

# Foreign Body in Tracheobronchial Tree

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## Abstract

A two year experience with the treatment of 50 patients (86% children) who were admitted for foreign body aspiration in the department of otorhinolaryngology and Head and Neck Surgery is reviewed. The object of this study was to show the clinical manifestations, the radiological findings, the nature and distribution in the tracheobronchial tree and complications due to long standing foreign bodies in the bronchial tree. Males (35) were more commonly involved as compared to females (15) in the ratio of 2.3:1. Right main bronchus was involved in 24 patients (48%), left main bronchus in 15 patients (30%) and trachea in 11 patients (22%). The most common foreign bodies found were beans (24%), peas (18%), and corns (10%). The most frequent clinical manifestation was choking (60%) and the most frequent radiological finding was atelectasis (44%). The most serious complication was pneumothorax in 2 patients who needed intercostal chest tube. In conclusion, inspite of an obvious foreign body in the tracheobronchial tree many cases are not diagnosed because sudden choking at the time of aspiration in children may not be noticed.

## Key words

Tracheobronchial tree, Foreign bodies.

## Introduction

Aspirated foreign bodies continue to present challenges to otorhinolaryngologists. The major issue involves the accurate diagnosis, speedy and safe retrieval of the foreign body. The accurate diagnosis may allude even the sophisticated physician because often the initial choking incidents are not witnessed and the delayed symptoms may mimic other common conditions, such as asthma, pneumonia, or upper respiratory tract infections (1-3). The retrieval of foreign body has been facilitated by technical improvements with the rod lens telescope, video endoscopy, a broad range of a variety of sized forceps and safe anesthesia. In spite of these advances, more than 3000 documented deaths occur per year because of foreign bodies and an untold number of patients survive

with variable sequelae (1,2). More than half of the children with foreign bodies are under the age of 4 years (2-4) and upto 94% are under the age of 7 years (2). The younger age group, however, is most vulnerable because they lack adequate dentition and immature swallowing coordination. Moreover, these children explore their world by introducing everything in their mouths.

The most common foreign bodies aspirated are food products - peanuts, beans and seeds (1,4). Beans and seeds absorb water over time and with subsequent swelling rapidly change from partial to complete bronchial obstruction. Some organic foreign bodies cause surrounding tissue reaction, and this may result in a condition known as arachidic bronchitis (1). This is seen

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radiographically as a spidery pattern on chest radiograph. Inert foreign bodies cause less tissue reaction and may remain in one position for a long time without causing complete obstruction (1,2).

### Material and methods

All patients of suspected foreign body aspiration admitted in the Deptt. of Otorhinolaryngology and Head and Neck Surgery, Government Medical College, Srinagar from May 2001 to April 2003 were studied. In the radiographs taken before the removal of foreign body, the foreign body opacity and lung volume (normal, hyperinflation, volume reduction, or total atelectasis) was analyzed. We also noted the procedure to remove the foreign body, the nature and site of the foreign body, as well as any complication. The removal of foreign body was performed under general anesthesia by rigid endoscope of proper size, which was determined by the following formula (in millimeters):-

$$\text{Size of the bronchoscope (< 6 years of age)} = \frac{\text{age in years} + 3.5}{3}$$

$$\text{Size of the bronchoscope (> 6 years of age)} = \frac{\text{age in years} + 4.5}{4}$$

Appropriate airway control was maintained throughout the procedure. After establishing the diagnosis of a foreign body, it was removed by foreign body forceps. Most of the vegetable foreign bodies were removed as fragmented pieces, so the procedure was longer and more difficult. Following the removal of foreign body, secretions were suctioned, the bronchial tree examined carefully and the bronchoscope removed. In cases where the procedure was prolonged, steroids were used during or before removal of the bronchoscope. In none of our cases, help of CVTS surgeon was needed.

### Results

50 patients with foreign body in the tracheobronchial tree were admitted in the Deptt. of Otorhinolaryngology and Head & Neck Surgery, Government Medical College, Srinagar from May 2001 to April 2003. Thirty five patients

were males (70%) and 15 patients females (30%). Age of the patients ranged from 8 months to 50 years (Table 1). The initial clinical symptoms included choking (60%), coughing (40%), dyspnoea (36%), fever (10%), wheezing (20%), cyanosis (4%), hemoptysis (2%) and no symptoms in (20%) patients. The majority of foreign bodies were beans (24%), peas (18%), and corns (10%) (Table 2). In 6 cases (12%) the foreign body was radiopaque and in 15 cases (30%) the radiograph appeared normal. Atelectasis was the most frequent finding in 22 (44%) patients (Table 3). The time over which the foreign body stayed in the tracheobronchial tree ranged from hours to one year and complications ranged from none to pneumothorax (Table 4). Pneumonia was found in 7 patients (14%). There were 3 patients (6%) who developed surgical emphysema and 2 patients who developed pneumothorax after endoscopy.

Of the 45 patients (90%) in whom the foreign body remained for a short period (hours to 5 days), 14 patients (28%) had history suggesting aspiration. In 5 patients without a history of aspiration, bronchoscopy was conducted because the patients treated for consolidation in the department of pediatrics did not respond to conservative treatment. In one patient, the symptoms were chronic cough and hemoptysis and was treated for tuberculosis for 9 months. Diagnostic rigid bronchoscopy was performed and a metallic foreign body was removed.

