Fiberoptic bronchoscopy in children

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AIMS: To describe the more common indications for fiberoptic bronchoscopy in children; to review the risks and benefits of fiberoptic bronchoscopy for the patient.

TARGET AUDIENCE: Otolaryngologist, Paediatrician, Pulmonologist, Student, Junior member, Fellow

AIMS

The aim of this lecture is to give an update on the most used pediatric Fiberoptic Bronchoscopes, on technical aspects of FOBs and on indications to Fiberoptic Bronchoscopy in children. Some clinical cases, in which bronchoscopy was necessary to make a diagnosis, will be presented and discussed.

SUMMARY

Fiberoptic bronchoscopy in children is a procedure widely used in the main Pediatric Pulmonary Units in all Countries of the European Community. Its spread was helped by advances in manufacturing companies that have built increasingly sophisticated tools and by training courses that are organized in Europe, such as the one sponsored twice a year by the ERS.

The age at which most often children are undergoing bronchoscopy is to preschool (1). At that age, the size of the airway is such as to require the use of a fiberoptic bronchoscope with a 3.8 or 4.9 mm outer diameter at the distal end of the instrument to reduce the risk of side effects (2, 3).

The indications to fiberoptic bronchoscopy in children are clearly defined in a ERS task force (4) and more recently in an ATS task force (5). The guidelines reported in both task forces include: the various causes of airway obstruction, persistent radiological abnormalities of the chest, chronic cough, therapeutic bronchoscopy and special procedures that can be performed during bronchoscopy: bronchoalveolar lavage (BAL), transbronchial biopsies (TBB), bronchial mucosal biopsies (BB) etc.

With the fiberoptic bronchoscopy it is possible to diagnose malformations of the lower airways, such as laryngomalacia, or tracheomalacia from vascular compression or associated with esophageal atresia and TE fistula (6). The most frequent vascular abnormalities causing tracheal compression are aberrant innominate artery, succlavia lusoria, right sided aortic arch or double aortic arch and pulmonary artery sling. They can cause burking cough, recurrent lower airway infections and sometimes bronchiectasis.

Also unilateral paralysis of the larynx in newborn can be easily diagnosed (7).

Clinical symptoms and radiological findings before bronchoscopy have a low diagnostic value in children with a history of foreign bodies aspiration (8); bronchoscopy with rigid bronoscope is
mandatory to remove the foreign body inhaled in the lower airways. There is much discussion on the use of the flexible bronchoscope in these patients. Only a paper in the last years gives great importance to the use of the flexible bronchoscope in removal of inhaled foreign bodies in children, reporting experience on 1027 patients(9). In a german survey with 255 questionnaires collected from different physicians (n= 29.9 % pediatricians, 50.8 % anesthesiologists, 0.4 % surgeons, 11.4 % Otolaryngologists, 3.9 % internists, 3.5% others) for confirmation of foreign body aspiration the majority of them (74.1%) preferred flexible bronchoscope; for foreign body removal 49.2% preferred rigid bronchoscope, while 20% preferred flexible bronchoscope; 30% routinely used a combination of rigid and flexible bronoscopes(10).

In most Pediatric Pulmonary Centers in which are made bronchoscopy in children, BAL is a routine procedure during fiberoptic bronchoscopy and it can give very important information on the cellular and not cellular component of the bronchoalveolar fluid; the technique is well standardized (11). One common cause of childhood chronic cough is protracted bacterial bronchitis (PBB), especially in children aged ≤6 years. PBB is characterized by a chronic wet or productive cough without signs of another cause. If bronchoscopy and bronchoalveolar lavage are performed, evidence of bronchitis and purulent endobronchial secretions are seen. Bronchoalveolar lavage specimens typically reveal marked neutrophil infiltration and culture large numbers of respiratory bacterial pathogens; appropriate antibiotic therapy leads to the child healing (12).

In areas such as North America and Western Europe, where there is minimal internal transmission of tuberculosis and routine provision of post exposure prophylaxis, a small proportion of children is affected by pulmonary tuberculosis, and most cases occur in immigrant populations. In some children after primary infection and in absence of adequate treatment, the progression of the disease can determine in the following months complicated lymph node disease (airway compression, expansive caseating pneumonia, infiltration of adjacent anatomical structures[bronchus, esophagus]) (13). Accurate and timely diagnosis is crucial for timely treatment that might minimize the risk of disease transmission. In small children and in children with negative sputum, fiberoptic bronchoscopy can be very useful because it allows not only to see endobronchial granulation tissue and bronchial compression caused by peribronchial affected lymph nodes, but it also permits with the first BAL sample to collect useful material for PCR of mycobacteria and their typing (14). In conclusion fiberoptic bronchoscopy is an essential tool to perform a correct diagnosis in children with recurrent or chronic lower airway diseases. In the near future, when diagnostic and therapeutic procedures now available for endoscopists of adult will also become available for children, new diagnostic and therapeutic possibilities are also open in pediatrics.

REFERENCES


FACULTY DISCLOSURE

Prof. Angelo Barbato has no real or perceived conflicts of interest that relate to this presentation.

EVALUATION

1. What types of fiberoptic bronchoscopes are most frequently used in children:
   a. 2.2 mm diameter at the distal 2nd
   b. 2.8 mm diameter at the distal end
   c. 3.8 mm diameter at the distal end
   d. 4.0 mm diameter at the distal end
   e. 4.9 mm diameter at the distal end

2. What is the age at which most often children are undergoing fiberoptic bronchoscopy for different indications?
   a. less da 3 years of age
   b. between 3 to 5 years of age
   c. between 5 to 10 years of age
   d. between 10 to 15 years of age

3. Protracted bacterial bronchitis in children can be diagnosed by:
   a. ChestXray
   b. fiberoptic bronchoscopy
   c. fiberoptic bronchoscopy and BAL
   d. fiberoptic bronchoscopy and endobronchial biopsy

4. In case of suspected foreign body aspiration in a child it is useful:
   a. To perform Flexible Bronchoscopy and then Rigid Bronchoscopy
   b. To require urgently a Chest-X-Ray
   c. To perform Flexible Bronchoscopy with BAL
   d. To send the child to ED

5. In case of tuberculosis in children fiberoptic bronchoscopy can be useful:
   a. To perform endobronchial biopsy of granulation tissue
   b. To collect one sample of BAL
   c. To collect three samples of BAL
   d. To check the endobronchial stenosis