

Tracheobronchial foreign bodies in relation to feeding practices in young children

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Abstract

Tracheobronchial foreign bodies, which are common in children, are a leading cause of accidental deaths in children under four years of age. Three cases of tracheobronchial foreign bodies in children less than two years old are described. One of the foreign bodies was unsuspected; the other two were probably related to food habits. All three cases improved without sequelae following prompt bronchoscopic intervention.

Young children should not be given food containing bones or hard chitinous shells.

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Tracheobronchial foreign bodies may cause acute respiratory distress, atelectasis, chronic pulmonary infections, or death. Usually symptoms of coughing, choking, or wheezing will be present or will precede admission in most cases. A problem with children, and particularly infants, is obtaining such a history, and the importance of non-resolving pneumonia cannot be overestimated. The purpose of this paper is to report cases where foreign bodies have entered the tracheobronchial tree in young children and to highlight the factors which predispose to the entry of such foreign bodies.

Case 1

A five month old male child was referred to the University Hospital with a history of sudden onset of cough and dyspnoea of two days' duration. There was no history of foreign body aspiration, choking, or wheezy episodes. He was treated for aspiration pneumonia with ampicillin and netilmycin for two days at the district hospital. However, his dyspnoea worsened and was associated with high grade continuous fever. On admission, the child was febrile and tachypnoeic, with marked subcostal and intercostal retraction, but without stridor or cyanosis. Examination of the respiratory system revealed bronchovesicular breath sounds with inspiratory wheeze and diminished air entry in the right upper lung zones. Other systems were normal.

Routine blood and urine examination was normal. The initial chest radiograph done at the district hospital showed collapse of the right upper lobe of the lung. When this was repeated 48 hours later at our hospital it showed right upper lobe consolidation (fig 1). Emergency bronchoscopy revealed a black foreign body, which appeared to obstruct the whole of the right main bronchus (fig 2). After removal, which was difficult since the foreign body was friable, the foreign body was found to be a 4 cm long dried rolled leaf (fig 3). The patient had an uneventful postoperative course, with uniform air entry in all the lung fields. A subsequent chest radiograph showed normal lung appearances. The child was treated with antibiotics and was discharged on the third day.

