

TRACHEOBRONCHIAL FOREIGN BODIES: A CHALLENGE IN THE RURAL SETUP

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HOW TO CITE THIS ARTICLE:

Diptanshu Mukherjee, Swagatam Banerjee, Maumita De, Sekhar Bandyopadhyay, Manotosh Dutta, S. N. Bandyopadhyay. "Tracheobronchial Foreign Bodies: A Challenge in the Rural Setup". Journal of Evidence based Medicine and Healthcare; Volume 1, Issue 15, December 15, 2014; Page: 1894-1900.

ABSTRACT: Accidental foreign body aspiration represents a common problem in India, especially in the pediatric population. The main challenges facing an otolaryngologist in rural tertiary care Centre's of developing countries include the significant delays in referral, the relative lack of sophisticated equipment at the surgeons' disposal and the mortality associated with loss of airway. **MATERIALS AND METHODS:** All patients who underwent bronchoscopy for suspected aspiration of foreign bodies in North Bengal Medical College, Darjeeling, between June, 2012 and May, 2014 were included in the study. All patients underwent rigid bronchoscopy under general anesthesia. Foreign bodies, when found, were removed using conventional grasping forceps. **RESULTS:** Thirty-six patients were admitted for suspected tracheobronchial foreign body (TFB) during the study period. The presentation pattern was highly variable between the patients although the predominant presenting complaint was that of respiratory distress (63.9%). The interval between suspected accidental inhalation and presentation ranged from 1 to 31 days. The foreign bodies retrieved were classified into four broad groups. Seeds and nuts were the most common foreign body. The site of lodgment of the foreign body in the tracheobronchial tree was also variable. **CONCLUSION:** Our experience in a rural tertiary care centre in West Bengal has shown that a high index of suspicion must be present to diagnose such cases as early as possible. Digital radiographs might be normal in a considerable number of cases and any suspicion of a TFB should warrant a bronchoscopic examination. Symptoms like choking and cough may not be always present and even a definite history of accidental foreign body aspiration may be absent. **KEYWORDS:** Foreign bodies, Bronchoscopy, Aspiration, Airway obstruction.

INTRODUCTION: Accidental foreign body aspiration represents a common problem in India, especially in the paediatric population. The mortality rate associated with foreign body aspiration seems to range from 0% to 1.8% according to various studies.^[1] A common cause for these inadvertent injuries in childhood is the inappropriate exposure of children to seemingly innocuous looking nuts or other small objects coupled with the ubiquitous tendency of placing such objects in the mouth.^[2,3]

The presenting clinical features are dependent on a variety of factors including the nature, size, shape and consistency of the aspirated foreign body, the site and degree of obstruction and the time interval between aspiration and presentation.^[4] The main challenges facing an otolaryngologist in rural tertiary care centres of developing countries are the significant delays in referral, large catchment area of population, the relative lack of sophisticated equipment at the

ORIGINAL ARTICLE

surgeons' disposal (e.g., flexible fiberoptic bronchoscopes) and the mortality associated with loss of airway as a consequence of bronchial oedema.

Early and accurate diagnosis and prompt subsequent management form the mainstay of treatment of tracheobronchial foreign bodies, and given the limitations of a rural tertiary care centre, treatment of such patients presents a challenging situation. The aim of our study was to share our experience of treating tracheobronchial foreign bodies with the available resources.

MATERIALS AND METHODS: All patients who underwent bronchoscopy for suspected aspiration of foreign bodies in North Bengal Medical College, Darjeeling, between June, 2012 and May, 2014 were included in the study. The preoperative workup included a detailed history, a thorough clinical examination with meticulous recording of findings, a chest radiograph and routine haematological investigations on an emergency basis. Pre-operative intravenous antibiotic (co-amoxiclav) and dexamethasone were administered to all patients in doses appropriate to their body weight.

All patients underwent rigid bronchoscopy under general anaesthesia with the surgeon and the anaesthetist sharing the common airway. SpO₂ was monitored using a pulse oxymeter and attempt was made to keep it at least at 90%. Foreign bodies, when found, were removed using conventional grasping forceps.

Post-operatively, the patients were continued on parenteral antibiotics, analgesics and steroids with administration of supplemental oxygen for 24 hours. Repeat radiological investigations were done if satisfactory resolution of symptoms were not obtained. The patients were discharged after attaining stable vitals and a complete resolution of symptoms.

ETHICS: Appropriate procedures were followed and clearance was taken from the Institutional Ethical Committee before commencement of the study.

