most of the aspirated foreign bodies are visualized by endoscopy and removed by one of the several types of capture forceps.^[9] Magill forceps have been used with some success for foreign bodies located below vocal cord but above the cricoids ring. With the laryngoscope, this may be the quickest method of removing foreign bodies above the cricoids ring.^[4]

Concomitant use of fluoroscopy and use of a Fogarty balloon catheter has been employed for successful extraction of more peripherally located foreign bodies.^[13]

In the very rare situation that distal impaction renders the foreign body not removable endoscopically, thoracotomy and bronchotomy may be necessary. On a rare occasion, segmental or lobar resection may be the only practical alternative for removing the impacted bronchial foreign body.^[2]

According to statistics of the national safety council of the United States, of 1995, mechanical suffocation was responsible for 167(5.0%) of accidental death in children under the age of four.^[1] Aspiration of foreign body is the most important cause of accidental death of children younger than six years of age in American homes.^[1]

Historically, foreign body aspiration has been a tremendous cause of death and disability.^[16] About 2 centuries have passed since BOZZINI (1806), used a candle as a light source to remove foreign bodies from airway.^[17] Jackson in 1936, reported a decrease in

mortality for foreign body aspiration from 24% to 2% with the use of endoscopic techniques for foreign body removal.^[18]

Bronchoscopy allows direct visual examination of the upper airway and tracheobronchial tree, sampling of respiratory tract secretions and cells, and biopsy of airway, lung, and Mediastinal structures. Bronchoscopy is used for diagnosis and therapy.^[19]

There are two types of bronchoscopes; Flexible instrument which consist of many small glass fibers that transmit light and allow your physician to see clearly through it. A small channel in the instrument allows small specimens to be obtained. This instrument can be passed either through the nose or mouth into the air passages. The Rigid bronchoscope (open tube bronchoscope) which can be inserted only through the mouth.^[19]

The development of small diameter flexible endoscopes has allowed medical specialists access to the airway in the conscious, sedated patient. Topical anesthetics and sedation do not control the anxieties and defensive hyper reflexes of children undergoing complicated and possibly prolonged endoscopic procedure.^[2]

In small children, the endoscopes that allow ventilation, suction of secretions, access for extracting forceps, and access for light and vision are rigid.^[20] Although there are flexible fiber-optic endoscopes as small as 1.7 mm available for passage through an endotracheal tube or for a wake diagnostic endoscopy, it is not possible to ventilate or manipulate instruments with these devices.^[21]

The smallest diameter rigid endoscopy that contains, a working channel and a ventilation channel is the 3.5 mm sheath, through which a 1.9 mm telescope can be passed while leaving enough room for ventilation.^[2]

The complications may occur either during the procedure or post bronchoscopy. Among the complications that have been reported were.^[20]

Aim of the study

To determine the clinical characteristics and the result of the bronchoscopic approach for foreign body aspiration in children's airways referred to the pediatric surgery center.

PATIENTS AND METHODS

To achieve the aim of the present study, a prospective study on 315, pediatric patients, on whom bronchoscopy was carried out in the pediatric surgery center at AL-Khansaa Teaching Hospital, due to suspected foreign body inhalation, from January 2002 up to January 2004.

Many of these patients were referred to the pediatric surgery center directly, and some of them were referred

from private hospitals, clinics, and local pediatric hospitals. All cases were examined by different consultant pediatric, surgeons in the center and underwent bronchoscopic examination under general anesthesia, most cases were done by senior- house officer (Registrars) supervised by the consultant except in few life saving cases.

The elected criteria for Bronchoscopy were positive history of foreign body aspiration, positive clinical findings, positive radiological findings, and children with persistent chest infection despite adequate therapy.

