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CLINICAL EVALUATION OF FLEXIBLE FIBEROPTIC BRONCHOSCOPE IN DIAGNOSIS OF NEW CASES OF SPUTUM SMEAR-NEGATIVE PULMONARY TUBERCULOSIS (SSN-PTB)

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ABSTRACT

Background: Bronchoscopy is very useful for diagnosing of Sputum smear-negative pulmonary tuberculosis (SSN-PTB). Our aim is to find out the diagnostic yield of fiberoptic bronchoscopy in sputum smear negative under RNTCP and radiologically suspected new cases of pulmonary tuberculosis and the complications of fiberoptic bronchoscopy. **Material and Methods:** It is a cross-sectional prospective study in which consecutive 43 patients were enrolled in the present study at Department of Tuberculosis and Chest Diseases, RNT Medical College, Udaipur from 1st July 2005 to 7th July 2006. The patients whose three-sputum smear for Acid Fast Bacilli was negative and chest X-ray suggestive of pulmonary tuberculosis were included into the study. Patient's history, observations on physical examination and relevant investigations were noted. Fiberoptic bronchoscopy was carried out. **Results:** The diagnostic yield of fiber optic bronchoscopy for tuberculosis in new cases. Positive early diagnosis was done in 5 cases (11.6%) whereas, overall yield for AFB after bronchial aspirate culture was 8 out of 43 patients (18.6%). **Conclusions:** Our study suggests that fibre-optic bronchoscopy can provide excellent material for diagnosis of suspected cases of pulmonary tuberculosis when smears of expectorated sputum do not reveal mycobacteria. Fibre-optic bronchoscopy combined with transbronchial lung biopsy helps in early diagnosis of smear negative pulmonary tuberculosis and can differentiation of other disorders which clinical picture mimics tuberculosis.

Key words: Sputum smear-negative pulmonary tuberculosis (SSN-PTB), Fiberoptic bronchoscopy,

INTRODUCTION

Tuberculosis is the most common cause of death from the infectious diseases at global level, is being second only to HIV/AIDS. It accounts for over a quarter of avoidable deaths worldwide. Most deaths occur in developing countries and affect the young in productive years of their life.**(1)** Prevalence of radiologically active abacillary (sputum smear negative) pulmonary

tuberculosis is estimated 16 per 1000 with total number 13.6 million cases **(2)**

Although detection and cure of smear positive tuberculosis remains the foremost priority of a tuberculosis control programme, diagnosis and management of smear negative tuberculosis cannot be over looked.

In recent years smear negative tuberculosis is being reported more frequently with HIV co-infection **(3)** especially in respect of India where half of the nearly 4 million HIV infected individuals are also bearing the tuberculosis infection.**(4)** If left untreated about 35 % of smear negative symptomatic may develop active tuberculosis over a 2 year period .**(5)**

Sputum smear and culture examinations still remain the commonly practiced investigations in the diagnosis of pulmonary tuberculosis. It is also known that in many patients, this stringent criterion cannot be satisfied due to factors like:

(a) lack of sputum production,
(b) low bacterial yield, and
(c) incorrect or improper sampling.

There are many factors that produce false negative smear results in patient with pulmonary tuberculosis. In under resourced, over worked

TB Control Programmes, laboratories cannot cope with the influx of diagnostic and follow up smear examination and smears may not be done at all. For example, in Botswana in year 1992, 48% of patients reported with pulmonary tuberculosis had no smear examinations performed. **(6)**

Other causes of sputum smear false negative are inadequate quantity, quality or number of sputum specimen to be examined, poor staining techniques and overly thick slides.

Published observations suggest that over 50% of smear negative patients would be needing chemotherapy by 12 months if left untreated.**(7,8)** Data from longitudinal surveys from Bangalore district, India **(9)** indicate that at 18 months of follow-up, the mortality rate for smear negative, culture-positive cases was 14.1% compared with the 34.7% observed in smear-positive patients. Thus, early diagnosis of active SSN-PTB disease is also important in certain situations. However, sputum smear-negative pulmonary tuberculosis (SSN-PTB) still remains a common problem faced by the clinicians. This is particularly true in the case of children who are unable to produce an adequate sample of sputum, patients with immunosuppressed states such as those with HIV, infection and the acquired immunodeficiency syndrome (AIDS) in whom SSN-PTB is quite common. ATT is frequently started empirically in sputum negative and radiologically suspected cases. This strategy is useful in most of the cases with the advantage of avoiding invasive diagnostic procedures and an early treatment is beneficial to the patient. However, diseases like bronchogenic carcinoma, diffuse lung diseases etc. are sometimes missed and cases are put within the gray area of tuberculosis suspect this may lead to delay of treatment resulting in poor outcome.**(10)**

In the earlier days of rigid bronchoscopy, patients with tuberculosis were seldom subjected to bronchoscopy for diagnostic purpose. With the advent of fibre-optic bronchoscopy, smear and culture for mycobacteria from the bronchial

aspirate, bronchial brushing, bronchial washing, bronchoalveolar lavage fluid, postbronchoscopy sputum and biopsy material have all been used to a definitive diagnosis for pulmonary tuberculosis. Hence, a prospective study was commenced to evaluate the diagnostic yield of fiberoptic bronchoscopy in sputum smear negative under RNTCP and radiologically suspected cases of pulmonary tuberculosis.

