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Original Research Article

THE ROLE OF RIGID BRONCHOSCOPY IN CHILDREN WITH TRACHEOBRONCHIAL FOREIGN BODY ASPIRATION

TARAR JM[1*], BHATTI S[2], RASHID M[3]

[1]*Departmentt of Thoracic Surgery, Bakhtawat Amin Trust Hospital & Medical & Dental College Multan, Pakistan*
[2] *Department of ENT, Bakhtawat Amin Trust Hospital & Medical & Dental College Multan, Pakistan*
[3] *Department of Thoracic Surgery, Alhada Armed Forces Hospital Taif Saudia Arabia.*
*Correspondence author email address: drkash226@gmail.com

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Abstract: *To assess the role of rigid bronchoscopy in children with tracheobronchial foreign body aspiration (FBA) a retrospective study was carried out in Pediatrics Ward of Bakhtawar Amin Trust Hospital & Medical & Dental College Multan for 1 year. A total of 80 children aged 6 months to 15 years with foreign body aspirations were included in the study. Data was collected from the medical histories of the patients. Rigid bronchoscopy was performed in all patients under anesthesia. All the data was analyzed by using SPSS version 21. The study was conducted on a total of 80 patients whose mean age was 2.5 years. 66 (82.5%) patients aspirated organic FBs, while 14 (17.5%) aspirated inorganic FBs. Cyanosis (37,46.2%) and stridor (33,41.2%) were the most common symptoms. In 78 (97.5%) patients rigid bronchoscopy was performed. In 75 (93.7%) no post operative event occurred. The medical history of patients with FBA is important for diagnosis. In addition, bronchoscopy is mandatory in patients with history of choking even if chest x-ray and initial examination are normal.*

Keywords: Foreign body aspiration, rigid bronchoscopy, pediatrics, radiology

Introduction

Foreign body aspiration (FBA) is commonly occurring complaint among pediatrics. It is a life threatening condition that require urgent recognition and prompt management for minimizing fatal consequences(Nasir and Subha, 2021). It is a leading cause of accidental death in children below three years of age (Gendeh et al., 2019). It is more common among male children (Sekar et al., 2018). Foreign bodies (FBs) that are commonly aspirated include parts of toys, hardware, food particles, seeds and peanuts (Fauzi et al., 2022). Older children more commonly aspirate no food items (Patel and Sharma, 2021). Common presenting symptoms are sudden onset of choking and cough(Parikh and Huang). Location of object and extent of airway blockage along with type of object and child's age determine presentation of symptoms (Brkic et al., 2018). The classic combination of diminished breath sounds, cough and wheeze is not always present. Though the foreign body can be lodged anywhere but mostly right man bronchus is affected, as it is comparatively more in line with trachea (Ahmed and Shuiabu, 2014).Chest radiographs are used for detecting airway foreign body but are not always confirmatory as more than half tracheal and 1/4th bronchial FBs do not appear on the radiographs. Above 75% of the airway foreign bodies are radiolucent. Radiolucent foreign bodies appear on radiographs as unilateral hyperinflation, bronchiectasis and atelectasis. In asymptomatic patients or those having normal radiograph but have suspicion of foreign body aspiration computed tomography (CT) scan is a helpful option(Parikh and Huang). Radiolucent foreign bodies not visible on plain radiographs can be detected by CT scan. Bronchoscopy is used for ultimately ruling out suspected FBA, regardless of the results of radiography (Parikh and Huang). Flexible bronchoscopy is helpful in making diagnosis but it is difficult to remove foreign objects using it. For management of foreign body aspiration in pediatrics, rigid bronchoscopy is preferred procedure for diagnosis and treatment (Ciriaco et al., 2021). The aim of this study is to assess the pattern of FBA in tracheobronchial tree and to evaluate effectiveness of rigid bronchoscopy in children. We will also assess the relationship between types of foreign body with age, complications and presentation in the patient.