In 24 patients (48%) foreign body was found in the right main bronchus, in 15 patients (30%) in the left main bronchus and in 11 patients (22%) in the trachea. The foreign body was removed in all patients through rigid bronchoscope except in 2 patients where the foreign body was removed by a rigid endoscope through a tracheostome because of the laryngeal edema and bigger size of the foreign body. None of the patients needed thoracotomy. The bronchoscopy procedure lasted from 20 minutes to 150 minutes. Retained vegetable foreign bodies required more time for removal. There were 2 deaths in this study and 8 children needed tracheostomy.

**Table 1: Age distribution of patients.**

Age in years	No. of patients	%age
0-2	13	26
3-4	13	26
5-6	7	14
7-8	4	8
9-10	6	12
11-20	5	10
>20	2	4

**Table 2: Type of foreign body.**

Foreign body	Number	%age
Beans	12	24%
Peas	9	18%
Corn	5	10%
Plastic whistle, pen cap	4 each	8% each
Soya bean, metallic foreign body, almond shell	2 each	4% each
Cherry, toffee, button, tablet, coal, ball pen spring, polythene piece, paper piece, syringe needle & denture	1 each	2% each

**Table 3: Radiographic findings**

Finding	No. of patients	%age
Radiotransparent foreign bodies	40	80
Radiopaque foreign bodies	6	12
Atelectasis	22	44
Normal appearing lungs	25	50
Hyperinflation	9	18

**Table 4: Time of foreign body remained in tracheobronchial tree and complications.**

Time	No. of patients	%age	Complications
0-2 days	39	78	None
3-4 days	6	12	2 pneumonias
5-30 days	3	6	5 pneumonias & 2 collapses
>month	1	2	1 hemoptysis

**Table 5: Site of foreign bodies**

Site	No. of patients	%age
Right main bronchus	24	48
Left main bronchus	15	30
Subglottis & trachea	11	22

**Table 6: Symptoms**

Symptom	No. of patients	%age
Choking	30	60
Cough	20	40
Respiratory distress	16	32
Aspiration	14	28
Stridor	7	14
Cyanosis	2	4
Refusal to feeds	1	2
Hemoptysis	1	2
Fever	1	2

## Discussion

Fifty two percent of the patients in this series who had a foreign body in the tracheobronchial tree were under 4 years of age and 86 % were under 10 years. These observations agree with previous data (1,2). Foreign bodies were rarely observed in adults (3). We had 2 such patients-one an elderly Gujjar lady who had history of cough with hemoptysis and a radiopaque shadow on chest X-ray, was treated for tuberculosis but showed no improvement. Diagnostic rigid bronchoscopy was done where a metallic foreign body was removed from the right main bronchus. Second patient was a 25-year-old primigravida who underwent LSCS operation (lower segment caesarian section). Patient could not maintain saturation after extubation. Diagnostic rigid bronchoscopy was done where an artificial denture was found in the subglottis, which had been concealed by the patient.

Bean, peas and corns were the most commonly found foreign bodies, possibly because most of our patients came from rural areas where these commodities are easily available (table II) The high rate of normal radiograph findings (50%) and the low frequency of radiopaque foreign body (12%) are in agreement with previous reports (2, 4-6) . If a conventional radiograph appears normal, an attempt should be made to take it during expiration where a localized hyperinflation might be detected (2,7). If the foreign body does not totally occlude the bronchus, or act as a ball - valve, the inspiration radiograph might appear normal in more than 20% of the

cases. Because children hardly ever cooperate with this procedure and because a radiograph may not be conclusive if it appears normal, we suggest bronchoscopy whenever a foreign body is clinically suspected (8). Atelectasis was the most frequent radiological finding because of the large diameter of the inhaled foreign body. Beans as well as peas may totally occlude a main or lobar bronchus in a child younger than 4 years (1-3). It is also well known that a long-standing foreign body in the bronchial tree, even if it is very small, may result in total obstruction by edema or secretions. Wiseman (9) comparing patients with early and late diagnosis, found that in the early group half had evidence of air trapping, and one sixth had atelectasis or consolidation. The rationale behind this large number of patients with atelectasis or consolidation seems to be a long standing foreign body in the tracheobronchial tree. We also found greater frequency of atelectasis in long standing foreign bodies as in other reports (3,5,6). These findings indicate the necessity for more attention by the clinician who first attends the patient. Two of our patients developed subcutaneous emphysema which is in agreement with Saoji R (10). A peculiar arrangement of fascial planes in the neck, chest and abdomen and an excessive pressure gradient at the alveolar level, facilitates extra-alveolar migration of air in the subcutaneous tissues. Rigid bronchoscopy is considered the treatment of choice for removal of the majority of foreign bodies from airways.

This is consistent with other reports (1, 2, 5, 6). We think that the better indication for flexible bronchoscopy is for foreign body in the distal bronchus, where neither the rigid bronchoscope nor the forceps is able to reach the foreign body.

Foreign bodies should always be suspected in the cases of repeat or difficult to treat pneumonias.

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