LEADING ARTICLE

FIBREOPTIC BRONCHOSCOPY: ITS PRACTICE TODAY

K W Chan

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INTRODUCTION

The flexible fibreoptic bronchoscope was first demonstrated by Ikeda[1] in 1966. Since that time, this revolutionary and remarkable tool has become an integral part of a well-trained chest physician's armamentarium. Others such as intensive care physicians and anaesthetists have acquired sufficient manipulative and interpretative skills to use it for selective purposes. In this issue, Yaacob et al evaluated their experience with fibreoptic bronchoscopy (FOB) in a teaching hospital in the north east of Peninsular Malaysia. Their results showed some minor disparity with those from the developed countries and this can be attributed partly to geographical distribution of diseases, methods of selecting patients and variable bronchoscopic techniques.

SEDATION AND TOPICAL ANAESTHESIA

FOB may be performed with no sedation[2] on a stoical patient by an experienced operator. However, most bronchoscopic practices include some sedative regimen. In our institution, we commonly premedicate our patients with atropine (0.6 mg i.m.) and pethidine (50-75 mg i.m.) 30-60 minutes before the procedure. Atropine reduces oropharyngeal secretions and blocks vagus-mediated adverse reactions whereas pethidine provides some analgesic and anti-tussive effects. If a troublesome cough is present, codeine phosphate (30-60 mg i.m.) may be tried.

An extremely apprehensive patient may need additional medication with diazepam (5-10 mg i.v.) or midazolam (3-10 mg i.v.). We prefer midazolam which produces excellent anxiolysis and amnesia. It is given in carefully titrated doses especially in the elderly eg. initial 2 mg i.v. slowly followed by 1 mg at one minute intervals until slurred speech or somnolence is noted. It is best avoided in patients with severe liver disease or chronic obstructive lung disease. When necessary, flumazenil (0.3-0.5 mg i.v.) a specfic benzodiazepine antagonist, can provide rapid reversal of midazolam sedation.

The topical anaesthetic of choice is lignocaine. A conventional hand-powered nebulizer is used to spray a 4% lignocaine solution into the nose (for transnasal approach), oropharynx and upper airways. For further anaesthesia, aliquots of a 1-2% lignocaine solution are delivered through the suction channel of the bronchoscope. The total maximum dose for lignocaine in an adult is 300 mg.

DIAGNOSTIC FIBREOPTIC BRONCHOSCOPY

The indications for diagnostic FOB are many and varied[3-5]. It is advisable to consider these indications as broad guidelines and the decision to bronchoscope must be based on experience and sound clinical judgment of individual cases[5].

FOB is used extensively in the evaluation of abnormal chest radiographs suspected of lung cancer. The procedure allows direct visual inspection of the airways beyond the segmental level, including those of the upper lobes. In general, the diagnostic yield is higher when the tumour can be visualized bronchoscopically. Martini and McCormick[6] reported that in endoscopically visible carcinomas, the yield for bronchial washings, brushings and forceps biopsy was 79, 92 and 93% respectively; this yield rose to 98% when two or more procedures were combined. On the other hand, a study by Cortese and McDougall[7] showed that in endoscopically non-visible tumours, fluoroscopically guided brushings and biopsy produced yields of 40 and 46% respectively; a combination of both procedures gave a 60% yield. Bronchial washings did not add to the yield significantly. Another aspect of FOB evaluation is the staging of lung cancer. Bronchoscopic clues of non-resectability include vocal cord paralysis, widened main carina and tumour extension to main carina and trachea. Furthermore, transbronchial needle aspiration of mediastinal and hilar lymph nodes[8] may assist in detecting mediastinal spread of cancer and hence obviate the need for invasive surgical staging procedure.

The workup of many cases of haemoptysis includes FOB primarily to exclude bronchial carcinoma. Weaver et al[9] identified three risk factors linking haemoptysis to bronchial carcinoma viz. age over 40 years, any abnormality on the chest radiograph and haemoptysis lasting more than one week. An additional risk factor that favours FOB is a history of early cigarette smoking.