Methodology

The retrospective study was conducted in Pediatric Ward of Bakhtawar Amin Trust Hospital & Medical & Dental College Multan from July 2021 to July 2022. The study included children aged between 6 months and 15 years. Children who had suspicion of FBA but findings of bronchoscopy were negative

were excluded. Informed consent of the parents was taken. The Ethical Board of the hospital approved the study. Medical data was collected from the record files. Data including age, gender, choking history, time elapsed between event and diagnosis, radiological findings, complications and location and type of foreign body was extracted. In all patients rigid bronchoscopy was performed under general anesthesia as shown in Figure I,II and III. In 1 patient rigid bronchoscopy failed and flexible bronchoscopy was performed. In another patient a thoracotomy was performed after rigid bronchoscopy failed. SPSS version 21 was used for data analysis. *P* value ≤.05 was considered significant.

Results

The study was conducted on a total of 80 patients whose mean age was 2.5 years. Of the total sample, 38 (47.5%) were male and 42 (52.5%) were female. 37 (46.2%) patients came from urban areas while 43 (53.7%) were from rural areas. 66 (82.5%) patients aspirated organic FBs, while 14 (17.5%) aspirated inorganic FBs. 78 (97.5%) had positive history of choking and 74 (92.5) had cough. Cyanosis (37,46.2%) and stridor (33,41.2%) were the most common symptoms. In 31 (38.7%) chest X-ray was normal. In 2 patients chest CT scan was done which showed repeated episodes of chest infection. Location of FBs and findings of imaging are summarized in Table I. Flexible bronchoscopy was used for removal of foreign body in 1 (1.25%) patient. In 78 (97.5%) patients rigid bronchoscopy was performed. In remaining 1 patient left posterolateral thoracotomy was performed for removal of foreign body. The mean duration of post operative hospital stay was 21.51 ±16.57 hours. In 75 (93.7%) no post operative events occurred. (Table II) The relationship between post operative outcome and type of foreign body was significant (p=.012), sharp objects were more dangerous than others. There also was a significant relationship between types of foreign body and pneumonia and dyspnea (p=.033, .008 respectively). Pneumonia and dyspnea most commonly resulted by aspiration of organic substance.

Table I Imaging Results and location of FBs

Imaging	Frequency (%)
Chest X ray	
Normal	31 (38.7%)
Foreign body directly visible	12 (15%)
Emphysema	26 (32.5%)
Atelectasis	2 (2.5%)
Pneumonia	7 (8.75%)
Total	78 (97.5%)
Missing	2 (2.5%)
Total	80
Chest CT scan	
Not performed	78 (97.5%)
Right lower lobe consolidation	1 (1.25%)
Left lower lobe consolidation	1 (1.25%)
Total	80
Location of foreign body	
Trachea	14 (17.5%)
Left bronchus	27 (33.75%)
Right bronchus	31 (38.7%)
Both bronchi	5 (6.25%)
Larynx	3 (3.7%)
Total	80

Table II Post operative outcome

Outcome	Frequency (%)
Uneventful	75 (93.7%)
Post operative death	1 (1.25%)
Pneumothorax	1 (1.25%)
Subcutaneous emphysema	2 (2.5%)
Thoracotomy	1 (1.25%)
Total	80