RESULTS: Thirty-six patients were admitted for suspected tracheobronchial foreign body (TFB) during the study period. The male: female ratio was 1:1 (18 males and 18 females) with an average age of 8.6±4.3 years. 80.6% of the patients were below 12 years. (Table 1)

The presentation pattern was highly variable between the patients although the predominant presenting complaint was that of respiratory distress (63.9%). A definite history of a choking episode was only present in one-third of the patients. 5 out of the 36 patients had no complaint but were brought to our institution due to a suspected history of foreign body inhalation. (Table 2)

The interval between suspected accidental inhalation and presentation at our institution was also variable, ranging from 1 to 31 days with a mean of 7.9±8.3 days. Only 6 out of the 36 patients (16.67%) presented within the first day. (Table 3)

Preoperative chest radiographs revealed unilateral hyperinflation in one-third of the patients whereas one-fourth of the patients had normal pulmonary findings (9 out of 36). However, in 3 of these patients, a foreign body was detected in the chest radiograph whereas the rest 6 had absolutely normal findings. Out of these 6 patients, a foreign body was subsequently

ORIGINAL ARTICLE

retrieved by bronchoscopy in 2 patients showing that a normal chest radiograph does not exclude the presence of a TFB. (Table 4)

The foreign bodies retrieved were classified into four broad groups (Table 5). Seeds and nuts were the most common foreign body (13 out of 36 – 36.1%) while in 4 out of 36 patients (11.1%), no foreign body was found even after extensive bronchoscopic examination. All the fish/meat bones and metallic items were detected preoperatively on chest radiograph (Fig. 1) while only 3 out of 13 (23.1%) seeds and nuts could be detected. None of the plastic items showed up on the preoperative chest radiograph.

The site of lodgment of the foreign body in the tracheobronchial tree was also variable. Half of the cases had a foreign body in the primary bronchus. The right side was affected in 50% of the cases (18 out of 36) with two-thirds of those (12 out of 18) lodged in the right primary bronchus. (Table 6)

Out of the 32 patients in whom a foreign body was detected bronchoscopically, the foreign body was retrieved successfully in 31 patients. One patient expired during the surgery due to a respiratory arrest. One patient expired after a successful removal of the foreign body due to pulmonary oedema. Tracheostomy was required in 3 patients due to laryngeal oedema as a result of prolonged procedures.

DISCUSSION: Accidental foreign body aspiration is a common problem in the paediatric population in India with mortality rates varying between 0% to 1.8%.^[1] Innocuous looking objects such as nuts and plastic items are often placed in the mouth and inhaled accidentally.^[2,3] Numerous studies have shown that children between the age of one and three years are the most at risk with a distinct male predominance.^[4,5,6,7] However, in our study, only 11.1% of the patients were under 4 years of age albeit 80.6% of the patients were below 12 years with an equal number of male and female patients. The shift in age of highest incidence is probably related to the fact that young children in rural Bengal are always under the protective watch of their mothers and only as the child grows up is he allowed unsupervised activities.

The presentation pattern was also quite variable but the most common presenting complaint was that of respiratory distress (63.9%). Medical literature shows that cough is usually the most common symptom but in our study, cough was present only in 16.7% of the patients.^[3,8] 13.9% of the patients had no presenting complaint but were brought to the hospital because of a history of suspected foreign body inhalation.

The interval between suspected accidental inhalation and presentation often determine the outcome of treatment. In our study, the suspected onset-presentation interval at our institution ranged from 1 to 31 days with a mean of 7.9 ± 8.3 days. Only 6 out of the 36 patients (16.7%) presented within the first day. Various studies have shown a wide range of onset-presentation intervals depending upon factors such as socioeconomic status, delay due to diagnostic errors and availability of healthcare facilities. A study showed that in 47% of the patients, the diagnosis was delayed from 1 day to 1 month. In our study, 83.3% patients presented between the second and thirty-first days. The main problems faced by our patients causing inadvertent delays in presentation were economic constraints, difficulty in arranging for

ORIGINAL ARTICLE

suitable transportation, lack of awareness of parents about the incident of aspiration or seriousness of the condition and false reassurance from local quacks.

The diagnostic accuracy of a chest radiograph has been reported to vary from 67% to 83%.^[7] Unilateral hyperinflation was the most common radiological finding in our study (33.3%) but one-fourth of our patients had a normal chest radiograph as far as pulmonary findings were concerned. 8.4% of the patients had foreign bodies detected on the radiograph but pulmonary findings were normal. Out of the 16.7% patients who had an absolutely normal chest radiograph, one-third had a foreign body retrieved by subsequent bronchoscopy. Hence, a normal chest radiograph does not exclude the presence of a tracheobronchial foreign body.

