

Yield of Acid-fast Bacilli by Direct Sputum Smear Examination with Bronchial Washings and Post-bronchoscopy Sputum Smear Examination

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Abstract

Backgrounds and Objectives: The objective of the present study is to evaluate the yield of acid-fast bacilli (AFB) by direct sputum smear examination with bronchial washings and post-bronchoscopy sputum smear examination.

Materials and Methods: This prospective study was conducted on 50 patients with suspected pulmonary tuberculosis (TB) for a period of October 2009-September 2011 at Kamineni Institute of Medical Sciences Hospital, Narketpally, Nalgonda.

Results: Out of 50 clinically suspected, sputum smear-negative cases, 19 cases were diagnosed as active pulmonary TB. Bronchial washings for AFB smear were positive in 16/50 (32%) of cases, and post-bronchoscopic sputum smear was positive in 8/50 (16%) of cases. Both bronchial washings and post-bronchoscopic sputum smear for AFB were positive in 5 (10%) cases. 3/8 additional cases are diagnosed by post-bronchoscopic sputum smear over the bronchial washings. A total yield of bronchoscopy in the diagnosis of sputum-negative pulmonary TB was 38.00%, of which bronchial washing smear samples are superior in the diagnosis and is contributed to 32%.

Conclusion: It has shown that additional yield of 38% more than direct sputum smear examination helps to initiate early treatment of TB.

Key words: Bronchial wash, Bronchoscopy, Post-bronchoscopy sputum for acid-fast bacilli, Smear negative PTB

INTRODUCTION

India has the highest burden of tuberculosis (TB) in the world and accounts for nearly one-fifth of the global burden of TB per year.¹ Evidence of pulmonary TB can be frequently obtained from sputum smear stained for *Mycobacteria*, yet TB prevalence surveys have shown that in a substantial proportion of persons with active TB sputum smear for acid-fast bacilli (AFB) bacilli negative

but culture for *Mycobacterium TB* is positive which has been observed in 22-61% of the cases.² The difficulty is compounded by the fact that the growth of *Mycobacterium TB* requires up to 8 weeks pose diagnostic problems and therapeutic dilemma to the chest physicians. Fiber-optic bronchoscopic studies provide various types of specimens (bronchial washings, bronchial lavage, bronchial biopsy, and bronchial brushings) for early diagnosis of sputum smear-negative pulmonary TB.

MATERIALS AND METHODS

Study Design

This prospective study was conducted on 50 patients with suspected pulmonary TB for a period of October 2009-September 2011 at Kamineni Institute of Medical Sciences Hospital, Narketpally.

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Data Collection

The patients involved in this study are two (spot and overnight) sputum smear-negative with clinically and radiologically suspected cases of pulmonary TB. All sputum-negative cases were subjected to bronchoscopy.

Statistical Analysis

Data were analyzed by the Statistical Package for Social Sciences Version 16.0. Numerical data were summarized by mean \pm standard deviation for continuous normal data and median \pm interquartile range for continuous non-normal data/ordinal data. Categorical data were summarized by count and percentages. The association between categorical variables was done by Chi-square test. All the $P < 0.05$ were considered as statistically significant.

RESULTS

The total number of patients involved in this study was 50, of which 32 were male patients (64%) and 18 were female patients (36%). The most common age group involved in this study was in between 15 and 30 years (42%). The youngest patient was aged 18 years, and the oldest was 72 years. Most of the patients presented to the hospital in <2 months of onset of symptoms, that is, in 42%, cough was the most common symptom, present in all the patients (100%), followed by fever (70.0%) and constitutional symptoms (64.0%). The other symptoms include expectoration (34.0%), dyspnea (26.0%), hemoptysis (14.0%), and chest pain (0.10%) (Table 1). 34 (68%) patients had unilateral lesions (right or left), and 16 (32%) had bilateral lesions. 12 (24%) had cavitary lesions, and 38 (76%) had infiltrations without cavitations on chest radiography.

The most common (Table 2) bronchoscopic finding was congestion with mild-to-moderate hyperemia with whitish plaques of variable size in between, and it observed in 41 (82%) cases. In the remaining cases, erosions and ulceration in 16 (32%), intrabronchial bleeding in 8 (16%), and intrabronchial growth in 2 (4%) were observed (Table 3). Bronchial washing smear for AFB was positive in 16/50 (32%) cases, of this predominant age group that shows more positivity belongs to 15-30 years (42.85%) followed by 31-45 years (40.0%). Post-bronchoscopic

Table 1: Symptomatic distribution of patients

Symptoms	Number of patients (%)
Cough	50 (100)
Expectoration	17 (34.0)
Fever	35 (70.0)
Dyspnoea	13 (26.0)
Hemoptysis	7 (14.0)
Chest pain	5 (10.0)
Constitutional	32 (64.0)

sputum smear for AFB was positive in 8/50 (16%) cases, of this predominant age group that shows more positivity belongs to 15-30 years (23.80%).

