Tracheobronchial Foreign Bodies in Children: Reaching a Diagnosis

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Abstract

Tracheobronchial foreign body aspiration constitutes a significant cause of morbidity and mortality in the paediatric age group. Diagnosis is often delayed with symptoms and signs being attributed to other causes of respiratory distress. In this study we evaluate the importance of three criteria on which the diagnosis of foreign body aspiration may be based - a history of aspiration, physical examination and a plain chest radiograph. These parameters are correlated with findings on bronchoscopy. It is seen that a history of foreignbodyaspiration isnotoriouslyunreliable in children of allage groups (p>0.1). Similarly, presence or absence of findings on physical examination suggestive of foreign body aspiration or its sequalae are not always indicative (p0.1). Chest radiograph may be normal or misleading. It is therefore concluded that this is a diagnosis based on the cumulative evidence provided by all three parameters in the clinical context. The hazards of betel nut intake, the object most commonly incriminated, are emphasized (JPMA 48:332,1998).

Introduction

Aspiration of foreign bodies is a common cause of respiratory distress in the paediatric age group. If diagnosed and treated early, morbidity is very low. If left untreated, it can lead to serious, sometime fatal, complications[1-3]. Therefore, this is a problem that requires early, accurate diagnosis and prompt intervention. With this study we aim to identify the factors that can help in diagnosing foreign body aspiration as the underlying cause of respiratory distress.

Patients and Methods

A retrospective review of clinical records and radiographs of children below 12 years of age admitted between January 1, 1997 and December 31, 1997 with suspected foreign body aspiration to 19-A Unit, Department of Paediatric Surgery, National Institute of Child Health, Karachi, was conducted. The importance of three criteria in reaching a diagnosis offoreignbody aspiration was evaluated - a positive history of aspiration of a foreign object, a suggestive physical examination and radiographic fmdings consistent with this diagnosis. The presence or absence of these factors was then correlated with the bronchoscopic fmdings. A rigid Storz paediatric ventilating bronchoscope was used.

Results

Sixty-six (38 male, 25 female) patients were assessed forforeignbody aspiration during this time. Three patients left against medical advice before bronchoscopy could be performed and have beenexciuded from further analyses. The age distribution is shown in Table I.

Table I. Age distribution of patients evaluated for foreign body aspiration.

Age	Number	%
Upto 1 year	7	11
> 1 year to 3 years	24	38
> 3 years to 5 years	18	29
>5 years	14	22
Total	63	100

The age range was from fourmonths to 11 years. The symptoms, inorderofdecreasing frequency, are shown in Table II.

Table II. Frequency of presenting symptoms (most children had more than one complaint).

Symptoms	Number	%
Cough	49	78
Tachypnea	47	75
Chest infection	23	37
Cyanosis	17	27
Choking	3	5
Whistling sound	2	3
S/c emphysema	2	3
Vomiting	2	3
Altered sensorium	1	2

A history of significant fever associated with respiratory distress was taken as an indicator of chest infection. Extensive subcutaneous emphysema involving the chest wall, neck and face was noted in two patients. The durationof symptoms at the time of presentation varied from a few hours to as long as three months (Table III).

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Fifty-two children (83%) had aforeignbody in the respiratory tract confirmed on bronchoscopy, while in 11(17%) no foreign body was visualized. The correlation of history of foreign body aspiration and of a suggestive physical examination with bronchoscopic findings is seen in Tables IV and V.

Table III. Time lag from the onset of symptoms to presentation.

Duration	Number	%
Within 24 hours	20	32
1 day to 1 week	21	33
>1 week to 1 month	18	29
>1 month	4	6

Table V. Correlation of presence of findings on physical examination with bronchoscopic findings (n=63; p value >0.1).

	F.B. present	F.B. not present
Examination positive	44	8
Examination negative	8	3
Total	52	11

Forty-four of the 63 patients who underwent bronchoscopy had plainchest radiograph available for review. In the remaining cases a chest radiograph had not either been perfonned since the severity of symptoms at the time of presentation did not allow it, or was not in the record. Of these 44 patients, 43 had findings suggestive of foreign body aspiration on chest radiograph. These findings included hyperinflation, collapse, consolidation and mediastinal shift. Thiriy-fourout of43(79%) hadapositive bronchoscopy. One patient with a history of foreign body aspiration and suggestive physical exanunation had a normal chest radiograph. Bronchoscopy was done and was negative. In 24 children (38%) respiratory distress was severe enough to warrant emergency bronchoscopy (i.e., as soon as possible after being seen and diagnosed in the Emergency Room), while the remaining 39 (62%) children with less severe symptoms were admitted and bronchoscoped on the next operating list (all within 24 hours of initial presentation). The site from where the foreign body was retrieved was most commonly the right bronchial tree; however in a significant number the object was lodged in the left bronchial tree (Table VI).