MATERIAL AND METHODS

43 patients were enrolled in the present study at Department of Tuberculosis and Chest Diseases, RNT Medical College, Udaipur from 1st July, 2005 to 7th July, 2006.

The patients whose three sputum smear for Acid Fast Bacilli was negative under RNTCP and chest X-ray suggestive of pulmonary tuberculosis were included into the study.

Patient's history, observations on physical examination and relevant investigations were noted.

Fiberoptic bronchoscopy was carried out using either an Olympus OF2T10 bronchoscope.

Following examinations were applied on the obtained specimens:

- AFB smear examinations were done in bronchial aspirate and post bronchoscopic sputum at TB and Chest Hospital, Bari, Udaipur.
- AFB culture of bronchial aspirate done at department of microbiology, RNT Medical College Udaipur.
- Cytology of Bronchial aspirate/washing and bronchial brushing, and histopathologic examination of bronchial biopsy done at Department of Pathology, RNT Medical College, Udaipur.

Reports were obtained and analyzed accordingly.

RESULTS

The mean age of subjects was 43.76 ± 15.43 years. There were 33 male and 10 female patients in the study group. 60 % of total patients under study were non-vegetarian and 39 % were vegetarian.

28% patients were alcoholic and 72 % patients were non-alcoholic. All of 10 females were non-alcoholic. Thus the alcoholic habit was also far more in males as compared to females.

Mean duration of illness of newly diagnosed tuberculosis patients was 6.5 months. Above table shows the cough was the single most common presenting symptom (100%) followed by expectoration (86.04%), fever (55.81%), breathlessness (55.81%), chest pain (55%) and haemoptysis (39.53%) and constitutional symptoms such as decreased appetite (65%), weakness, bodyache, malaise, etc also observed.

Table no. 2 showing that bronchoscopically normal tracheobronchial tree was observed in 25% cases, whereas congestion/erythema in 32.55 % of cases, Unhealthy mucosa/granuloma in 27.9, Cheesy secretion and necrotic material and, Bleeding from bronchus was found in 6.9 % cases. Muco-purulent secretion from bronchus in 37.2%, growth seen in 5% and external compression in 4% of the patients.

Table no. 3 shows diagnostic yield of fiber optic bronchoscopy for tuberculosis in new fresh cases. Positive early diagnosis was done in 5 cases (11.6%) whereas, overall yield for AFB

after bronchial aspirate culture was 8 out of 43 patients (18.6%).

Table 1. Patient characteristics

Patient characteristic	%	N=43
Sex		
Male	76.7	33
Female	23.2	10
Mean age (years)		
Total	43.76 ± 15.43	
Male	43.48 ± 14.42	
Female	44.7 ± 19.25	
Mean duration of illness	6.5 months	
Symptoms		
Cough	100	43
Expectoration	86.04	37
Fever	55.81	24
Decrease appetite	65.11	28
Dyspnea	55.81	24
Hemoptysis	39.53	17
Chest pain	53.48	23
Other constitutional symptoms	51.16	22

Table 2. Bronchoscopy findings in 43 suspected cases of pulmonary tuberculosis

Normal appearance	**11**
Abnormalities seen* :	
Muco-purulent secretion from bronchus	16
Unhealthy mucosa/granuloma	12
cheesy secretion and Necrotic material	3
Congestion	14
Bleeding from bronchus	3

* Multiple findings in some cases

Table-3: Diagnostic yield of fiber optic bronchoscopy for tuberculosis in fresh cases (n=43)

Bronchoscopic method	Positive results		Exclusive positive specimen	
	No.	%	No.	%
Bronchial aspirate/Washing smear	5/43	11.6	1	**2.3**
Bronchial biopsy (HPE)	0/1	0.0	0	**0.0**
PBS for AFB smear	3/42	7.1	--	--
Positive early diagnosis	**5/43**	**11.6**	--	--
Bronchial aspirate AFB culture	6/34	17.65	3	**8.82**

After culture reports overall yield for tuberculosis	**8/43**	**18.6**	**--**	**--**

DISCUSSION

The respiratory physicians have is the problem in the diagnosis of tuberculosis patients with suspected radiography and negative sputum smear. **(11)** Culture results in these patients wait leads to a delay in treatment and on the other hand, empirical treatment initiation in patients load can bring unnecessary treatment, especially in terms of endobronchial tuberculosis. Baran and colleagues alike studies, TB Bronchoscopy in intrathoracic lymphadenopathy, is an important diagnostic tool and other invasive procedures to be considered before was emphasized .**(12)** The present study was carried out on 43 sputum smear negative for AFB under RNTCP and radiologically suspected new cases of pulmonary tuberculosis, to evaluate diagnostic yield of fiber optic bronchoscopy.