Figure I: Foreign Body in Right main Bronchus

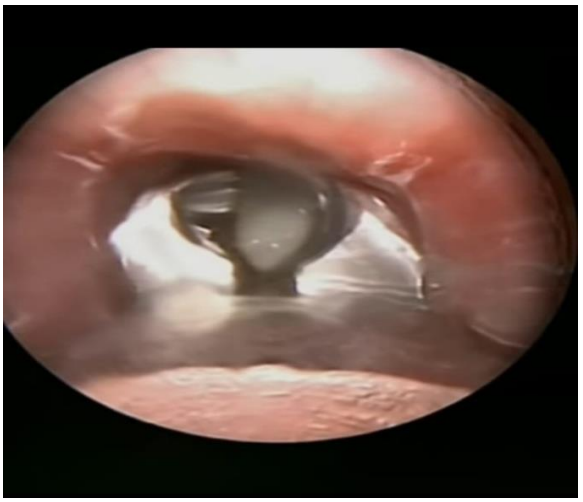

Figure II: F.B being removal with rigid Bronchoscope

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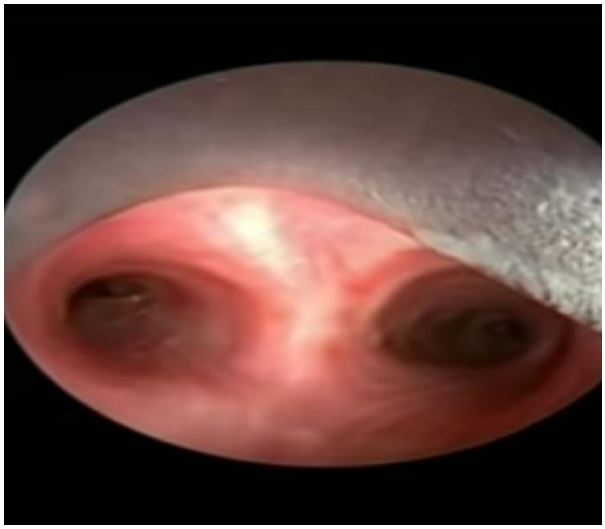

Figure III: Clear airways after F.B removal

Discussion

Foreign body aspiration is a common presenting complaint in children < 3 years (DeGeorge et al., 2020). Common etiological factors include activity during eating, inadequate swallowing reflex, failure of laryngeal closure reflex and use of oral route for exploring things (Reid et al., 2020). In this study male to female ratio was 0.90:1, unlike the findings in the previous studies(Ding et al., 2020; Reyad et al., 2021). In current study, 82 % of FBAs were organic, this finding was in line with the previous studies(Reyad et al., 2021; Safari and Manesh, 2016). In this study, most common aspirated object was bones, which is same as reported in previous Southeast Asian study(Patel and Kazerooni, 2001). In current study, 6 patients aspirated pins used for head scarf, 4 of them were female. It implies role of culture and religion and is cited as "Hijab syndrome" in literature (Baram et al., 2017).

Definitive diagnosis of FBA is based upon detailed history including risk factors, examining important signs and evaluating supportive chest X-ray. When any of these modalities is positive diagnostic bronchoscopy is performed. If patient is stable and none of above modalities is positive or is inconclusive examination and imaging is repeated after 24 hours (Baram et al., 2017). In the current study all patients were symptomatic and 97.5% had positive history of choking, important clinical symptom of aspiration; therefore, bronchoscopy was performed. Cough was the second common symptom, similar to as reported in the previous study (Guglielmo and Khemani, 2021). In current study, most patients had normal chest X ray and chest auscultation (normal airway and no sound), unlike previous studies which reported lowered breath sounds and rhonchi (Liang et al., 2015; Sink et al., 2016). Common imaging results in these studies were atelectasis, air trapping and mediastinal shift (Liang et al., 2015; Sink et al., 2016). Majorly normal chest X rays in this study is associated with inorganic radiolucent FBs. Chest CT scan was taken in 2 patients; it was avoided to reduce exposure to ionizing radiation. In this study, right bronchial tree was the most common site of impaction, like reported by the previous studies (Chisholm and Johnson, 2018; Gao et al., 2020). It is mostly due to the position and wider diameter of the right bronchi. Type of foreign body and dyspnea and pneumonia were significantly related as organic FB cause more inflammation as compared to nonorganic FB (Na'ara et al., 2020).

Conclusion

Detailed history is the most important aspect for accurately diagnosing FBA. Diagnostic must be performed in suspected case irrespective of normal chest examination and X ray. Organic FBs leads to more local reaction, inflammation and complications.

Conflict of interest

The authors declared absence of conflict of interest.

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