Table VI. Location of foreign object within the tracheobronchial tree as visualized on bronchoscopy.

Site of foreign body	Number
Trachea	5
Right bronchus	26
Left bronchus	14
Unspecified	7

The implicated foreign body was most commonly abetel nut. Objects retrieved are listed (Table VII).

Table VII. Nature of the foreign object in the 52 cases where bronchoscopy was positive.

Type of foreign body	Number
Betel nut	29
Whistle	9
Nuts	4
Seed	4
Vegetative material	2
Eraser	1
Bean	1
Plastic pin	1
Metallic pin	1

In sevenpatients, betel nut was impacted and could not be removed on the first attempt. A repeat

bronchoscopy after 48-72 hours was successful in each case. Three patients with severe respiratory distress required ventilatory support preceding bronchoscopy and were ventilated for a short period after removal of the foreign body. One child who had aspirated chewed pieces of eraser one hour prior to presentation, was found to have generalized haemorrhage from the tracheobronchial tree on performingurgentbronchoscopy. She expiredwithinone hour of the procedure due to exsanguination.

Discussion

Tracheobronchial foreign body is a well documented cause of acute, intennittent and chronic respiratory distress in the paediatric age group[3-5]. In this series as in other[3-5], the majority of cases involve children between one and five years of age. However, it is important to note that a significant number of patients in our series were older, the eldest being an 11 year boy who had aspirated a betel nut. The presenting symptoms varied in their severity. Only 5% of patients presented with symptoms directly attributable to foreign body aspiration (whistling sound). In the remaining cases, the symptoms could be attributed to other causes of respiratory distress like pneumonia, asthma or bronchitis. in fact, a number of patients who present late have been treated with antibiotics, steroids and/or bronchodilators before the correct diagnosis is made. The time lag from the onset of symptoms to presentation may vary from a few hours to weeks or months. These factors contribute to make this a diagnostic challenge in many instances.

The history of aspiration of an offending agent is notoriously unreliable in children of all age groups, as seen in this series. Examination of the respiratory system may be either normal or findings may be such that can be attributed to other diseases of the respiratory tract that are commonly seen in the paediatric age group[6]. The findings on a chest radiograph that are suggestive of foreign body lodged in the tracheobronchial tree include ipsilateral hyperlucency, mediastinal shift, collapse, consolidation and a radiopaque foreign body[6,7]. A significant number of patients may have a normal plain chest radiograph[2,6,7]. It is thus evident that relying on any one of the above parameters in reaching a diagnosis could lead to a large number of either missed diagnoses or unnecessaiy bronchoscopies. However, we feel that it is acceptable to perfonu bronchoscopy in suspected cases even if there is a slightly higher chance of there being a negative finding (1% in our series). It is prudent to make a diagnosis of foreign body aspiration keeping in view the history, physical examination and radiographic findings in the clinical context. Other modalities proposed to help in diangosis include inspiratory and expiratory chest radiographs, fluoroscopy, isotope examination of the lung and CT scanning[7]. Whilethefu tof these investigations is extremely difficult to achieve in children, the remaining are too expensive andunavailable inemergency settings in most centers.

A significant number of patients require urgent intervention since the respiratory distress is severe at the time of presentation. In these cases if obstruction of the tracheobronchial tree is not relieved immediately, irreversible hypoxic damage and fatality could ensue. While the perception in the past has been that foreign bodies tend to lodge in the right bronchial tree more often than the left, we find that a significant proportion are retrieved from the left bronchial tree - afmding corroborated by other authors[3,5,6]. In the past decade the hazards of betel nut (Arecha catechu; vernacular supari) intake by children has been emphasized repeatedly[1,2,5,6], yet no steps have been taken to educate the public. Betel nuts continue to be incriminated in a majority of cases. Colourful packets of chemically treated betel nuts are marketed aggressively and are easily accessible to children. This supari has the added disadvantage of causing severe bronchospasm and erosion of the trachobronchial tree, compounding the effects of mechanical obstmction.

Foreign body aspiration should be an important differential diagnosis whenever any physician or surgeon is evaluating a child with respiratoiy distress, especially when symptoms are not responding to

medical management It is important to keep a high index of suspicion in context of the histoiy, physical examination and radiographic fmdings. All large centers dealing with paediatric emergencies must have personnel sensitized to the possibility of this diagnosis and be trained to intervene promptly. We reiterate the importance of mass education regarding the hazards of betel nut intake.

References

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