The demographic characteristics, clinical presentation, chest radiographic appearance, types of foreign bodies, and the site of their lodgment in the tracheo bronchial tree were recorded. In clinically stable cases, the necessary steps are performed, such as intravenous hydration, antibiotics when necessary, and pre-anesthetic evaluation. The bronchoscopy was carried out under general anesthesia using A STORZ rigid ventilating bronchoscope with fiberoptic light source, the removal of foreign bodies by means of different forceps under direct vision, including re introducing the bronchoscope for removal of any remaining fragments, suction of secretions, evaluation of tissue reaction, edema, ulceration, and any anatomical abnormalities, all these findings were recorded. A lens-aided forceps was used on few occasions to confirm the presence of and remove the foreign body in the distal part of trachea-bronchial tree.

As for the technique of bronchoscopy, the bronchoscope was routinely introduced after direct laryngoscopy using the anesthetist laryngoscope (mackintosh), straight or curved blade.

RESULTS

Total sample size was 315 patients; 196 (62.2%) were males and 119 (37.8%) were females with the male to female ratio was 1.6:1.

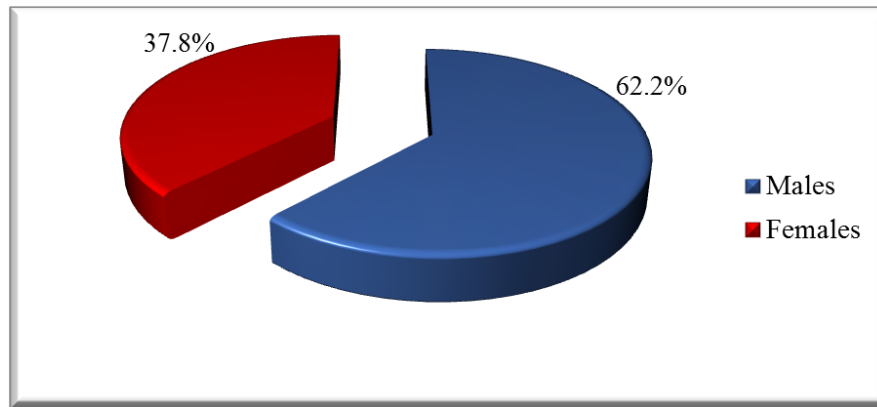


Figure (1): Pie chart representing sex distribution.

The age distribution was showed in table (1) and demonstrated that the patients were divided into 4 groups according to their age, ranged from 8 days to 11 years,

with mean age of (26.0±3.561) months. More than half of the patients 177 (56.2 %) were between one and three years.

Table (1): The age distributions.

Group	Age (Year)	Number	Percent
I	0 -1	91	28.9
II	1 -3	177	56.2
III	3 -5	24	7.6
IV	> 5	23	7.3
Mean age/ month	26.0±3.561		

The distribution of the study sample according to the race was demonstrated in figure (2), in which, there were 224 Arabic patients represented 71.1%, the Kurdish

patients found in 77 (24.4%), and the Yazedian represented 14 (4.5 %) of the study sample.

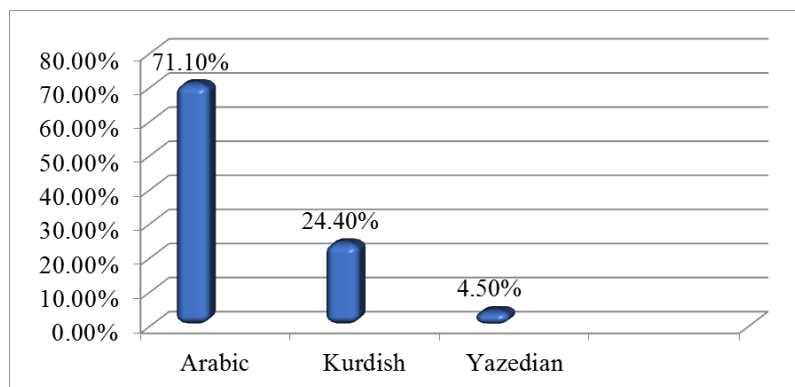


Figure (2): Distribution of the study sample according to race.

The symptoms and signs associated with aspirated foreign bodies are outlined in table (2). The most frequent symptom was what we called the (Penetration

Syndrome), defined as a sudden onset of choking and intractable cough with or without vomiting, as seen in 262 patients (83.2%).