Bronchial washing smear for AFB was positive in 16/50 (32%) cases, post-bronchoscopic sputum smear for AFB was positive in 8/50 (16%) cases, and in 5 (10%) cases, both post bronchoscopic sputum and bronchial washings are positive (Table 4). A total yield of bronchoscopy in the diagnosis of sputum-negative pulmonary TB was 38.00%, of which bronchial washing smear samples are superior in the diagnosis and are 32%.

DISCUSSION

The WHO Expert Committee on TB recommends that patients of pulmonary TB in whom the disease has not been confirmed bacteriologically should be classified as “suspects” till the presence of AFB is demonstrated, and a patient with persistent symptoms whose sputum does not contain AFB should be followed up and anti-tubercular treatment should be given only if the diagnosed bacteriologically.

In our study, we had selected 50 patients with sputum smear negative on two occasions, of which 32 were males and 18 were females. This was comparable to the study done by Purohit *et al.*,³ wherein the sample size of 50 cases, they had 35 males and 15 females.

Out of the 50 patients in our study, 50 patients (100%) presented with cough, 17 patients (34%) had cough with

Table 2: Distribution based on bronchoscopy findings

Finding	Number of patients (%)
Congestion/hyperemia	41 (82)
Erosions, ulcerations	16 (32)
Bleeding	8 (16)
Growth	2 (04)

Table 3: Radiological distribution of patients

Radiological manifestations	n (%)
Site of lesion	
Right	21 (42.0)
Left	13 (26.0)
Bilateral	16 (32.0)
Total	50 (100)
Type of lesion	
Cavitary	
Single	9 (18.0)
Multiple	3 (06.0)
Infiltrations without cavity	
Diffuse	15 (30.0)
Localized	23 (46.0)
Total	50 (100)

Table 4: AFB yield in different age groups in 2 procedures

Age in years	Number of cases	Bronchial washings for AFB		Post-bronchoscopy sputum for AFB	
		Positive (%)	Negative (%)	Positive (%)	Negative (%)
15-30	21	9 (42.85)	12 (57.14)	5 (23.80)	16 (76.19)
31-45	14	4 (28.57)	10 (71.42)	2 (14.24)	12 (85.71)
46-60	9	2 (22.22)	7 (77.77)	1 (11.11)	8 (88.88)
>60	6	1 (20.00)	5 (83.33)		6 (100)
Total	50	16 (32)	34 (68)	8 (16)	42 (84)

AFB: Acid-fast bacilli

expectoration, 35 (70%) patients had fever, 7 patients (14%) had hemoptysis, and 5 patients (10%) presented with chest pain. These patient characteristics were similar to the study done by Kulpati and Heera.⁴

In our study, the bronchoalveolar lavage fluid smears were taken in all 50 cases and were positive for AFB in 16 (32%) patients. In the previous studies, it varied from 7.5% to 57.1% in studies done by Charoenratanakul *et al.*⁵ and Malekmohammad *et al.*,⁶ respectively.

In our study, post-bronchoscopy sputums were collected on 3 occasions and subjected to smear for AFB yielding 8% (16/50). This was comparable to the 23% positivity (7 out of 30 cases) in post-bronchoscopy sputum studied by Wongthim *et al.*⁷ Kulpati *et al.* also noted 25% positivity (5 out of 20 cases) by phosphate-buffered saline culture, and 26% AFB smear positivity was noted by Purohit *et al.*³ During our study, we were able to diagnose cases out of 50 cases (38%) by combining 2 procedures.

CONCLUSION

The study concludes that flexible fiber-optic bronchoscopy along with post-bronchoscopy sputum examination is a useful tool in early diagnosis of pulmonary TB in sputum

smear-negative patients. Bronchoscopy reveals a higher bacteriological confirmation of diagnosis in patients with strong clinical and radiological evidence suggestive of pulmonary TB. Thus, bronchoscopic-aided procedures should be undertaken in sputum smear-negative pulmonary TB patients with a high index of clinicoradiological suspicion.

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