ROLE OF CLINICAL ASSESSMENT AND PLAIN CHEST RADIOGRAPH IN THE MANAGEMENT OF SUSPECTED TRACHEOBRONCHIAL FOREIGN BODY

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ABSTRACT

Objective — *To determine the role of clinical and radiological assessment in patients with suspected foreign bodies (FB) of tracheobronchial tree.*

Study design — *A comparative study.*

Place & Duration of study — *This study was conducted at Khyber Teaching Hospital Peshawar, from January 2003 to December 2004.*

Patients and Methods — *A total of 124 patients were included in the study who underwent rigid bronchoscopy for suspected foreign body inhalation. Patients were clinically assessed for respiratory distress, chest excursion, air entry etc. All had chest radiograph to note baseline x ray findings. Those patients in whom FBs was found were placed in group B and others in group A. The groups were then compared for various variables like demography, clinical features, clinical examination and radiological findings.*

Results — *Ages of the patients ranged from two months to 10 years. But most of them (n 65) were between 1-3 years of age. More boys (n 72) were affected than girls, in a ratio of 3:2. The most common manifestations were cough, wheeze and decreased breath sounds. Chest x-ray revealed obstructive emphysema of the affected lung with mediastinum shift in majority of cases with foreign body aspiration. Children in whom no FB was found on bronchoscopy were mostly below one year of age and their main manifestations were fever and bilateral wheeze with radiological findings of atelectasis and pneumonia. Foreign bodies were found in 84 cases (group B). The FBs were mostly of vegetative origin like peanuts, beans, grams (n 74), while others were plastic objects and beads etc (n 10). FBs were removed in all but two cases who were referred to cardiothoracic unit for removal.*

Conclusions — *Proper history taking and carrying out thorough physical examination with a high index of suspicion is crucial for early diagnosis of tracheobronchial foreign bodies. The presentation of acute airway problems like stridor, hoarseness of voice, cough etc are commonly seen in acute infections, particularly croup. Foreign body inhalation can present in the same way. The diagnosis may be missed unless a specific history of F.B inhalation is mentioned by the patients or parents, or it is specifically considered by the Physician. The condition is also over looked in cases of delayed presentation. Thorough clinical approach combined with radiological assessment helps in early diagnosis.*

Key words — Bronchoscopy, Foreign Body, TracheobronchIal tree, Children.

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INTRODUCTION:

Foreign body inhalation is a life threatening condition and requires immediate removal. Although foreign body aspiration most commonly occurs in children, it occurs in adults as well. It is commonly called a "café coronary."[1] In the United States, approximately 500 – 2000 deaths occur each year from foreign body aspiration.[2,3] Although the exact figures are not available in Pakistan but deaths due to FB inhalation are much higher than the Western countries. Despite advances in radiological techniques, the diagnosis of foreign body aspiration can be difficult at times. Sometimes the FB may remain undetected due to lack of definite history of inhalation, particularly in children. Even the clinical and radiological findings may be misleading in some cases.[4]

Foreign body aspiration may results in acute onset of respiratory distress. The foreign bodies that are large, sharp, and irregular in shape, have a greater tendency to become lodged in the larynx or trachea.[5] Most of these patients present with an acute onset of choking, respiratory distress, cyanosis, severe coughing and wheezing.[6] These foreign bodies draw immediate attention and in most cases are diagnosed readily and removed immediately.

In some cases there is either no history of aspiration or atypical history with non-specific symptoms.[7,8] When history of aspiration is lacking the patients may present days to weeks or even months after the event. Most foreign bodies lodge in the peripheral airways distal to the larynx and trachea. Partial airway obstruction occurs when the upper airway is partially occluded or if obstruction occurs distal to the carina. The presentation in these patients is due to secondary complications like recurrent pneumonia, persistent cough, wheezing or atelectasis.[9]

The presentation of acute airway problem like stridor, hoarseness of voice, cough etc are commonly seen in acute infections, particularly croup. Foreign body inhalation can present in the same way.[10] The diagnosis may be missed unless a specific history of FB inhalation is mentioned by the patients or parents or it is specifically considered by the physician. The condition is also overlooked in case of delayed presentation. Inflammation and granulation develop around the FB and it is not uncommon for the patients to be treated for other disorders like asthma, pneumonia etc. The diagnosis and removal of the FB becomes more difficult in such cases.[11] The objective of this study was to highlight the potential significance of the condition and assess the role of clinical assessment and radiological findings in such cases.

