

Review Articles

Cough and Foreign Body

Pralhad P Prabhudesai*, Rasika VP Singh, Rajesh Nathani*****

Introduction

Foreign body aspiration is associated with cough and sometimes this may be the only symptom. To diagnose a foreign body, a high index of suspicion is very important and a diagnosis in time can save the patient from an unnecessary surgical procedure. Presently Bronchoscopy is considered the gold standard in the diagnosis and treatment of foreign body aspiration.

Mechanism of Cough

Cough starts with deep inspiration followed by glottic closure, relaxation of the diaphragm and muscle contraction against a closed glottis. The resulting markedly positive intra-thoracic pressure causes narrowing of the trachea. Once the glottis opens there is a large pressure difference between the airway and the atmosphere which when coupled with tracheal narrowing produces rapid flow rates through the trachea. This shearing is what helps in the elimination of mucus and any foreign material.

Common Causes of Cough

Any disorder which is associated with infiltration, inflammation, constriction, or compression of the airways can cause cough.

Causes of cough in adults can include viral bronchitis, asthma, pneumonia, lung abscess, ILD, tuberculosis, sarcoidosis, cancer, mediastinal masses, foreign body, drugs (ACE

inhibitors), GORD and post nasal drip.

Causes of cough in children include viral infections, pneumonia etc. but development of sudden cough with or without wheezing and decreased breath sounds should always suggest the possibility of a foreign body aspiration.¹

Why is it Important to Diagnose a Foreign Body Aspiration?

Foreign body aspiration manifests with a wide range of clinical presentations and often these are not accompanied by any reliable witness to supply clinical history especially in children. Since imaging modalities are often not adequate in making a diagnosis, foreign body aspiration can go unrecognized for a long time, during which time these patients may have been given medications for other disorders. Unrecognized foreign body aspiration if present over a long period of time can lead to complications such as unresolving pneumonia, lung abscess, recurrent haemoptysis, bronchiectasis. It can cause complete destruction of a distal lobe and even the lung, which may subsequently need surgical resection since, late removal of a foreign body does not improve structural damage. Chronic persistent cough in older people can also be due to aspirated foreign body. Therefore early diagnosis of foreign body aspiration is necessary to prevent these complications.

Common Foreign Bodies Aspirated

In adults commonly aspirated foreign bodies include beetle nut (Figs. 2, 8), which

*Consultant Chest Physician; Lilavati Hospital and Research Centre and Gurnanak Hospital. **Clinical Assistant, ***Pediatric Surgeon, Guru Nanak Hospital, Mumbai.

is eaten very commonly after meals. When had after alcohol the post alcohol anaesthetic effect can lead to its aspiration. Seeds like that of chiku (Fig. 7) custard apple and tamarind (Fig. 9) are easily aspirated because of their smoothness. Other things which can be aspirated are pills and tablets. In one of our cases there was a garlic pearl which was aspirated while swallowing.

In children the list can include nuts, seeds, bones, small toy parts, other food particles.

This list is not exhaustive and foreign bodies aspirated can be very unpredictable.

Causes of Foreign Body Aspiration

Though foreign body aspiration can take place in any age group the most commonly affected age groups include children below 3 year of age but is seen up to 4-5 years and adults in their sixth or seventh decade.

Causes in children include :

- Lack of adequate dentition
- Immature swallowing co-ordination.

Small children have a way of exploring the world by putting objects in their mouth.

Causes in adults include failure of airway protection due to :

- Alcohol intoxication
- Poor dentition
- Sedative and hypnotic drugs
- Senility
- Mental retardation
- Trauma and loss of consciousness
- Seizures
- General anaesthesia

Any material can be aspirated during laughing, crying, sneezing or very often talking while eating.

Location of Aspirated Foreign Body

In adults the aspirated foreign bodies which are small enough to go through the vocal

cords have a tendency to go towards the right mainstem bronchus since this is more in line with the trachea than the left mainstem bronchus.

In children this tendency of a foreign body to go towards the right bronchus is not applicable because the left mainstem bronchus does not branch at the same acute angle as in adults.

How Does a Patient with Foreign Body Aspiration Present?

Presentation and severity of the symptoms depend on the location and the type of foreign body aspirated.

Large objects when aspirated cause occlusion of the larynx. This presents acutely in the form of a brief period of choking and gagging and maybe associated with hoarseness, aphonia and cyanosis. In one of our cases a 4 year old child presented with hoarseness of voice for 3 months. It was found that she had a chicken bone exactly between the anterior and posterior commissure between the vocal cords (Fig. 1).

Smaller foreign bodies can go further and lodge into the subglottic region or the trachea causing inspiratory stridor or bouts of cough.

Once the foreign body is in the distal bronchus it presents with lesser symptoms. It may remain silent for years especially if it is an inorganic foreign body. It is the organic foreign bodies that tend to swell up and cause a complete obstruction of the bronchus. In our study the presentations in adults was as shown in Table 1.