Table (2): Symptoms and signs.

Symptoms and signs	No. of patients	Percentage
Penetration syndrome	262	83.3
Shortness of breath	228	72.3
Stridor / Wheezing	182	57.8
Cyanosis	31	9.8
Decrease air entry on affected side	249	79.0
Other abnormal chest examination (crepitation, rhonchi)	81	25.7
Normal local chest examination	66	20.9

The radiological findings associated with aspirated foreign bodies are outlined in table (3). AP and lateral views of the chest and neck had been taken for 290 (92.1%) patients and were not done in 25 (8.0%). It

elicited that 149 (47.3%) patients there had no any abnormal radiological findings. The most frequent finding was collapse consolidation in 71(22.5%).

Table (3): Radiological findings.

X- ray findings	No. of patients	Percentage
Normal X -ray	149	47.3
Collapse consolidation	71	22.5
Hyper translucency	29	9.2
Not done	25	7.9
Atelactasis	19	6.1
Radio – opaque F.B	11	3.5
Empyema / Effusion	9	2.9
Collapse right upper lobe	1	0.3
Pneumothorax	1	0.3

Indications of Bronchoscopy was demonstrated in figure (3) and illustrated that positive history of foreign body inhalation represented 214 patients (67.9 %). The

positive clinical findings were found in 249 patients (79.0%). Positive radiological findings found in 141patients (44.8%).

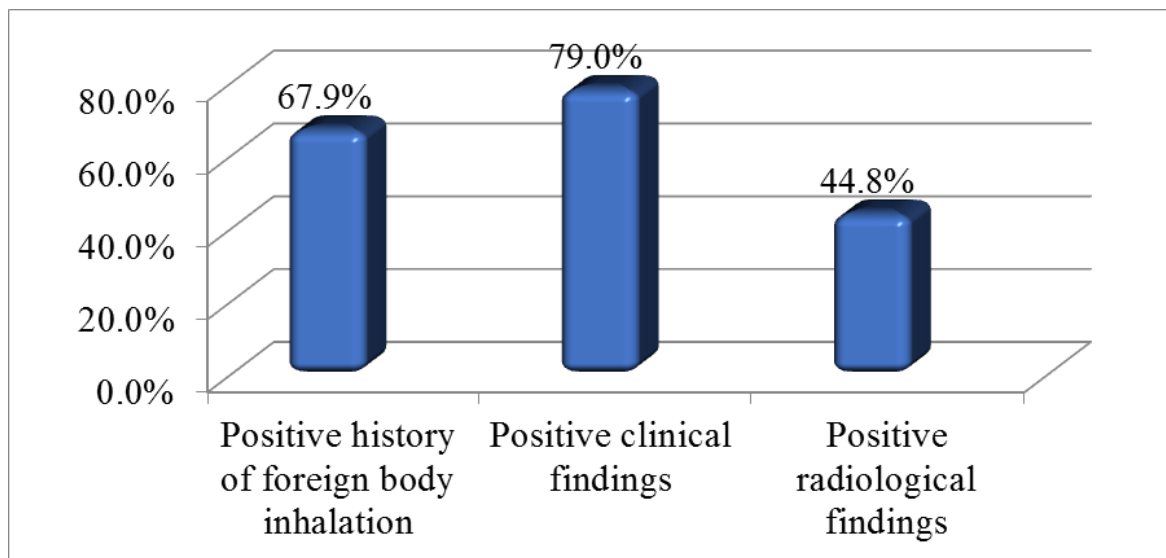


Figure (3): Indications of Bronchoscopy.

The history of FBA in relation to the bronchoscopy findings was showed in table (4) and demonstrated that number of patients have foreign bodies in their airways, (positive bronchoscopy) was 209(66.3%) while number of patients do not have foreign bodies in their airways

(negative bronchoscopy) was 106(33.7%). Number of patients had positive history of foreign body aspiration was 214 (67.9 %). The number of patients do not have history of foreign body aspiration was 101(32.1%).

Table (4): The history of FBA in relation to the bronchoscopy findings.