PATIENTS AND METHODS:

This study was carried out at Khyber Teaching Hospital Peshawar over a period of two years, from January 2003 to December 2004. Patients were referred from D.H.Q Hospital, paediatric department, ENT outdoor and Emergency Department of Khyber Teaching Hospital. Children who were critically ill on arrival, immediately underwent bronchoscopy or tracheostomy and were not included in the study.

History and clinical examination were carried out in detail. Plain chest radiographs were obtained in all cases. CT scan was not included in the protocol because of its non availability in the hospital during study period. The diagnosis was confirmed by bronchoscopic examination under general anaesthesia. Based upon the confirmation of FB or otherwise on bronchoscopic examination, patients were divided into two groups A (without foreign body) and group B (with foreign body) and their clinical, radiological and bronchoscopic findings including type and location of FB, were compared.

RESULTS:

A total number of 124 patients were included in the study. Foreign bodies were found and removed in 84 cases (group B). The study shows that most of them were boys. Most of the patients with FB aspiration were between 1 – 3 years of age. In significant number of patients no FB was found on bronchoscopy and these were below one year of age. Cough was the most common manifestation in patients undergoing bronchoscopy for suspected FB aspiration as 92% of patients with positive bronchoscopy and 60% of patients with negative bronchoscopy had cough. Witnessed choking was only mentioned in 35% (n 71) of patients and they all belonged to group B. Fever and decreased breath sounds were also found in higher number in patients of group B. Bilateral wheezing chest was found mostly in children belonging to group A. The number of patients who had clinical finding of pneumonia was also significantly higher in group A (table 1).

Table 1: Clinical Findings

Clinical Findings	Group A	Group B
	No foreign body found on bronchoscopy	Foreign body retrieved during bronchoscopy
Number of patients	40	84
Gender Distribution (M/F)	22/18	50/34
Patient's age (less than 1 year)	21 (52%)	11 (13%)
(1 - 3 years)	14 (35%)	51 (60%)
(More than 3 years)	5 (13%)	22 (27%)
Cough	24 (60%)	77 (92%)
Wheezing	16 (40%)	20 (24%)
Decreased Breath Sounds	15 (38%)	54 (65%)
Temperature	11 (28%)	10 (12%)

Plain x-ray chest was a prerequisite for inclusion criteria. Only two patients who were partially cyanosed on arrival were taken to the OR without x-ray. They were not included in the study. Inspiratory and expiratory films were not always possible due to lack of cooperation in this particular age group of patients. Only 10% of the patient had radio-opaque FB. These foreign bodies were mostly small rounded battery cells, metallic beads, part of whistle which are easily available in the market as toys. In one case it was a safety pin lodged in the trachea. These groups of patients having radio-opaque FB were never missed by the clinician and therefore were readily treated (table 2).

Unilateral emphysema with mediastenal shift to the opposite side was the most common and typical presentation in chest radiographs of patient in the group B with positive bronchoscopic findings. Chest x-rays of most of the patients in group A revealed pneumonia and atelectasis. This radiographic picture was also seen in patient in group B who presented late to the hospital. Normal chest radiograph were also seen in group A as well as in group B patients.

Most of the FBs were in the bronchus, 58%(n 48) in right main bronchus while 31% (n 26) in left main bronchus and ten in trachea. Forty patients had no FB in their tracheobronchial tree. Most of the FBs were radiolucent and of vegetative origin. Most common objects were peanuts, beans, and grams. The radio-opaque objects were only seen in 10% patients (table 3).

