

THERAPEUTIC AND DIAGNOSTIC ROLE OF BRONCHOSCOPY IN PEDIATRIC AGE GROUP

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ABSTRACT

Two hundred and seventy five cases were evaluated bronchoscopically for various respiratory conditions. In 140 cases, a foreign body and in 30 cases mucus plug was removed. In 47 cases there was inflammation of the tracheobronchial tree. Forty patients with empyema thoracis were evaluated bronchoscopically because of persistence of bronchopleural fistula or continued pus discharge from intercostal tubes not responding to the routine treatment. The purpose of the article is to stress the therapeutic as well as diagnostic aspect of bronchoscopy for various respiratory conditions in pediatric age group.

Key words: Bronchoscopy, Foreign body.

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The advent of bronchoscopy has been comparatively recent. Bozzini in 1806 is credited with the first real attempt at bronchoscopic examination using a crude instrument by today's standard. Killian is regarded as the father of bronchoscopy. He used local anesthesia and was the first to use a head mirror(1). Rigid bronchoscopes have been in use for years successfully. The introduction of flexible fiberoptic bronchoscopes in the early 1970s led to a dramatic increase in diagnostic bronchoscopy in adults. But flexible instruments suitable for use in infants and children were not developed until nearly 10 years later(2). Because of this delay, bronchoscopy has been underutilized for diagnosis in children and has been largely restricted to therapeutic procedures such as the removal of foreign bodies. Today, advances in both rigid and flexible instrumentation have made bronchoscopy a useful diagnostic and therapeutic procedure in pediatric age group(3).

Material and Methods

During the last 8 years a total of 275 bronchoscopic procedures were carried out for a variety of conditions (*Table I*) in the Department of Pediatric Surgery, S.M.S. Medical College and attached S.P.M. Child Health Institute, Jaipur. All the bronchoscopies were done under general anesthesia using a rigid Storz bronchoscope. The important indications included:

1. Acute onset of respiratory distress with suspected history of foreign body inhalation/ingestion;
2. Chronic cough, not responding to routine medical management, thereby suspecting some foreign body or mucus plug.
3. Persistent collapse/consolidation, demonstrated radiologically.

TABLE I—Diagnosis of Bronchoscopy (1983 to 1990)

Diagnosis	Cases	
	No.	%
1. Foreign Body in respiratory tract	140	51.0
2. Mucus plug	30	11.0
3. Inflammation of tracheo-bronchial tree	47	17.0
4. Empyema thoracis	40	14.5
5. Normal	18	6.5
Total	275	100

4. Diagnostic bronchial aspiration for bacteriological examination.

Results

One hundred and forty cases of foreign body in tracheobronchial tree were encountered in the present series. Maximum number of patients were between 1 and 3 years of age. The males predominated in the ratio of 2.7:1. These patients were admitted with the complaints of cough (70%), wheeze (58.5%) and respiratory distress (25%). Seven per cent of the patients were symptomless at the time of admission. Definitive history of foreign body ingestion or inhalation was present in 125 patients. The time lag between the foreign body ingestion and diagnosis varied from one day to eight months. Fifty per cent of them were diagnosed within 24 hours and 25% presented within 7 days. Eight per cent of these patients were brought after a gap of 30 days of the foreign body ingestion.

On examination decreased air entry on the affected side and ronchi were found in the majority of cases. Twenty patients had

inspiratory strider while 18 cases had no positive findings.

Skiagram chest was done in all the cases which revealed obstructive emphysema in 54, partial or complete collapse of lung with or without mediastinal shift in 40 and pneumonic consolidation in 18 cases. Radio-opaque foreign body was seen in 15 patients and 18 patients had normal skiagrams.

The site of foreign body was larynx (8.5%), trachea (5.7%) and either of the bronchi (85.7%) with right bronchus being the commonest site (58.5%).

Food related substances constituted about 70% of all inhaled foreign bodies, by far the largest component being nuts. The remaining 30% of foreign bodies were of plastic, metal and miscellaneous materials (Table II).

