

## DIAGNOSTIC YIELD OF FIBER-OPTIC BRONCHOSCOPY IN SPUTUM SMEAR NEGATIVE AND RADIOLOGICALLY SUSPECTED OLD CASES PULMONARY TUBERCULOSIS

Sharma Shubhkaran<sup>1\*</sup>, Luhadia S.K.<sup>2</sup>, Gupta N.K.<sup>3</sup>

1.Assistant professor, Dept of T. B. and Chest, Geetanjali Medical College and Hospital, Udaipur, Rajasthan , India

2.Professor and Head, Dept of T. B. and Chest, Geetanjali Medical College and Hospital, Udaipur, Rajasthan , India

3.Professor and Head, Dept of T. B. and Chest, R.N.T Medical College and Hospital, Udaipur, Rajasthan , India

\*Email id of corresponding author- [drshubhkaran@yahoo.com](mailto:drshubhkaran@yahoo.com)

*Received: 12/09/2013*

*Revised: 17/04/2014*

*Accepted:21/04/2014*

### Abstract

**Objectives:** - To study the diagnostic yield of fiber-optic bronchoscopy in sputum smear negative under RNTCP and radiologically suspected old cases of pulmonary tuberculosis. **Material and Methods:** - The present study was carried out on 57 patients who had come with previous history and three tuberculosis sputum smears for Acid Fast Bacilli was negative under RNTCP and chest X-ray suggestive of pulmonary tuberculosis at Department of Tuberculosis and Chest Diseases, RNT Medical College, Udaipur from 1<sup>st</sup> July, 2005 to 7<sup>th</sup> July, 2006 (one year). After assessment Fiber optic bronchoscopy was performed in every case per nasal or oral to observe the changes in tracheobronchial tree and to obtain specimens. Obtained specimens were subjected to AFB smear examinations, AFB culture, Cytology examinations. Reports were obtained and analyzed accordingly. **Results:** Diagnostic yield of fiber optic bronchoscopy for tuberculosis in patients who had history of ATT (n=57). Early positive yield for tuberculosis was 8.8% whereas overall positive diagnostic yield after culture results was 12.3%. Bronchial biopsy histopathology showed fibroid granuloma in one out of 6 patients (16.7%). **Conclusion:** - In conclusion, bronchoscopic procedures was found to be relatively safe and provided a better choice for the diagnostic of pulmonary tuberculosis in the sputum smear negative under RNTCP and radiologically suspected old cases of pulmonary tuberculosis.

**Key words:** Sputum smear-negative pulmonary tuberculosis (SSN-PTB), Radiologically suspected pulmonary tuberculosis, fiber- optic bronchoscopy.

### INTRODUCTION

Tuberculosis is caused by mycobacterium tubercle bacilli, primarily affecting the lungs. (1) India accounts for nearly one-third of global

burden of tuberculosis. There are about 5 lakh deaths occur annually due to tuberculosis with incidence and prevalence being 1.5 and 3.5 million per year respectively. (2) Diagnosis of

pulmonary tuberculosis is established by detecting mycobacterium in specimen by various methods, out of which microscopic examination of sputum smear for AFB is quickest, earliest, simple, cheap, and the most practicable and effective method for diagnosis of sputum smear positive pulmonary tuberculosis (3) but unfortunately AFB microscopy lack sensitivity as compared to culture.

Many medical conditions that may be misdiagnosed as smear negative tuberculosis includes bacterial pneumonia, empyema, pulmonary nocardiosis, PCP, fungal diseases, interstitial pneumonitis, gram negative bacteriemia, bronchogenic carcinoma, lymphoma, ABPA, CHF, COPD, occupational lung diseases (e.g., silicosis), residual lesion. (fibrosis, cavitations, etc.). (4)

Radiological diagnosis is the most sensitive tool in the diagnosis of pulmonary tuberculosis but it is not a specific test and some time it is difficult to diagnosis a defaulter or repeat case of TB with radiology.