History of FBA		Bronchoscopy		No. of Patients
		Positive No. (%)	Negative No. (%)	
History	Positive	176 (82.2)	38 (17.8)	214 (67.9)
	Negative	33 (32.7)	68 (67.3)	101 (32.1)
Total		209	106	

The location of foreign bodies was showed in figure (4) and found that the FB were predominant in the bronchia 157(75.1 %); with 94 (45.0%) of the cases in the right main bronchus and 30.1% in the main left bronchus.

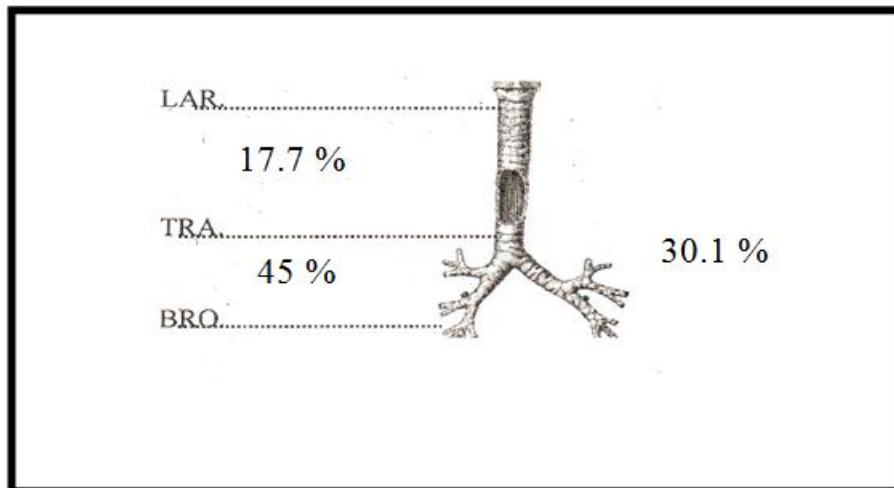


Figure (4): Distribution of FB in the airways.

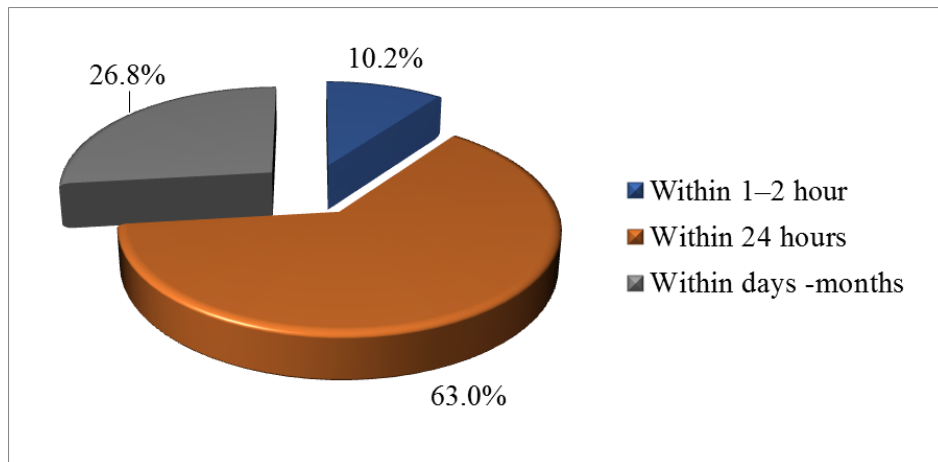
Nature of the Foreign body was demonstrated in table (5) and showed that a variety of foreign bodies were seen, 22 different types of foreign bodies, the most common being

sun seeds, which account for one 1/3 of all foreign bodies, followed by watermelon seeds.

Table (5): Types of foreign bodies extracted.