The number of children included in the study was 7 and they presented as shown in Table 2.

Investigations

A positive history of foreign body aspiration always helps but most of the time this history



Fig. 1 : Foreign body in a four year old child, presenting with 3 month history of hoarseness.

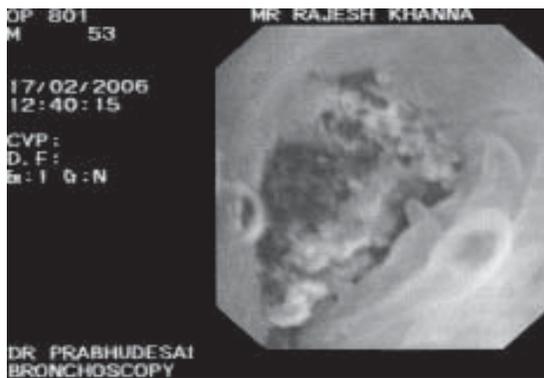


Fig. 2 : Beetle nut



Fig. 3 : Wire in the tracheal tree (broken stent)

may not be known and a high index of suspicion is required to make a diagnosis. Physical examination reveals inspiratory



Fig. 4 : Aspirated tooth

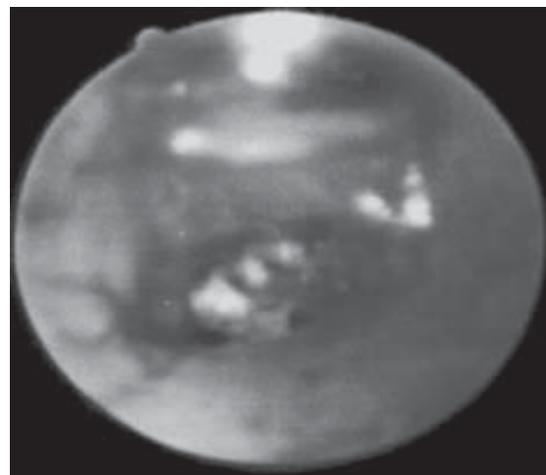


Fig. 5 : Vegetable matter

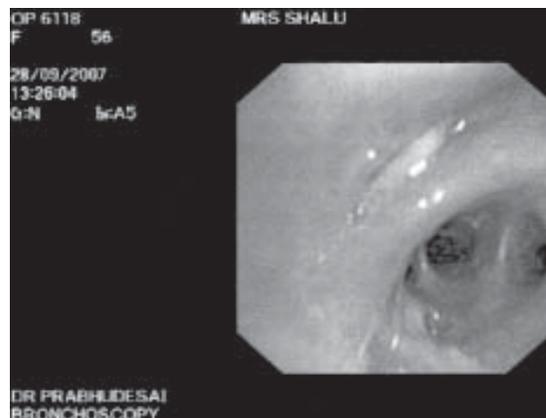


Fig. 6 : Aspirated tooth

localized wheeze or stridor, if the foreign body is in the main bronchus. A chest X-ray may show:

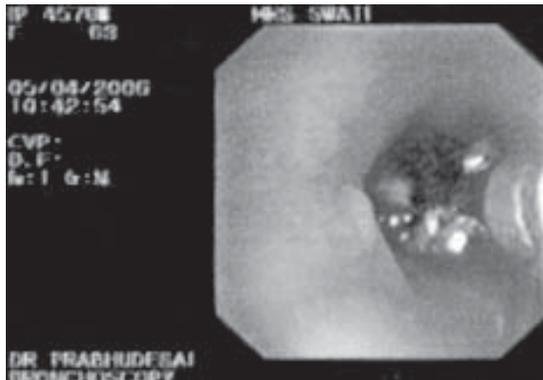


Fig. 7 : Aspirated Chiku seed.



Fig. 9 : Aspirated tamarind seed.



Fig. 8 : Aspirated beetle nut



Fig.10 : Air trapping seen on the right side in a child with foreign body aspiration.

- Air trapping (Fig. 10)
- Atelectasis
- Mediastinal shift
- Pulmonary infiltrates
- Pneumomediastinum.

These signs are not very definitive in making the diagnosis. Only radio-opaque foreign bodies can be visualized on Chest X-rays (Fig. 10).

CT scan with virtual bronchoscopy (Fig. 11) is a useful procedure to rule out foreign body aspiration if the foreign body is in the trachea or the main bronchus.