Flexible fiber-optic bronchoscopy and related procedures like bronchial aspirate/washing, B.A.L., brushing and biopsy is a tool which may give access to the diseased area and better bacteriological and histological diagnosis. Its diagnosis yield is high enough to lead to a definitive diagnosis without any serious complications and delay. Most of the previous studies done are retrospective and only new sputum smear negative cases without history of previous ATT has been taken in these studies (5)

Hence, a prospective study was undertaken to evaluate the diagnostic yield of fiber-optic

bronchoscopy in sputum smear negative under RNTCP and radiologically suspected whose have take AAT previously cases of pulmonary tuberculosis irrespective to status of previous anti-TB treatment.

## MATERIAL AND METHODS

The present study was carried out on 57 patients, at Department of Tuberculosis and Chest Diseases, RNT Medical College, Udaipur from 1<sup>st</sup> July, 2005 to 7<sup>th</sup> July, 2006 (one year).

The patients who come with previous history and three tuberculosis sputum smear for Acid Fast Bacilli was negative under RNTCP and chest X-ray suggestive of pulmonary tuberculosis were included into the study. Severity of disease was classified according to radiological extent as under criteria of National Tuberculosis Association of USA (1961).

## Procedure

After assessment selected patients were kept fasting overnight and with proper consent offered fiber-optic bronchoscopy. Fiber optic bronchoscopy was done with Pentax Broncho Fibroscope Model FB-18 P, Japan/Karl Storz 11004 BC1, Germany. Pre-medication was done with injection Atropine sulfate and injection Promethazine and 2% lidocaine (xylocaine) solution used as local anaesthetic agent during the procedure. Fiber optic bronchoscopy was performed in every case per nasal or oral, to observe the changes in tracheobronchial tree and to obtain specimens.

Obtained specimens were subjected to following examinations:

- 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 patients studied were between the age group 16-75 years. The majority of patients (87.7%) belong to the age group of 21 to 60 years. There were 50 male and 7 female patients in the study group. 61.4 % (35) of total patients under study were non-vegetarian and 38.59% (22) were vegetarian.

Out of 57 patients, 40% (23) were non-smoker, 33% (19) were smoker and 26.3% (15) were ex-smoker. 31.5% (18) patients were alcoholic and 68% (39) patients were non-alcoholic. All of 7 females were non-alcoholic. Thus the alcoholic habit was also far more in males as compared to females. The studied patients were also grouped according to domicile. 91% (52) patients belonged to the rural areas while 8 % were urban. The cough was the single most common presenting symptom (98.24%) followed by expectoration (86%), fever (71.9%), breathlessness (66%), chest pain and decrease appetite (56.14%) and haemoptysis (33.3%). Hoarseness of voice, dysphagia and

constitutional symptoms (24%), weakness, bodyache, malaise, etc. also observed.

**Table 1.** Patient characteristics

Patient characteristic	%	N=57
<b>Sex</b>		
<b>Male</b>	87.7	50
<b>Female</b>	12.2	7
<b>Mean age (years)</b>		
<b>Total</b>	43.07 ± 14.22	
<b>Male</b>	43.96 ± 14.13	
<b>Female</b>	36.71 ± 8.78	
<b>Mean duration of illness</b>	24.36 months	
<b>Symptoms</b>		
<b>Cough</b>	98.24	56
<b>Expectoration</b>	85.96	49
<b>Fever</b>	71.9	41
<b>Decrease appetite</b>	56.14	32
<b>Dyspnea</b>	66.66	38
<b>Haemoptysis</b>	33.33	19
<b>Chest pain</b>	56.14	32
<b>Other constitutional symptoms</b>	24.56	14
<b>Chest radiography</b>		
<b>Site of lesion</b>		
<b>Right</b>	35.08	20
<b>Left</b>	21.05	12
<b>Bilateral</b>	9.3	25
<b>Type of lesion</b>		
<b>Cavitary</b>	40.35	23
<b>Non cavitary</b>	59.64	34

Table no 2 shows the distribution of patients (who had taken ATT) according to gap between ATT and FOB. There was no gap between ATT and FOB in 26 (45.60%) out of 57 patients in 6 patients (10.50%) gap was less than 2 months

while in 25 patients (43.9%) the gap was 2 months or more than 2 months duration.

