The role of diagnostic fiberoptic bronchoscopy for rapid diagnosis of pulmonary tuberculosis

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Summary

The role of fiberoptic bronchoscopy for rapid diagnosis of pulmonary tuberculosis was examined among 74 patients who were suspected of having the disease but had negative sputum smear for acid fast bacilli. Bronchial brushing and washing were routinely performed in all subjects and bronchial biopsy was performed on abnormal mucosa in 7 of them. The diagnosis of pulmonary tuberculosis was confirmed in 44.6% of the patients studied from smear examination, culture, histology or the combination of them. Rapid diagnosis was achieved in 54.5% of the confirmed cases from smear or histology within a few days of examination. Two of the cases had concomitent bronchogenic carcinoma. We conclude that the fiberoptic bronchoscopy is a useful investigation for this group of patients as confirmation of the diagnosis can be made fairly rapidly in a significant proportion of them, hence the treatment can be started confidently.

Key words: Fiberoptic bronchoscopy, pulmonary tuberculosis.

Introduction

Pulmonary tuberculosis is a highly prevalent disease in this country and in many other parts of the world. Sputum examination is the most common and useful way to diagnose the disease. However about 50% of patients with active pulmonary tuberculosis suspected on clinical and radiological grounds may not have bacteriological proof of the disease either because acid fast bacilli are not seen in sputum or sputum is not available for examination[1]. This poses problem to the clinicians who often have to embark on emperical anti-tuberculous treatment if clinical suspicion is high, at the same time subjecting patients to potentially toxic drugs and the inconveniences of prolonged therapy. An alternative approach is to wait for the culture results which often takes 6-8 weeks before deciding on the treatment. This too has its own problem as treatment is frequently delayed and may have adverse consequences.

Fiberoptic bronchoscopy offers a mean of investigation whereby bronchial secretion and washing can be collected from the most likely abnormal site under direct vision for microbiological examination. Bronchial or transbronchial biopsy for histological examination or culture can also be carried out. Some of the results of the procedures are available within a few days and this may help the physician to decide on whether to treat the patient or otherwise without having to wait for a long time. In our

institution, fiberoptic bronchoscopy is done routinely for patients with suspected pulmonary tuberculosis but with negative acid fast bacilli on repeated sputum smear examination. We report here the efficacy of fiberoptic bronchoscopy in making a rapid diagnosis in patients with pulmonary tuberculosis but with negative sputum smear examination for acid fast bacilli.

Materials and methods

74 patients aged 18-78 years old who were suspected of having pulmonary tuberculosis based on clinical and radiological appearances were prospectively studied between January 1989 - February 1990. All subjects had at least 3 sputum smear examination which were negative for acid fast bacilli. The bronchoscopy was performed transnasally using Pentax FB-15H bronchoscope by 2 bronchoscopists under local anaesthesia. All patients received lignocaine 10% spray to the nose and throat and lignocaine 2% solution to the vocal cords, trachea and bronchi. Between 40 to 120mg lignocaine was used for the anaesthesia of bronchial trees. Premedication with pethidine 50 - 75mg and atropine 0.6mg intramascularly was given to all the in-patients half an hour before the procedure but not to the out-patients. Bronchial brushing using protected brush was routinely performed on the affected lobar or segmental bronchi based on the abnormal appearance on bronchoscopic observation or on radiological assessment. The specimen obtained was placed on slides for Ziehl-Nielsen staining. Bronchial washing was performed using 40 - 60ml normal saline on the suspected area and the fluid was sucked into a plastic trap and stained with Gram stain and Ziehl-Nielsen stain and also cultured onto blood agar, mycotic agar, Mac Conkey, Sabouraud and Loweinstein-Jensen media. Bronchial biopsy was performed on abnormal looking mucosa and stained with Eiosin-hematoxylin and Ziehl-Nielsen stains.

Results

Of the 74 patients examined, 33 (44.6%) were confirmed to have pulmonary tuberculosis. Table 1 shows the details of the result of the 33 confirmed cases. Smear examination for acid fast bacilli were positive in 17 of these 33 cases i.e. 51.5%; 14 (42.4%) from washing specimen, 10 (31.2%) from brushing whilst 7 were positive in both. In 7 patients who had bronchial biopsy done, 3 were histologically consistent with tuberculosis. Rapid diagnosis was obtained in 18 patients (54.5%), either from smear examination or from histology; the results were available within 48 hours and 7 days for the smear and histology respectively. The culture for *M. tuberculosis* was positive in 28 (84.8%) of the total confirmed cases, 10 of which provided the exclusive confirmative evidence of the diagnosis (where smear and histology were negative). Three specimens sent for culture were not traceable but the smear examination were positive for acid fast bacilli. Other organisms cultured from washing specimens were *M. fortuitum* in 2 and *C. albicans* in 1. Two patients had unexpected findings of bronchogenic carcinoma on histology. Both of them also had acid fast bacilli on smear examination.