Bronchoscopy is considered the gold standard in diagnosis and treatment of foreign body aspiration. This should be considered in all cases of localized bronchiectasis,

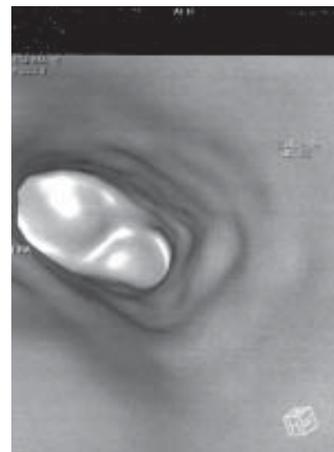


Fig. 11 : Virtual bronchoscopy.

unresolving pneumonia or recurrent infections and undiagnosed cough to prevent an unnecessary surgical procedure.²

Table 1 : Symptoms of foreign body aspiration in adults

Severe persistent cough	5
Acute cough, wheezing, acute choking	5
Chronic cough, recurrent lung infections	18
Total number of patients	28

Table 2 : Symptoms of foreign body aspiration in children

Breathlessness and cough	6
3 months history of hoarseness of voice	1
Total number of patients	7

Management

The treatment for foreign body aspiration is to get it out. Most paediatric centres consider rigid Bronchoscope the safest instrument. In our experience, flexible bronchoscopes proved to be very useful for all 7 paediatric patients in finding the location of the foreign body. Three of the foreign bodies were removed using a flexible fiberoptic bronchoscope and 4 were removed using the rigid bronchoscope. In adults all 28 foreign bodies were removed by flexible bronchoscope, there was just 1 failure where an impacted tooth could not be removed in an acute MI patient who had severe haemoptysis following thrombolytic therapy. An emergency intubation had caused the tooth to be lodged into the right lower lobe. A repeated attempt for removal was again made elsewhere.

Foreign bodies aspirated in our study is shown in Table 3.

The general rules of Bronchoscopy for foreign body removal:

- 1) Preparation is a must for ensuring success. Thoughtfully plan the procedure.
- 2) Bronchoscopy is a three handed procedure. An extra pair of hands, that

Table 3 : Foreign bodies aspirated

Tumour (Slipped during surgery)	1
Tooth	5 (1 could not be removed)
Chicken bone	1
Beetle nut	14
peanut	3
Mutton bone	1
Degraded vegetable seed	1
Chiku seed	2
Custard apple seed	2
Tamarind seed	1
Gauze piece	3
Wire	1
Total	35

of the trained assistant are always required but while removing a foreign body an anaesthetist's hand is also a must.

- 3) Always use the oral approach for the removal of foreign body.
- 4) A good bronchoscopist not only has excellent skills but also excellent support and backup.
- 5) All the accessories must be kept ready during the foreign body removal since any of them maybe required.
- 6) The procedure must be explained to the patient and the patient must be made comfortable throughout the procedure.
- 7) Avoid complete sedation because the cough reflex which makes the patient expel the foreign body gets suppressed.

We used the following instruments for foreign body removal in our study successfully (Table 4).

The following instruments were used in the paediatric age group (Table 5).

The oral approach is considered better than the nasal approach in order to avoid losing the foreign body in the narrow nasal passage.

Table 4 : Accessory instruments with flexible fibroptic bronchoscope for foreign body removal in adults

Grasping forceps	8 cases
Balloon Catheters	8 cases
Dormia basket	3 cases
Cryotherapy	6 cases
Only suction	3 cases
Total	28 cases

Table 5 : Accessory instruments with bronchoscope for foreign body removal in children

Baskets and Suctions	4 cases
Balloon	2 cases
Chittle forceps with laryngoscope	1 cases
Total	7 cases

The suspected location of the aspirated foreign body is examined last and the other airways are examined as well to rule out the possibility of more than one foreign body being aspirated. After the visualization of the object is done and the surrounding area is examined the appropriate bronchoscopic accessory is chosen.

The idea is to secure the foreign body with the grasping instrument and remove the bronchoscope, grasping instrument and the object together and not just remove the foreign body through the working channel of the scope. The foreign body must be kept at the centre of the airway and be visualized constantly.

Tissue reaction must be seen prior to the removal of foreign body and sometimes the granulation tissue has to be removed before the foreign body can be removed. Other techniques like laser photo resection are used to break a larger object into smaller manageable pieces which are then removed. Removal of a sharp foreign body is a challenge

and the key to its removal is to locate the sharp end and to attempt to dislodge it. Once the sharp end is freed, the object is grabbed and removed.

Conclusion

The incidence of foreign body aspiration is seen in a bimodal age group i.e. below 3 years of age but seen up to 4-5 years and then in the sixth or the seventh decade of life. Since the signs and symptoms of foreign body aspiration are very non specific it may lead to a delay in the diagnosis and treatment. This delay can lead to sequel like bronchiectasis, recurrent infections, recurrent haemoptysis, chronic lung disease etc. Therefore a high index of suspicion is important in the diagnosis of foreign body aspiration. Whenever there is sudden onset of symptoms like cough, wheezing, etc. in children and adults, foreign body aspiration should be ruled out as a diagnosis.³

Acknowledgement

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