Fiberoptic Bronchoscopy in Children: An Audit from a Tertiary Care Center

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ABSTRACT

A retrospective review of 529 fiberoptic bronchoscopies was done with an aim to identify conditions where it will be most useful. The common indications were persistent/ recurrent pneumonia, persistent collapse, stridor and pulmonary hemorrhage. The diagnostic yield was maximum when it was performed to identify structural abnormalities and the yield was relatively poor in suspected drug resistant tuberculosis, and interstitial lung diseases. Serious complications were seen in children with pulmonary arterial hypertension. Fiberoptic bronchoscopy is an important tool for management of respiratory problems but should be performed with caution in children with pulmonary arterial hypertension.

Key words: *Fibreoptic bronchoscopy, Persistent pneumonia, Recurrent pneumonia, Stridor.*

INTRODUCTION

Fiberoptic bronchoscopy is an important and frequently performed procedure in pediatric pulmonology(1-3). For appropriate referrals it is important to know the indications and yield of procedure. There are limited numbers of reports from India on fiberoptic bronchoscopy in children(4,5). We report an audit of bronchoscopy at a tertiary care hospital from India.

METHODS

This retrospective review of fibreoptic bronchoscopy was done in the Pediatric Pulmonology division of the Department of Pediatrics at a tertiary care referral center in New Delhi. Records of all the bronchoscopies performed from 2000 to 2005 were reviewed.

The clinical details of patients, indications, complications and findings along with laboratory results were extracted. The procedure had been performed by using fibreoptic bronchoscope (Olympus or Karl Storz) with 3.6 mm external diameter. An informed written consent was obtained from the caretakers/parents of all the children. The procedure was discussed with the children above 5 years of age. Sedation protocol included: pethidine (1-2 mg/kg), promethazine (1 mg/kg) and midazolam (0.05-0.15 mg/kg). Children above 12 years of age and considered to be cooperative by verbal assessment and those with hypoxia (oxygen saturation <90% in room air) were sedated with midazolam alone. All children also received intravenous atropine (0.01 mg/kg) just before the procedure. 2% Xylocaine solution was sprayed just above the glottis and at carina through the suction channel.

The visual findings of the airway anatomy were recorded. Bronchoalveolar lavage was performed, when indicated, by wedging the scope in affected lobes (if information was available) or in right middle lobe if there was no localization. Sterile saline (3-4 ml/kg) was injected after wedging the scope and sucked back in sterile mucus trap

immediately by using suction. All children received free flow oxygen by tube kept in front of nostrils and oral cavity. Monitoring during the procedure included: clinical monitoring for respiratory efforts, cyanosis and peripheral perfusion along with oxygen saturation and heart rate with saturation monitor.

After the procedure, children were monitored every 30 minutes for next 2-4 hours. Once child regained full consciousness, he/she was offered plain water to drink and then other food if there was no cough/ dysphagia. Children were sent home on the same day after the procedure.

RESULTS

During the study period, 529 bronchoscopies were performed at our center. The age distribution was 15 days to 15 years (<12 months- 135, 2-6 years- 200, 7-12 years- 150 and > 12 years- 44). Male to female ratio was 2.5 (380:149).

The common indications for doing bronchoscopy and yield are shown in ***Table* I** and ***Table* II** respectively. Bronchoalveolar lavage was performed in 469 patients. Microbial pathogens could be isolated in 106 (23%). Organisms were gram negative bacilli (*Pseudomonas, E. coli, Acinetobacter, H. influenzae*) in 50 (10.7%), acid fast bacilli in 25 (5.3%), gram positive cocci (*Staphylococcus, Streptococcus pneumoniae*) in 16 (3.4%) and fungi (*Candida, Aspergillus, Mucor*) in 15 (3.2%). Hemosiderin laden macrophages were demonstrated in 20 (4.3%) of samples.

Complications occurred in form of transient, self limiting respiratory distress [24 (4%)], vomiting after the procedure [23(4%)], upper airway bleeding [15(3%)], laryngospasm [5(1%)], respiratory failure requiring assisted ventilation for 24 hours (1) and subcutaneous emphysema (1). Procedure was abandoned in 10 (2%) patients due to worsening hypoxemia; five of them had underlying heart disease and pulmonary hypertension.

DISCUSSION

This retrospective audit of bronchoscopy provides common indications, yield and complications of the procedure in a tertiary care center from north India. The results may be applicable to other centers in developing countries. From our experience, we suggest that the results are more gratifying in children with suspected structural abnormalities like agenesis of lung. In these disorders, diagnosis is established immediately and further investigations like computerized tomography of chest or bronchography may be avoided. Other conditions that gave very good yield were cystic fibrosis and recurrent pneumonia. In these conditions, the bronchoalveolar lavage helped in identifications of microbial pathogens that helped in choosing antibiotics for treatment. The results of

TABLE I INDICATIONS AND POSITIVE FINDINGS ON BRONCHOSCOPY

Indications	N	Abnormal (%)
Suspected pulmonary agenesis/ H type TEF	10	10 (100)
Cystic fibrosis	34	30 (88)
Stridor	53	42 (79)
Suspected pulmonary hemorrhage	42	32 (76)
Persistent/ recurrent pneumonia	221	132 (60)
Pneumonia in immunocompromised	26	10 (38)
Persistent collapse	82	25 (30)
Suspected resistant TB	40	4 (10)
Interstitial lung disease	24	1 (4.1)
Total	529	284 (54)

TABLE II ABNORMAL FINDINGS ON BRONCHOSCOPY (N=529)

Findings	N	(%)
Increased secretions	29	(5.5)
Laryngomalacia	15	(2.8)
Endobronchial tuberculosis	15	(2.8)
Tracheomalacia	6	(1.1)
Agenesis of bronchus	8	(1.5)
Subglottic stenosis	5	(0.95)
External compression of trachea	5	(0.95)
Foreign body	5	(0.95)
Bronchomalacia	3	(0.57)
Vocal cord palsy	3	(0.57)
TEF H type	2	(0.38)
Pharyngomalacia	2	(0.38)

WHAT THIS STUDY ADDS?

- The yield of fiberoptic bronchoscopy is maximum in children with suspected structural abnormalities.

procedure were not very encouraging in immunocompromised hosts with pneumonia, interstitial lung diseases and drug resistant tuberculosis. We believe that the poor culture yield in immunocompromised hosts with pneumonia and suspected drug resistant tuberculosis was due to prior broad spectrum antibiotics/antituberculosis drugs in these patients. Possibly the yield can be improved in these patients by using molecular diagnostic techniques for identification of pathogens. The yield in interstitial lung disease can also be improved by using specialized techniques for differential cell counts, CD markers and special staining methods(6-8).

The indications, yield and complications in the present series were similar to that reported from Europe(9) and Chennai(4), except that we had more patients with suspected drug resistant tuberculosis as it is more common in this part of world. Bronchoscopy was safe in majority of patients. Significant side effects were observed in children with underlying heart disease with pulmonary arterial hypertension. It has been suggested that bronchoscopy is more risky in children with severe hypoxia, uncontrolled bleeding diathesis, cardiac failure or severe pulmonary hypertension(10).

We conclude that fiberoptic bronchoscopy is safe procedure in all age groups. It should be performed on priority in all children with suspicion of structural abnormalities of respiratory tract, as the yield is good. Bronchoscopy should be performed with caution in children with pulmonary arterial hypertension.

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