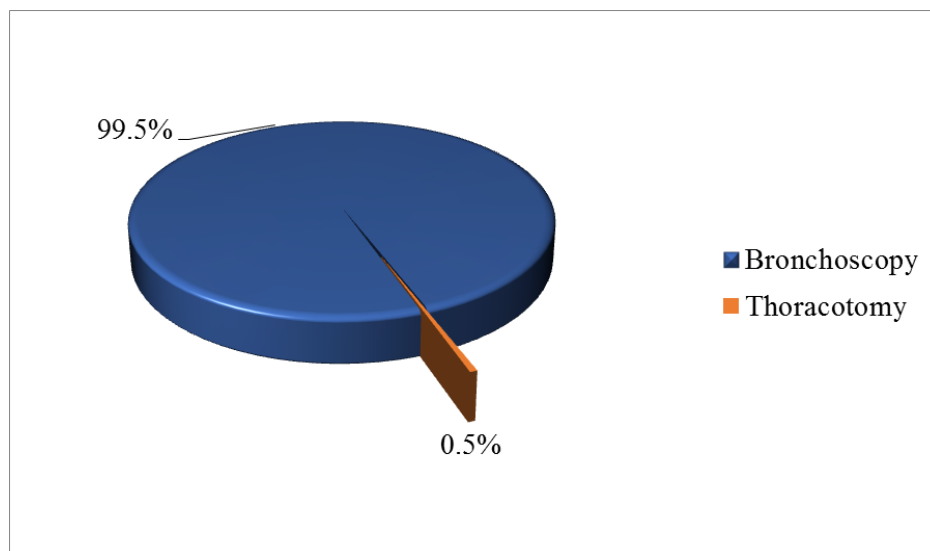
Nature of foreign bodies	No. of patients	Percentage
Sun seeds	69	33.0
Water melon seeds	40	19.1
Beans	37	17.6
Peanuts	30	14.4
Piece of bone	8	3.8
Beeds	8	3.8
White seeds	7	3.3
Piece of plastic (toys)	4	1.9
Rubber piece	3	1.4
Egyption seeds	2	0.96
Cessi peel	2	0.96
Flagcolet	1	0.48
Apricot stone	1	0.48
Peach peel	1	0.48
Buttone	1	0.48
Orange seeds	1	0.48
Nylon paper	1	0.48
Piece of plant	1	0.48
Pear stone	1	0.48
Walnut	1	0.48
Metallic ball	1	0.48
Cabbage	1	0.48

Time of procedure was showed in figure (5) and demonstrated that 21(10.0 %) patients, bronchoscopy was done within 1–2 hour of the onset of symptoms. In 132(63.0%) patients, bronchoscopy was done within 24 hours of the onset of symptoms. In 56(26.8%) patients, bronchoscopy was done within days –months.



Successful bronchoscopy was showed in figure (6) and displayed that in 208(99.5%) patients, it was possible to remove the foreign body. In one (0.5%) patient of

impacted peripheral foreign body, thoracotomy was decided after several unsuccessful attempts.



The most common findings in patients of whom no foreign bodies were demonstrated in table (6) and found that by the bronchoscopy, there were an infection (Pus), and inflamed mucous membrane. Sample for bacteriological study was obtained in most of the cases. In one patient with persistent chest infection,

bronchoscopical examination was negative for foreign body, there was bulging of posterior upper 1/3 of trachea, Esophagoscopy also done which revealed secretion and difficult to assess the exact pathology, patient was disappeared for follow up.

Table (6): Findings of negative bronchoscopy.

Findings	No. of patients	Percentage
Infection (Pus)	47	44.3
Inflammation (redness, congestion)	33	31.2
Normal bronchoscopy	24	22.6
Bulging of posterior wall of upper 1/3 of trachea	1	0.95
Small stenosed upper right bronchus	1	0.95

DISCUSSION

Despite several reports in the literature and emphasis on the dangers of foreign body aspiration, it remains a problem for young children all over the world. Foreign body aspiration is responsible for more than 300 deaths

per year in children under 6 years of age in the United States.^[22]

Boys are usually more involved in foreign body aspiration, with a ratio male: female ratio of 2:1, which

might be explained by their more adventurous personality and sharper curiosity, compared to girls.^[1,23]