Table 1
Diagnostic yield from various bronchoscopic procedures for diagnosis of pulmonary tuberculosis in 33 confirmed cases

Specimen	Results		Total
	Positive No. (%)	Negative No. (%)	
Smear from washing	14 (42.4)	19 (57.6)	33
Smear from brushing	10 (30.3)	23 (69.7)	33
Smear from washing or brushing	17 (51.5)	16 (48.5)	33
Histology of biopsy	3 (42.9)	4 (57.1)	7
Smear or histology or both	18 (54.5)	15 (45.5)	33
Culture from washing	28 (84.8)	2 (15.2)	30

Table 2 shows chest radiograph abnormalities in 74 patients studied. The diagnosis in 41 patients who were examined but eventually showed negative results for pulmonary tuberculosis is summarised in table 3. Only 5 of the 41 patients had definitive diagnoses supported by microbiology or histology. In 11 patients the diagnoses were highly probable after a review of chest radiographs and assessment of clinical progress were made. In 25 patients the diagnoses were only presumptive and mainly based on the clinical progress and their responses to treatment, as all the microbiological or histological examinations were negative. Noteworthy, 5 of them were treated for pulmonary tuberculosis and showed good responses. The complications from the procedure were negligible with a few patients developed slight hemoptysis related to the procedure but all settled without any need for blood transfusion or surgical intervention.

Table 2
Chest radiograph abnormalities in 74 patients with suspected pulmonary tuberculosis

	Result for PTB		
CXR Abnormality	**+ve**	**-ve**	**Total**
Unilateral upper lobe opacity	13	11	24
Bilateral apical opacities	2	2	4
Unilateral or bilateral apical fibrosis	0	5	5
Unilateral upper lobe cavity	2	3	5
Mid or Lower zone consolidation	5	5	10
Bilateral patchy opacities	5	3	8
Miliary shadows	3	1	4
Pleural effusion	2	3	5
Multiple cavitating lesions	0	4	4
Single mid or lower zone cavity	1	4	5
Total	**33**	**41**	**74**

Table 3
Diagnosis in 41 patients with negative results for pulmonary tuberculosis

Definitive diagnosis	
Bacterial pneumonia	2
Bronchogenic carcinoma	1
Histoplasmosis	1
Cryptococcosis	1
Highly probable diagnosis	
Apical fibrosis	5
Diffuse bilateral fibrosis	2
Bronchiectasis	4
Presumptive diagnosis	
Bacterial pneumonia	8
Active tuberculosis	5
Pyogenic abscess	4
Old tuberculous cavity	3
? Apical fibrosis	5

Discussion

The diagnostic yield of bronchoscopy for the diagnosis of pulmonary tuberculosis in suspected patients with negative sputum smear examination for acid fast bacilli is quite variable. Wallace et al[2] reported 52% diagnostic result with the procedure whilst others had reported more than 80% achievements[3-6]. If we include the 5 patients who have clinical features of pulmonary tuberculosis but without microbiological or histological proof of the disease into the total active disease, our overall diagnostic yield is 86.8% (33 out of 38). In 54.5% of our confirmed cases of pulmonary tuberculosis the results were available within a short period of time i.e. less than 1 week; either from smear or histological examinations. The smear results is often available within 24 hours. This contributes significantly to the management of the patients since antituberculous drugs can be started with confidence. Other workers reported rapid diagnosis in 48 - 79% of their cases[2,5,6].

Bronchial and transbronchial biopsies were only selectively performed in our cases as we feel the specimens from bronchial brushing and washing are sufficient for diagnostic purposes. This will also minimise the rate of complication especially from transbronchial biopsy. Sarkar et al[7] had obtained 86.6% confirmative results from bronchoscopic suction and washing without doing any biopsy. Danek and Bower[3] only obtained 28% features of granuloma from all his biopsied specimens; the others showed non-specific inflamation or normal histology but tuberculosis were confirmed by other means. One clear advantage of biopsy is that, co-existing disease like bronchogenic carcinoma may also be diagnosed like in 2 of our patients.

The results of our culture is quite satisfactory where 85% of all confirmed cases grow M. tuberculosis. We minimise the use of lignocaine local anaesthetic to 40 - 120mg for trachea and bronchi to prevent the inhibition of growth of mycobacteria, which have been previously reported[8-9]. This may be the reason why Kvale et al[10] had high false-negative cultures in their study. One disadvantage of bronchoscopy for the diagnosis of pulmonary tuberculosis is that the transmission from one patient to another may occur if the bronchoscope is not disinfected adequately with proper solution[11]. Further extension of the disease within the lung has also been reported after the procedur[12].

In conclusion, we feel that fiberoptic bronchoscopy is a useful procedure to establish the diagnosis of pulmonary tuberculosis when sputum smear examination does not show acid fast bacilli. This allows appropriate treatment to be started with confidence in those patients whom the diagnosis have been confirmed by either smear or histological examination. For patients without proof of the disease, the decision depends on the clinical consideration. Unexpected disease may also be diagnosed and may require different treatment.

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