A 5-year-male child was admitted with the complaint of acute respiratory distress after eating a piece of nut. Skiagram of chest revealed collapse of right lobe. Foreign body could not be visualized on bronchoscopic examination. Patient did well after bronchoscopy. Four days later he

TABLE II—Nature of Foreign Body

Nature	Cases	
	No.	%
1. <i>Vegetable</i> (Peanuts, beetle nuts, tamarind seed, water melon seed, other food particles)	98	70.0
2. <i>Plastic</i> (Beads, pieces of toys)	24	17.2
3. <i>Metallic</i> (Nail, pins, screws)	15	10.7
4. <i>Miscellaneous</i>	3	2.1
Total	140	100

again had an attack of severe paroxysm of cough and respiratory distress and X-ray chest revealed same findings of right lower lobe collapse. In spite of the routine treatment patient went into peripheral circulatory failure. Subsequently, X-ray chest showed complete collapse of left lung with disappearance of the collapse of right lower lobe. Bronchoscopy was repeated and a piece of beetle nut was removed from the left main bronchus. A diagnosis of wandering FB was made.

Eight patients needed more than one attempt to remove the foreign body(s) and one patient needed lobectomy as the foreign body could not be visualized on repeated bronchoscopic examinations. The foreign body (seed of wild grass) was removed from the resected specimen.

All cases improved dramatically after removal of the FBs. Respiratory distress and wheeze disappeared soon after bronchoscopy and air entry improved. Radiological signs of consolidation improved within a few days with antibiotics.

Seventy seven patients were admitted as pneumonic collapse/consolidation in Pediatric Medicine Ward. These patients did not improve with a course of antibiotics symptomatically and radiologically after a period of 7-10 days and were subjected to bronchoscopic examination. In 30 patients thick tenaceous viscus mucus plug was found in either of the bronchi as the obstructing agent. All these patients were below one year of age. In remaining 47 patients inflammation of the tracheo-bronchial tree was found. The secretions from the tracheo-bronchial tree were collected for bacteriological study and treated subsequently by physician.

Bronchoscopy was carried out in 40 patients with empyema thoracis, main indications being a persistent bronchopleural

fistula and continued pus discharge from intercostal tube for more than four weeks. Bronchial aspirate was positive for AFB in 4 cases (AFB could not be demonstrated in either the gastric lavage or pus from pleural cavity on previous occasions). These cases responded to antitubercular therapy.

Discussion

Foreign body inhalation is a major surgical emergency in children and bronchoscopy has reduced the morbidity and mortality significantly (4-6). In the present series, 51% of the total cases had foreign body in the airway. Children in 1 to 3 years of age group were more prone to have foreign body because of natural propensity of young children to gain knowledge of placing articles in the mouth. In older children laughing, fighting and running during eating is responsible for foreign body inhalation. Adults should avoid setting bad examples of putting pins and nails in the mouth when working with these articles since children readily mimic the action. Sex distribution is surprisingly high in males—probably because of their more adventurous and inquisitive nature.

Apart from the management of the foreign body in respiratory tract, bronchoscopy has helped us in the management of other respiratory conditions, i.e., persistent pneumonic collapse consolidation not responding to prolonged medical treatment and in diagnostic bronchial aspiration for bacteriological study. In 30 infants a thick mucus plug was aspirated leading to radiologic and clinical improvement in 60% of the patients within a week of bronchoscopy while 10% did not show any improvement.

In 17% of patients, some degree of inflammation of the tracheobronchial tree

was found. The aspirate cultures from the airway helped in starting appropriate antibiotics. Forty patients with empyema thoracis did not respond to routine treatment. The bronchopleural fistula and intercostal pus discharge persisted for a period of more than 4 weeks. These patients were evaluated bronchoscopically and aspirate was positive for acid fast bacilli in 10% of these patients. These patients did not show any other evidence of tuberculosis and responded to anti-tubercular therapy.

In 3.27% of the cases, there was momentary cardiac arrest during bronchoscopic procedure but all were successfully resuscitated. Laryngeal edema was observed in many cases after bronchoscopy specially in cases with large impacted foreign bodies and with laryngotracheobronchitis but only two patients required tracheostomy. Two patients developed pneumomediastinum and pneumothorax during immediate postbronchoscopy period which were managed successfully. Unfortunately, three patients died due to aspiration in the immediate postoperative period. Postoperative care must be improved further to avoid postoperative mortality.

In summary, bronchoscopy is generally a safe and simple procedure with minimum morbidity and mortality. It can be used in various conditions in children.

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