In the present study, the findings of foreign body more common in boys 137 (65.6%), especially in the first three years of their lives, which is in agreement with literature data.^[9,11]

Foreign body aspiration by children, especially those below the age of 3 years, is common.^[16]

In the current study, the most common age group was group II between 1-3 years, 176 /209 (84.2 %) in the first three years of life, which is in agreement with other studies.^[5,7]

The most important factor enabling early diagnosis remains a positive history of aspiration together with a high index of suspicion, the combination constituting an indication for bronchoscopy^[13]. In current study a definite history of foreign body aspiration was obtained in (82.2 %) of cases, confirmed by bronchoscopic finding, and (67.9%) of total cases (table 2). The positive history of foreign body aspiration is present in 72.0% to 85.0% of the cases confirmed by endoscopy, with reports of up to 89.2%.^[9]

The clinical presentation of foreign body aspiration varies according to different parameters. These include the degree of airway obstruction, the site of the foreign body, and the duration of the illness.^[10] Foreign body aspiration, more often was presented with a history of an initial episode of choking and coughing with subsequent respiratory symptoms.^[24] In the present sample, the most common presentation was the penetration syndrome (83.2%) which, is in accordance with the above mentioned authors. The most common physical sign was decreased or abnormal breath sounds.^[16] which is similar to the present finding (79.0%). Foreign body aspiration can be misdiagnosed as asthma, upper respiratory tract infection or croup.^[24] This has happened to one patient in our study where diagnosed and treated as a case of asthma for 8 months, which was proved to be a foreign body (small sunflower seed shell) at the carina.

Radiological findings may vary from being diagnostic to totally unremarkable; most aspirated foreign bodies in the present study (88.6%) as well as in all reported series were unfortunately, radiolucent. Radiographic findings vary with the size of foreign body in relation to that of bronchus, also depend on time elapsed and on the nature of the foreign body.^[13] In a series of 189 children with proven foreign body aspiration, (47.6%) had normal chest radiographs.^[24]

In the current study, 290 patients (92.0%) underwent a plain thoracic X -ray, the normal X -ray was noticed in (47.3%) of cases, this may either be due to the high suspicion of foreign body aspiration and early referral of patients with positive history, clinical and radiological

findings of foreign body aspiration, or the foreign bodies were removed within 24 hour in (73.2%) of cases, so there was no time for lung changes to be seen on X-ray. Collapse consolidation constitutes the most common abnormal X -ray finding in our study (22.5%). The higher frequency of consolidation in the X-ray examination observed by Lima *et al.*,^[9] (32.2%) was justified by the extended stay of the foreign body in the airway with a probable inflammatory reaction. The foreign material aspirated into the airway must be removed as soon as the diagnosis is suspected or confirmed, and when the patients' clinical conditions allow airway manipulation under anesthesia.^[11] The consequence of a delayed diagnosis is the delay in performing the endoscopy procedure.^[9]

In the present study, foreign body was removed within 24 hour in 153 (73.2%) of the cases, 7.2% in seven days, 9.1% within the first month, and 10.5% beyond 30 days. These results are nearly similar to those found by Wiseman, who obtained an early diagnosis in 62.0 to 66.0 % of the cases.^[9]

In the present study, the mean period between inhalation and removal of the foreign body was 3.5 days with a range of ½ hour to 8 months. These unnecessary delays can be circumvented by maintaining a high index of suspicion in children under the age of 5 years, presenting with a history and clinical feature suggestive of foreign body aspiration.

The distribution of foreign body location in the present study showed the predominance on right main bronchus (45.0%) in relation to other areas, this is because the right main bronchus is short and in line with the trachea, also because of the angulation of the left main stem bronchus, this distribution is in agreement with other studies.^[9,25] However, studies by Fraga *et al.*,^[11] show the predominance of foreign body in the left main bronchus, this finding is explained as probably occasional because of the small number of patients analyzed.