**Table-2: Distribution of patients who had history of ATT according to gap between ATT and FOB (n=57)**

Gap	No. of patients	Percentage
Nil	26	45.60
< 2 months	6	10.50
≥ 2 months	25	43.90
<b>Total</b>	<b>57</b>	<b>100.00</b>

Table no..3 shows diagnostic yield of fiber optic bronchoscopy for tuberculosis in patients who had history of ATT (n=57). Early positive yield for tuberculosis was 8.8% whereas overall positive diagnostic yield after culture results was 12.3%. Bronchial biopsy histopathology showed fibroid granuloma in one out of 6 patients (16.7%).

## DISCUSSION

In the era of rigid bronchoscopy, the rigidness of bronchoscope was causing more complication which limits the use of it for diagnostic purpose in tuberculosis patients. The fibre-optic bronchoscopy was a revolutionary invention for the diagnosis of lung diseases which make available different material like as bronchial aspirate, bronchial brushing, bronchial washing, bronchoalveolar lavage fluid, postbronchoscopy sputum and biopsy material for smear and culture for mycobacteria and other studies for diagnosis of pulmonary tuberculosis.

**Table-3: Diagnostic yield of fiber optic bronchoscopy for tuberculosis in patients who had history of ATT (n=57)**

Bronchoscopic procedure	Positive results		Exclusive positive	
	No.	%	No.	%
Bronchial aspirate/Washing smear	2/56	3.6	--	--
Bronchial biopsy (HPE)	1/6	16.7	1	16.7
PBS for AFB smear	3/54	5.6	1	1.85
Positive early yield for tuberculosis	5/57	8.8	--	--
Bronchial aspirate for AFB culture	3/47	6.4	2	4.3
Overall diagnostic yield for tuberculosis after culture	7/57	12.3	--	--

The present study was carried out on 57 sputum smear negative for AFB under RNTCP and radiologically suspected old cases of pulmonary tuberculosis, who had history of anti-tuberculous treatment of varying duration and their previous sputum status was not known, to evaluate diagnostic yield of fiber optic bronchoscopy.

By clinical presentation, cough (98.24%) was the most common presenting feature, followed by expectoration (86%), breathlessness (66%), chest pain (56%) and haemoptysis (33%). The physical findings such as pallor (57%), clubbing (55%), lymphadenopathy (8%) etc. were also observed. Majority of the patients (70%) had low body mass index (BMI). Clinical findings in the present study were consistent Holmes and Faulks study. (6)

Radiologically disease was minimal in 31%, moderately advanced in 44% and far advanced in 25% of the patients. Disease had bilateral distribution in 43.85 % of the patients and unilateral in 56%. Out of 57 patients, upper and mid zone involvement was found in 45% of cases and diffuse involvement in 32%, however lower-mid zone involvement was reported in 28% of cases. Cavitation was found in 40 % of cases, SPN in 2 %, bilateral hilar enlargement seen in one patient, associated pleural effusion in 2 patients, hydropneumothorax, pneumothorax and mediastinal widening found in one-one patient. Fibroproductive infiltration or exudative infiltrative shadow with or without consolidation was found in most of the patients (61%). Our findings were comparable to the findings observed by Woodring et al and Krysl et al.(7,8)

Woodring et al (1986) reported bilateral involvement in 32 - 64%, cavitation in 40-86% of cases, having multiple cavitation more common than single (54-76%) and also reporting mixed exudative and fibroproductive lesion in 79% of cases. They also found that in post-primary tuberculosis, exudative lesions (consolidation) were heterogeneous and illdefined, often involving more than one segment (88%). (7)