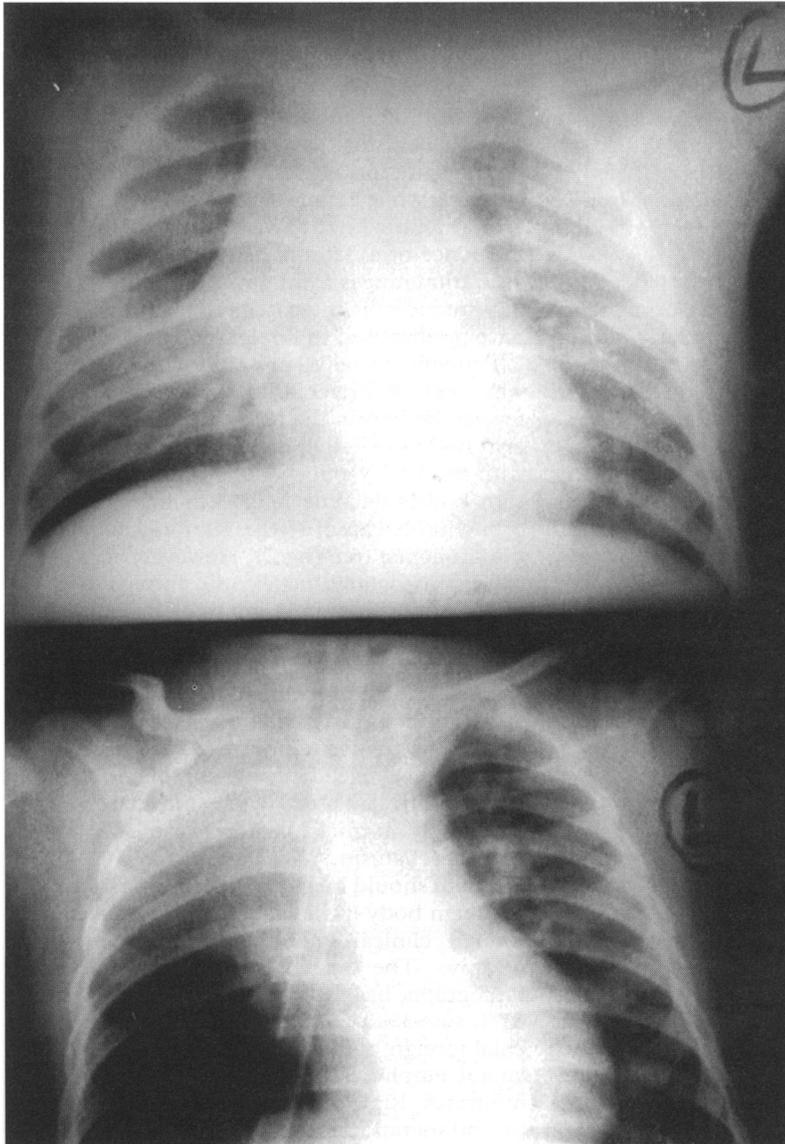


Figure 1 Preoperative chest radiographs of the child in case 1. Note the initial right upper lobe collapse and the subsequent consolidation. There is no conclusive evidence of any foreign body.

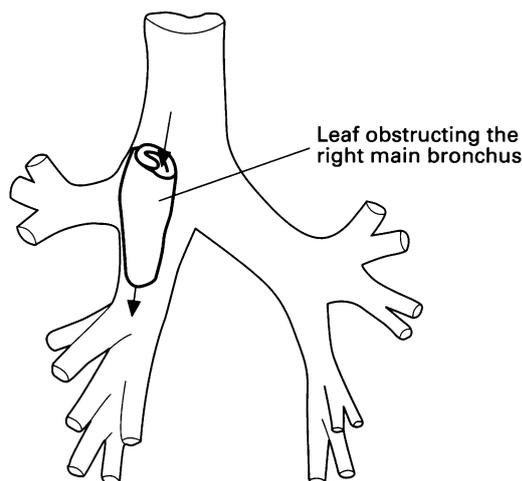


Figure 2 Diagrammatic representation of the tracheobronchial tree with the rolled leaf lodged in the right main bronchus. Note that the foreign body is obstructing the right upper bronchus whereas there is free passage of air into the lower lobes of the lung.



Figure 3 The foreign body which was removed from the right main bronchus (a dried leaf) in case 1.

Case 2

An 18 month old male child was brought to casualty with history of sudden choking during feeding. The food consisted of rice mixed with prawns. The parents had tried to dislodge the food from the throat with their fingers, resulting in bleeding from the throat and respiratory distress. Two hours later the stridor worsened, with marked substernal and intercostal recession. A chest radiograph taken at this time was normal. Emergency bronchoscopy showed a large foreign body blocking the right main bronchus. On removal, the foreign body was found to be a prawn with its shell, legs, and head intact. The postoperative period was uneventful. A repeat chest radiograph was also normal. The child was discharged 24 hours later under antibiotic cover.

Case 3

An eight month old female child was brought to casualty with a history of sudden choking after she tried to swallow cooked rice that she had eaten by herself. The food, as in case 2, contained rice mixed with fish. Her mother was able to retrieve part of a small fish with her fingers from the child's throat. The child then developed noisy breathing and so was taken to a general practitioner who gave some oral medication and reassured the mother. The child, however, vomited every time the medication was given, and 12 hours later the respiratory distress worsened. She was therefore brought to the University Hospital.

On examination, she was drowsy and cyanosed with intercostal recession. Air entry was reduced in all the lung fields. After induction of anaesthesia for emergency bronchoscopy, the anaesthesiologist noted one vertebral segment of a fish bone between the vocal cords and this was removed. On passing a 3.5 mm bronchoscope another vertebral segment of fish bone was found wedged in the lumen of the larynx in the subglottic region. This was also removed. The size of the two bones together was 1.5 cm. No further foreign bodies were found. The child was given three doses of 1 mg dexamethasone eight hourly and was discharged on the second postoperative day on oral antibiotics.

Discussion

Several studies have shown that children aged one to three years have the highest incidence of foreign body aspiration.¹⁻⁵ Furthermore, tracheobronchial foreign bodies are a leading cause of death in children under the age of four.⁶ Vegetable substances such as peanuts and grains are the commonest foreign bodies found.^{1,7,8} The following reasons have been suggested for the high frequency of such inhaled foreign bodies in children: the tendency of the infants and toddlers to put everything into their mouth, immaturity of the neural mechanisms that coordinate swallowing and respiration,¹ and playing, running, and laughing while eating. A history of foreign body aspiration may not always be available.^{9,10} The incidence of a definite history of foreign body aspiration ranges from 45.7% to 80%.¹¹ Feeding practices in the cases reported here could have predisposed to foreign body aspiration.