Table 2: Bronchoscopic Findings

Radio-opaque Foreign Bodies	Number of Patients
Pins	3
Metallic Beads	2
Metallic Part of A Whistle	5
Non-Radio-opaque Foreign Bodies	
Peanuts	29
Beans	20
Grams	18
Seeds	7

Patients in whom the signs and symptoms were vague, under went bronchoscopy due to suspicious history and x-ray chest findings. There were inflammation and granulation tissue around the object, with lot of mucous and purulent secretions while patients in whom the FB was retrieved earlier had limited and insignificant tissue reaction. They had only odema, and hyperemia. In group A patients where FB was not found unilateral or bilateral mucosal tissue odema, hyperemia, thick purulent secretions or mucous plugs were present. In all patients FB was removed successfully except two patients who were sent to cardiothoracic unit for removal.

Table 3: Radiological Findings

Plain Chest X-Ray	Group A	Group B
Visible foreign body	None	10% (8)
Emphysema	2 (5%)	56% (48)
Atelectasis	8 (20%)	15% (13)
Pneumonia	12 (29%)	6% (5)
Mediastinal Shift	2 (4%)	55% (46)
Normal X-ray	14 (34%)	20% (17)

DISCUSSION:

Foreign body aspiration is common in children under 10 years of age. More than 60% of the patients with FB aspiration were between 1 – 3 years of age. When we are dealing with patients where there is no definite history of FB aspiration or there are no typical clinical or x-ray findings, age of the patient should be considered significant criteria for suspecting FB. This also holds true for early as well as in late presentation of the patient. Most of the children with FB aspiration belong to lower socio-economic families. These children are mostly not being supervised while playing. Children in this age group are exploring their surroundings and placing objects into their mouth, therefore they are vulnerable to inhale FB.

We found FB more often in boys than is girls with a male to female ratio of 3:2 as reported by others.[12] The distribution of foreign bodies in our series, where right side involved more than left is similar to that reported in other series. In 25% of cases who under went bronchoscopy in our study bronchoscopy was negative for FB as reported by others.[13] Most of the patients did not give history of FB aspirtion unless they were specifically asked for. On inquiry they may reveal the history of sudden onset of choking, coughing and difficulty in breathing. After the acute episode patient continue to experience episodes of persistent coughing and wheezing, or they may become asymptomatic. Some patients experience recurrent episodes of pneumonia, other develop complications such as haemoptysis, bronchiectasis and bronchial stricture. In our study only 5% of the parents witnessed the aspiration episode.

The most common sign and symptoms of FB aspiration are choking, coughing, wheezing and decreased breath sounds. Long standing FBs can cause inflammatory reaction in the affected part of the lung and may present with recurrent pnumonia and persistent cough.[14] Same clinical picture of cough, pnumonia and temperature was observed in Group A patients, where FB was not found. They were mostly under

one year of age, with pathological changes such as mucosal odema, thick purulent secretions and mucous plug.

Inspiratory and expiratory posterio-anterior and lateral chest radiographs may help in diagnosing FB. Radio-opaque FBs are easy to diagnose by using radiograph. But most of the FBs are radio-lucent, so indirect radiographic signs such as obstructive emphysema, atelectasis, pneumonia and mediastinal shift help in diagnosis.[15] Unilateral obstructive emphysema is the most consistent indirect radiological sign of a radio-lucent object. The FB causes hyperinflation of the affected side of the lung by check valve mechanism which reflexly produces oligemia due to hypoventilation. This results in unilateral hyperlucent lung and mediastinal shift. With persistent lodgement, the object may be pushed distally resulting in complete obstruction of the bronchus, mucosal inflammation, oedema, granulation around the object and viscous secretions, that lead to atelectasis. X-ray alone are neither sensitive nor specific enough to exclude tracheobronchial FB.[16] CT scan can depict the FB within the lumen of the tracheobronchial tree and the 3 - dimensional film for FB with in the thorax is required.[17,18]

We conclude that aspirated FB should be removed immediately. Children with FB may present with misleading history and atypical clinical and radiological findings which leads to complications. In suspected cases a more detailed history, thorough physical examination and a high index of suspicion are crucial for early diagnosis.

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