Bronchoscopically normal tracheobronchial tree was observed in 8.7% cases, whereas congestion/erythema, distortion of bronchi and narrowing 4 or obliteration of lumen 2 was found in 50.8%, 12.2% and 19.2% respectively. Secretions were present in 50.8%, growth seen in 10.5% and external compression in 3.5% of the patients. Widened carina and decreased movement or paralysed vocal cords were found in 14.3 % and 8.7% of the procedures

respectively. Similarly, Kulpati DDS and Heera HS (1986) reported generalized congestion/hyperemia in most of the patients.(9) Punda BN et al (1995) observed growth in 5% (5/100) and external compression in 3% (3/100) patients. (10) In contrary to present study, So SY et al (1982) found endoscopic visible lesions only in 18% of patients. (11) Purohit SD et al (1983) reported frothy secretions in 60% in the tracheobronchial tree while in the present study mucoid-mucopurulent secretions found in 68% (44/60). (12)

Early positive diagnostic yield for tuberculosis was 8.8% (5/57) and overall diagnostic yield after culture was 12.3% (7/57) in patients who had history of anti-tuberculous treatment of variable period with or without interruption before fiber optic bronchoscopic procedures. Lower yield in the latter group might be due to anti-tuberculous treatment as Kvale et al (1979) observed that 68% of patients with documented tuberculosis, one third of whom were receiving anti tuberculosis therapy, had negative bronchial wash specimens from fiber optic bronchoscopy.(13)

The smear results of bronchial aspirate were lower than the studies of Panda et al and Chan *et al* who reported it as 12% and 14% respectively.(10,14) In the present study, the bronchial aspirate culture yield for mycobacterium tuberculosis was 6.38 % (3/47) which was lower than Chan *et al* who reported the yield at 93% and higher than that of Wallace et al who reported it as 4%.(14,15) It may be because we include only old cases and other scientist include both.

Positive post bronchoscopic sputum smear results for AFB were also lower than other studies of Jaiswal AK et al (1989) who observed it as 28%. (16)

In the present study results of histopathological examination of bronchial biopsies for tuberculosis were higher than that reported by Panda BN et al and Jaiswal AK et al (10% each) but lower than So et al (1982) who observed it at 58%. Possibly reason for that they did retrospective analysis of only the proven cases. (10,16,11)

In the present study it was observed that bronchial aspirate cytology had no significant correlation with the positive bacteriology. While correlating radiological lesion and positive bacteriology it was observed that patients with bilateral lesion had more incidence of positive bacteriology as compared to unilateral lesion, whereas more positive bacteriology cases were observed among minimal and moderately advanced, non-cavitary lesion carrying patients rather than the ones carrying far advanced and cavitary lesions. This observation may be explained by the fact that the patients with far advanced, cavitary lesions are more probable of having taken ATT.

In preliminary study, it was found that bronchial brushings seldom provided positive smear, so subsequently it was omitted.

In the present study no major complication or mortality was observed, only minor complications were observed in 4 patients (transient bleeding-2 and cough-2) for which no active management was required; which is similar with studies viz. Jaiswal et al and Sarkar et al.(16,17)

The values of diagnostic yield for bronchial aspirate, post bronchoscopic sputum and bronchial biopsy cannot be compared with those reported in literature as:

1. In almost all the previous studies sputum smear examination were done under non-DOTS. There were no previous studies in which 3 sputum smear examinations for AFB were done under RNTCP.
2. In most of the previous studies only fresh (New) cases were taken into study or no information was provided regarding previous anti-tuberculous treatment status.
3. Most of the previous studies were retrospective in nature and tuberculosis proven cases were taken into consideration for analysis.

All the above mentioned factors could be the reason for high diagnostic yield in the previous studies. While in present study, patients who had 3 sputum smears negative for AFB under RNTCP and radiologically suspected cases of pulmonary tuberculosis, irrespective of previous anti-tuberculous treatment (ATT) status, were included. This could be one of the probable reason for the lower positive yield reported in the present study.