The most commonly retrieved foreign body belonged to the group of 'Seeds and nuts' (36.1%). This is common because of the easy availability of agricultural products, especially in rural areas. However, studies in urban areas have also noted the incidence of metallic objects to be the most common.^[4] Hence, it is probably true that the most common type of aspirated foreign body depends on the socioeconomic factors of the study population.

The most common site of lodgment of the foreign body was the primary bronchus (50%), with 33% patients having the foreign body in the right primary bronchus. This is in accordance to published literature and the cause has been stated to be the anatomical configuration of the right primary bronchus.^[7]

The difficulties faced by us in retrieving the foreign bodies bronchoscopically were mainly related to the available infrastructure. We had difficulty localizing the site of foreign body lodgment, grasping smooth and round foreign bodies, maintaining the SpO₂ as we had to share the airway with the anaesthetists, disintegration of foreign bodies during the procedure and per operative bleeding due to lack of instruments of proper size.

CONCLUSION: Tracheobronchial foreign body is a common problem, especially in the paediatric population. Our experience in a rural tertiary care Centre in West Bengal has shown that a high index of suspicion must be present to diagnose such cases as early as possible. Digital radiographs might be normal in a considerable number of cases and any suspicion of a TFB should warrant a bronchoscopic examination. Symptoms like choking and cough may not be always present and even a definite history of accidental foreign body aspiration may be absent.

Infrastructural limitations test the surgeons' expertise in rural centres and the problem is compounded by the increased onset-presentation interval. An early referral to tertiary care Centre's should improve the outcome of such procedures and should be a prerogative for doctors in peripheral health Centres.

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ORIGINAL ARTICLE

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Age (in years)	No. of patients	Percentage
0-3	4	11.1%
4-7	11	30.6%
8-11	14	38.9%
12-15	4	11.1%
16-19	3	8.3%
Grand Total	36	100.0%

Table 1: Age Distribution of patients

Symptoms	No. of patients	Percentage
Choking	12	33.3%
Cough	6	16.7%
Fever	6	16.7%
Respiratory distress	23	63.9%
Wheeze	5	13.9%
No complaint	5	13.9%

Table 2: Presenting complaints of patients

Day	No. of patients	Percentage
<1	6.0	16.7%
2-6	16.0	44.4%
7-11	5.0	13.9%
12-16	3.0	8.3%
17-21	2.0	5.6%

ORIGINAL ARTICLE

22-26	2.0	5.6%
27-31	2.0	5.6%
Grand Total	36.0	100.00%

Table 3: Onset-presentation interval

Findings	No. of patients	Percentage
Normal pulmonary findings without any Foreign body	6	16.7%
Normal pulmonary findings with a Foreign body	3	8.4%
Atelectasis	6	16.7%
Consolidation	9	25.0%
Unilateral hyperinflation	12	33.3%
Grand Total	36	100.0%

Table 4: Chest radiograph findings

Nature of foreign body	Detected on chest x-ray	Percent age	Not detected on chest x-ray	Percent age	Total	Percent age
Seeds and nuts	3	8.3%	10	27.8%	13	36.1%
Fish/Meat bone	6	16.7%	0	0.0%	6	16.7%
Metallic items	7	19.4%	0	0.0%	7	19.4%
Plastic items	0	0.0%	6	16.7%	6	16.7%
No FB found	0	0.0%	4	11.1%	4	11.1%
Grand Total	16	44.4%	20	55.6%	36	100.0%

Table 5: Nature of foreign body with detection in chest radiograph

Site	Right	Left	Central	N/A	Grand Total
Primary Bronchus	12 (33%)	6 (17%)	0%	0%	18 (50%)
Secondary Bronchus	6 (17%)	3 (8%)	0%	0%	9 (25%)
Trachea	0%	0%	5 (14%)	0%	5 (14%)
FB Not found	0%	0%	0%	4 (11%)	4 (11%)
Grand Total	18 (50%)	9 (25%)	5 (14%)	4 (11%)	36 (100%)

Table 6: Site of lodgment of foreign body



Fig. 1

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Date of Submission: 11/11/2014.
Date of Peer Review: 12/11/2014.
Date of Acceptance: 28/11/2014.
Date of Publishing: 12/12/2014.