Most inhaled foreign bodies in children are food items, with peanuts being the most common.^[24] In the present study the most common foreign body was, sunflower seeds (33.0%), constitute 1/3 of the aspirated foreign bodies, confirmed by bronchoscopy, followed by watermelon seeds (19.1%), whereas the peanuts (14.3%) represent the fourth common foreign body, extracted. This is due to the common use of this type of seeds in most of our houses and in easy excess of the small infants and children especially when they lifted together unattended.

In this study, organic materials such as sunflower seeds (33.0%), beans (17.7%) and others corresponded to most of the aspirated foreign bodies, which is in agreement with literature data.^[9,11] Regarding the age range in the present study, predominance of foreign organic bodies (81.0%) found in the first three years of life and inorganic (78.0%) in children older than three years of

age. These data are in agreement with the literature, which emphasize the higher probability of finding food material in younger children, whereas inorganic objects are more frequently aspirated by older children.^[26]

In the present study, (98.7%) of the foreign body were removed with rigid bronchoscope. In one case, thoracotomy with bronchotomy was necessary to remove the foreign body. The review of 50 published papers, involving 6,393 patients with foreign body aspiration made by Bittencourt and Camargos revealed the need of thoracotomy in 2.5% of the cases.^[27]

In the present patient (0.5%) submitted to thoracotomy, the foreign body was peripherally located (plastic bead), causing mucosal edema and complicated by bronchial tear and pneumothorax making its removal difficult after many trials of bronchoscopy. Another thoracotomy was done to a patient with impacted screw in peripheral right bronchus which was not included in this study just before we do this study. A very high success rate (99.5%) in the removal of foreign bodies was achieved (208 cases), due to improved endoscopic facilities, and surgeons experience.

Fogarty balloon and Dormia basket was used in 2 cases, 2 patient required two or more attempts to remove the foreign body, a lens – aided forceps was used in 21 patients (10.0%) with peripherally located foreign bodies, and extraction of foreign body by use of Magill was achieved in 3 cases.

Despite the development of bronchoscopic equipment, the report of complications related to foreign body removal in children still occurs.^[27] Bronchoscopy is a delicate procedure and must be performed by an experienced team, due to the risk of bronchospasm and arrhythmias.^[25] Complication of bronchoscopy may occur either during the procedure or post-bronchoscopy. Among the complications that have been reported were hypoxemia, bronchospasm, laryngeal spasm, Pneumothorax, hemorrhage, and arrhythmias.^[19]

In the present study, the complication of rigid bronchoscope were limited to 11 cases (3.5%) of bronchospasm, only 5 of them necessitate ventilation, and one case of pneumothorax necessitate urgent thoracostomy tube on the table, followed by thoracotomy, there were also a temporary sore throat and hoarseness of voice in most of our patients, which recovered after few days.

Concerning the prevention of foreign body aspiration, the importance of prenatal orientation by doctors and the media about offering peanuts, seedy fruits, and such other foods to children younger than 5 years of age was emphasized, since these are the most aspirated foods in this age range.^[28,29] a fact also observed in the present study.

CONCLUSION

Children who have a sudden onset of choking and coughing should be taken seriously. A negative history, clinical examination, and chest X-ray do not necessarily exclude aspirated foreign body material. Normal radiographic findings should not be relied on to exclude the possibility of an aspirated foreign body. A negative bronchoscopy is more acceptable than a complication of a missed foreign body. Bronchoscopy is the most effective diagnostic and therapeutic modality to manage foreign body in the tracheobronchial tree and to prevent complications related to neglected foreign body aspiration. Older children and teenagers are also not immune to this problem.

Recommendations

1. Preventive measures, however, continue to remain the best means of protecting these children.
2. Public education is needed as regard to dangers of allowing young children to have sunseeds or peanuts or leaving them unattended with small objects.
3. Rigid bronchoscopy is a relatively safe procedure and should be carried out in children whenever symptoms like persistent cough, chest infection or stridor persist despite proper antibiotic therapy.
4. By far, beans and peanuts are common, where their extraction could create problems to their nature i.e, fragmentation can take place, and hence a residual foreign body has to be ruled out at the end of each endoscopy.
5. Early referral to appropriate hospital on suspicion, or if symptoms persist, should be made.

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