Patients usually present with dyspnoea, wheezing, and decreased breath sounds if the foreign body is in the bronchus. Laryngeal foreign bodies usually present more dramatically, with stridor, dyspnoea, and cyanosis. Most foreign bodies become lodged in the right main bronchus because of the anatomical form of the bronchial tree (fig 2). However, because of the intense cough reflex, the foreign body is often ejected from the right main bronchus and then becomes lodged in the left main bronchus. A foreign body in the left main bronchus, for well known anatomical reasons, is less easily dislodged. Bronchial foreign bodies may cause obstructive emphysema because of a check valve mechanism, complete collapse because of a stop valve mechanism, or apparently normal lungs because of a bypass valve mechanism.¹²

There should be a high index of suspicion of a foreign body if the history is suggestive, even though clinical or radiological findings are negative. The diagnostic accuracy of a chest radiograph has been reported to vary from 67% to 83%.^{1,7,9,13,14} Non-radio-opaque bronchial foreign bodies commonly present as unilateral emphysema, atelectasis, or pulmonary infiltrates. Rigid bronchoscopy is the diagnostic and therapeutic method of choice, as shown by several studies.¹⁵⁻¹⁸

In case 1, the patient was just five months old, there was no history of foreign body aspi-

ration, and on removal the foreign body was a leaf of approximately 4 cm length. The chest radiograph was highly suggestive. The possible mechanism is that the rolled leaf acted as a bypass valve for the lower lung lobes while acting as a stop valve for the upper lobe, resulting in a collapse of upper lobe alone (fig 2). The collapsed segment became infected and consolidated. A high degree of suspicion and prompt action prevented long term complications and may have saved the child's life. It is worth recording that the child was looked after by an elder sibling. A clinician would not normally suspect that a five month old infant had swallowed a raw leaf. In such cases, sibling rivalry or possibly child abuse should be borne in mind. With large families, or where both parents are employed, older children are often given responsibility for child care, as in case 1.

Infant feeding practices change from time to time, and also vary from place to place. In Malaysia, breast feeding is still the commonest method of feeding infants, particularly among young mothers. However, supplementary feeds, such as formula feeds, cereals, or rice mixed with cooked items like fish, prawns, and vegetables, are usually introduced to the infant diet between four and 12 months of age. Fuertes *et al*¹⁹ observed that 80% of babies were fed initially with breast milk, which is similar to our observations (unpublished data). Weaning from breast feeding is influenced by both non-modifiable and modifiable factors. Non-modifiable factors include ethnic background, prior educational level, age, place of residence, birth weight, parity, income, and year of survey. Modifiable factors include employment practices, support by friends, the health care system, etc.²⁰ In cases 2 and 3, a full sized prawn and a fish bone, respectively, were retrieved from the respiratory tract at bronchoscopy. The modifiable factors mentioned above could have played a part in the local dietary practices in these cases.

To our knowledge there have been no previous reports of feeding practices being implicated in the aspiration of tracheobronchial foreign bodies. Faulty feeding practices, such as mixing supplementary feeds for young children with cooked items like fish, prawns, and so on containing hard shells and bones or uncooked leafy vegetables, coupled with immature swallowing and respiratory mechanisms, can be harmful to infants and therefore this practice should be discouraged.

There should be a high index of suspicion about the presence of foreign bodies in the respiratory tract of children, and expert endoscopic and anaesthetic skills are needed for their detection; if foreign bodies are missed the death of the patient may result. With current advances in bronchoscopic and anaesthetic techniques, removal of aspirated foreign bodies should not be a problem if bronchoscopy is undertaken soon after aspiration. It is important to recognise that attempts to remove foreign bodies in a choking child by the finger sweep technique may force the foreign body deeper into the airway.²¹ Recommendations by the European Resuscitation Council include

encouraging the child to continue coughing when the cough is forceful enough, or a combination of back blows in the head down position, chest thrusts, and abdominal thrusts.²² These first aid methods are usually quite effective. Abdominal thrusts, which are useful in older children, are, however, to be avoided in infants for fear of injuring the relatively large liver, spleen, and stomach.²¹ Back blows should not be given in the upright posture since they may displace a loose foreign body further down.²³

Educational programmes to teach parents, child care providers, and medical personnel about possible situations where foreign body aspiration is suspected and the most effective resuscitative measures could greatly reduce mortality and morbidity resulting from this problem in children.¹⁰

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