**CONCLUSION:** In conclusion, bronchoscopic procedures was found to be relatively safe and diagnostic yield for pulmonary tuberculosis was 8.8 % in the sputum smear negative under RNTCP and radiologically suspected cases of pulmonary tuberculosis.

**Funding:** No funding sources

**Conflict of interest:** None declared

**Ethical approval:** The study was approved by the institutional ethics committee

## REFERENCES

1. Sharma S.K. and Mohan A. Tuberculosis, 1<sup>st</sup> ed 2001, reprint 2004; pp. 5, 110.
2. Govt. of India. Annual Report 2001-2002, DGHS, New Delhi.
3. Dr. R. Vasantha Kumari. Sputum smear examination: A view-point. Ind. J. Tub. 1995; 42: 135-137.
4. Colebunders R and Bastian I. A review of diagnosis and treatment of smear negative Pulmonary Tuberculosis. Int. J. of Tuberc. and lung Diseases, 4(2): 97-107, 2000. IUATLD.
5. Vijayan VK, Paramasivan CN and Sankaran K. Comparison of broncho alveolar lavage fluid with sputum culture in the diagnosis of sputum smear negative pulmonary tuberculosis. Ind. J. of Tuberculosis, 1996; 43:179-182.
6. Holmes P and Faulks L. Presentation of Pulmonary tuberculosis. Aust N Z J Med, 1981 Dec; 11 (6):651-3.
7. Woodring JH, Vandiviere HM, Fried AM *et al.*, update: the radiographic features of pulmonary tuberculosis. AJR AM J Roentgenol, 1986 Mar: 146(3): 497-506.
8. Krysl J, Korzeniewska-kosela M, Muller NL and Fitz Gerald JM. Radiologic features of Pulmonary tuberculosis: an assessment of 188 cases. Can. Assoc. Radiol. J. 1994 Apr; 45(2):101-7.
9. Kulpati DDS and Heera HS. Diagnosis of smear negative pulmonary tuberculosis by flexible fiber optic bronchoscopy. Ind. J. Tub., 1986; 33:179-182.
10. Panda BN, Rajan KE, Jena J, Nema SK, Murali M and Patil AP. Diagnostic yield from flexible fiber optic bronchoscopy in sputum negative pulmonary tuberculosis cases. Ind. J. Tub., 1995; 42:207-209.
11. So SY, Lam WK, Yu DY. Rapid diagnosis of suspected pulmonary tuberculosis by fiber optic bronchoscopy. Tubercle, 1982;63(3): 195-200.
12. Purohit SD, Sisodia RS, Gupta PR, Sarkar SK and Sharma TN. Fiber optic bronchoscopy in diagnosis of smear negative pulmonary tuberculosis. Lung India, 1983; I (4):143-146.
13. Kvale PA, Johnson MC and Wroblewski DA. Diagnosis of tuberculosis; Routine cultures of Bronchial washing are not indicated. CHEST, August, 1979; 76:2,140-142.
14. Chan HS, Sun HMA, Hoheisel GB. Bronchoscopic aspiration and bronchoalveolar lavage in the diagnosis of sputum smear negative pulmonary tuberculosis. *Lung* 1990; 168: 215-20.
15. Wallace JM, Deutsch AL, Harsell JH and Moser KM. Bronchoscopy and transbrochial Biopsy in evaluation of patients with suspected active tuberculosis. The American Journal of Medicine June 1981; vol. 70:1189-1194.
16. Jaiswal AK, Kulpati DD, Jain NK and Singh MM. Role of bronchoscopy in early diagnosis of suspected smear negative cases of pulmonary tuberculosis. Ind. J. Tub., 1989; 36:233-235.
17. Sarkar SK, Sharma TN, Purohit SD, Gupta ML and Gupta PR. The diagnostic value of routine culture of bronchial washings in tuberculosis. Br. J. Dis. chest, 1982; 76:358-360.