There were 33 males and 10 females with age ranging from 16 years to 75 years. Majority of the patients i.e. 93 % were having duration of illness from 1 month to 12 months. All of the patients (100 %) had low body mass index (BMI). By clinical presentation, cough (100%) was the most common presenting feature, followed by expectoration (86.04%), Decrease appetite (65.11), breathlessness (55.81%),and haemoptysis (39.53%). The constitutional symptoms including fever (55.81%) with evening rise of temperature, decreased appetite (65.11 %) were also present. The physical findings such as pallor (53.4 %), clubbing (41.18%), lymphadenopathy (6.9%) etc. were also observed. Clinical findings in the present study were consistent with clinical features described by Bachh AA in Tuberculosis. **(13)** Similar clinical findings were also reported by Holmes P and Faulks L.**(14)**

Bronchoscopically normal tracheobronchial tree was observed in 25% cases, whereas congestion/erythema in 32.55 % of cases, Unhealthy mucosa/granuloma in 27.9, Cheesy secretion and necrotic material and, Bleeding from bronchus was found in 6.9 % cases. Muco-purulent secretion from bronchus was in 37.2%, growth seen in 5% and external compression in 4% of the patients.

Similarly, Purohit SD et al (1983) reported generalized congestion/hyperemia in most of the patients. **(15)** Wallace JM et al (1981) reported congestion of mucosa in 86% with no significant correlation of endoscopic findings with mycobacterial positivity. **(16)**

Purohit SD et al (1983) has aslos reported frothy secretions in 60% in the tracheobronchial tree while in the present study mucoid-mucopurulent secretions found in 68% (44/60).**(15)**

Early positive diagnostic yield for tuberculosis was 11.6% (5/43) and after culture results, overall diagnostic yield was 18.6% (8/43) amongst the patients in whom there was no history of anti-tuberculous treatment.

The smear results (11.6 %)of bronchial aspirate were comparable with the study of Wallace et al (1981), who reported it as 13% but lower than the studies of Sarkar et al (1980) and

So et al (1982) who reported it as 67% and 38% respectively.**(16,17,18)**

In the present study, the bronchial aspirate culture yield for mycobacterium tuberculosis was 17.65% (6/34) which was higher than that of Wallace et al (1981)who reported it as 4%.**(16)**

Positive post bronchoscopic sputum smear results for AFB were also lower than other studies of Purohit et al and Danek and Bower (1979) who observed it as 42% and 21% respectively.(15,19)

In the present study results of histopathological examination of bronchial biopsies for tuberculosis were not significant. But other studies reported by Wallace et al (1981),So et al (1982) and Danek and Bower (1979), were very high as it at 30% , 58% and 27% respectively. It may be possibly because they did retrospective analysis of only the proven cases and we analyze the new unidentified cases. **(16,18,19)**

In the present study no major complication or mortality was observed, only minor complications were observed in 6 patients (sinus tachycardia-1, respiratory distress-1, transient bleeding-2 and coung-2) for which no active management was required. Whereas Purohit et al (1983) reported sinus tachycardia as minor complication. **(15)** Contrary to the present study Pereira W et al (1978) observed major complications in 1.7% of the procedures with one death yielding a mortality 0.1%, however reporting minor complications including vasovagal reactions, fever, cardiac arrhythmias, bleeding, obstruction of airway, nausea, vomiting, pneumothorax, psychotic reactions and apnoea occurred in 6.5% of the procedures.**(20)**

Non-tuberculous conditions were diagnosed by bronchoscopic method in 32 % (14/43) of the patients during the present study. Out of these malignancy was diagnosed in 1(2.3%) patient showing bronchogenic carcinoma coexisting with pulmonary tuberculosis and suppurative lung disease in 4 patients (9.3%). This value should be included when considering overall diagnostic utility of bronchoscopy and related procedures. 9 other patients were diagnosed with different respiratory disorders like ILD, Bronchitis, Pneumonia, Acute Bronchitis, Pneumonitis, Bronchiectasis, COPD.

These results are also useful for making decision regarding management. Bronchoscopy is needed in this group of patients because a delay in diagnosis by trying anti-tuberculosis treatment may result in poor prognosis.

CONCLUSION

In conclusion, our study suggests that fibre-optic bronchoscopy can provide excellent material for diagnosis of suspected cases of pulmonary tuberculosis when smears of expectorated sputum do not reveal mycobacteria. Fibre-optic bronchoscopy combined with transbronchial lung biopsy helps in early diagnosis of smear negative pulmonary tuberculosis and can differentiation of other disorders which clinical picture mimics tuberculosis.

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