FOB is also used to recover appropriate material for culture in suspected pulmonary infections. Unfortunately bronchial aspirates obtained through the suction channel of the bronchoscope are grossly contaminated by oropharyngeal flora[10]. This problem is overcome by using a telescoping plugged catheter[11] which is a sterile double-sheathed catheter brush with a glycerin plug. In smear-negative miliary tuberculosis, FOB is of value in ensuring a rapid diagnosis[12]. Adjunctive techniques of FOB such as bronchoalveolar lavage, transbronchial lung biopsy and telescoping plugged catheter are helpful in the investigation of AIDS and immunocompromised patients with diffuse pulmonary infiltrates[3,4,13-15]. Various opportunistic infections have been diagnosed correctly including those caused by Pneumocystis carini, cytomegalovirus, mycobacteria and fungi[13,14]. In particular, the diagnostic yield for P. carinii pneumonia in AIDS patients is extremely high when both bronchoalveolar lavage and transbronchial biopsy are done[13].

Transbronchial biopsy is useful in several non-infectious interstitial lung diseases[15]. Its role in sarcoidosis is well documented and it is also capable of diagnosing lymphangitic carcinomatosis, pulmonary alveolar proteinosis, eosinophilic granuloma and idiopathic pulmonary fibrosis. At present, bronchoalveolar lavage is research-orientated and has no clinical application in interstitial lung diseases.

Department of Medicine II
Tan Tock Seng Hospital
Moulmein Road
Singapore 1130

K W Chan, MBBS(Mal), MRCP (UK), AM(S'pore)
Consultant Physician

Occasionally FOB is used to place a bronchography catheter through which Dionosil is injected to obtain a bronchogram. However, Dionosil is difficult to procure nowadays. A recent study[16] suggested that iotrolan can be used in place of Dionosil and iotrolan has the advantage that it can be injected directly into the suction channel of the bronchoscope.

THERAPEUTIC FIBREOPTIC BRONCHOSCOPY

The therapeutic applications of FOB are increasing. In intensive care situations, the instrument can be used to remove retained secretions. It can also assist in performing difficult intubations in patients with mechanical derangements of the neck. It has been used successfully in removing aspirated foreign bodies although the rigid open-tube bronchoscope is the instrument of choice generally. The flexible bronchoscope can also be passed into an intubated patient using an adapter that permits mechanical ventilation to continue.

Patients with life-threatening haemoptysis may have inadequate pulmonary reserve to undergo resectional surgery. In this instance, bleeding can be controlled by endobronchial tamponade with a Fogarty catheter introduced by the bronchoscope[17].

A highly promising development in therapeutic FOB is the use of neodymium: yttrium-aluminium-garnet (Nd: YAG) laser treatment for obstructing tumours in the trachea and main stem bronchi. In a retrospective analysis of their cases, Brutinel et al[18] recommended three factors in selecting patients for Nd: YAG laser treatment: (i) endobronchial tumours, (ii) tumour 4 cm or less in length and (iii) functioning lung tissue distal to the obstruction.

COMPLICATIONS

Overall the procedure is low-risk. In a questionnaire survey by Simpson et al[2], the major complication rate was 0.12% and mortality rate 0.04% in routine bronchoscopies. Complications arising from premedication and topical anaesthesia are more likely in the elderly and those with underlying heart disease[3].

Transbronchial biopsy caused more complications with a major complication rate of 2.7% and mortality rate of 0.12%[2]. The main complications are pneumothorax, haemorrhage and respiratory depression[2]. The risk of pneumothorax is lessened by the use of fluoroscopy. Post-biopsy haemorrhage can be serious and patients with bleeding disorders, pulmonary hypertension or vascular adenomas must not be biopsied. Haemorrhage is also markedly increased in immunocompromised (25%) and uraemic (45%) patients[3].

Deaths are uncommon and those most at risk have underlying heart disease, advanced cancer, severe pneumonia or poorly controlled bronchospasm. Complications can never be totally eliminated but some precautions can be taken such as use of supplemental oxygen, pulse oximeter, cardiac monitoring and optimising treatment of bronchospasm prior to the procedure.

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