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Original Research Article

"A STUDY ON ROLE OF FIBRE OPTIC BRONCHOSCOPY IN SPUTUM SMEAR NEGATIVE PULMONARY TUBERCULOSIS"

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ABSTRACT:

Background: TUBERCULOSIS (TB) is one of the oldest and deadliest disease in the world and also major health problem, archaeological evidences from ancient civilizations have shown the existence of tuberculosis in the prehistoric era. Even though effective chemotherapy for tuberculosis has been available for decades, TB still remains a public health challenge all over the world. Even though the disease is curable, 2million deaths occurring every year that is some 5000 deaths occurring everyday[1].

AIM: To study the role of Fibreoptic bronchoscopy in sputum Smear Negative Tuberculosis.

Material & Methods: Study Design: A prospective observational study. **Study Period:**Feb. 2020 – Jan.2021 (1 year).**Study area:** The study was done at department of Pulmonary Medicine, Government Medical College, Ananthapur, Andhra Pradesh. **Study population:** Patients who were attending the Dept. of pulmonary medicine with symptoms of TB.**Sample size:** 50 **Sampling method:** Simple Random sampling method. **Study tools and Data collection procedure:** Patients were selected after screening of inclusion and exclusion criteria and taken up for the bronchoscopy. Procedure was carried out in patients with nil orally for 4 to 6 hours. Written consent was obtained from the patients. Procedure was explained to the patient in his own language. Patients were pre medicated 30 mints prior to bronchoscopy with 0.6 mg Atropine and Nebulization was done with 4% Xylocaine via ultrasonic nebulizer. Bronchoscopy was carried out under local anesthesia, 4%lignocaine was sprayed to both nostrils and mouth with 26 G syringe. OLYMPUS BF type E2 bronchoscope was used. **STATISTICAL METHODS:** Data will be analyzed using SPSS V 21.0. Continuous data will be summarized as Mean with SD or Median with Inter Quartile range. Categorical data will be summarized as frequency with percentage.

Observations & Results: A total of 50 patients were studied of which 32(64%) were males and 18(36%) were females. Most of the patients presented to hospital in less than 2 months of onset of symptoms, that is in42.0%. Post bronchoscopic sputum smear for AFB was positive

in 8/50 (16%) cases, out of this predominant age group that shows more positivity belongs to 15 – 30 years (23.80%).

CONCLUSION:
This study proved that Fiberoptic Bronchoscopy though little cost effective, is an effective tool in the diagnosis of sputum negative pulmonary tuberculosis. It has shown that additional yield of 38% more than direct sputum smear examination, which helps to initiate early treatment of tuberculosis to cut off the epidemiological cycle as we know one sputum positive case can infect 15 cases.

Key words: Fiberoptic Bronchoscopy, sputum negative pulmonary tuberculosis, BRONCHIAL WASHINGS

INTRODUCTION:

TUBERCULOSIS (TB) is one of the oldest and deadliest disease in the world and also major health problem, archaeological evidences from ancient civilizations have shown the existence of tuberculosis in the prehistoric era. Even though effective chemotherapy for tuberculosis has been available for decades, TB still remains a public health challenge all over the world. Even though the disease is curable, 2million deaths occurring every year that is some 5000 deaths occurring everyday[1].

Notifications on TB cases have stabilized in recent years. About 64% of the Estimated 10.4 million people who developed TB were notified as newly diagnosed cases[2]. Over the years not only the medical implications but also the social and economic impact of tuberculosis has been enormous[3].

Poverty, overcrowding and migration, prevalence of diabetes, malignancyhave contributed for significant rise of TB cases in HIV endemic areas. To help and address the situation, a Global strategy called DOTS was introduced[4].The review resulted in the genesis of Revised National Tuberculosis Control Programme (RNTCP). The programme tested as a pilot project in 1993 was found to be effective. The expansionof theprogramme was started in 1998.The programme is based on the WHO strategy of Directly Observed Treatment Short course (DOTS).

The initial diagnostic approach to suspected case of pulmonary tuberculosis is to demonstrate mycobacterium tuberculosis in stained smears of expectorated sputum. In most of the tuberculosis centers even after meticulous search the bacteriological positive yield from sputum is around 15-50% and large portion remain negative in spite of clinical profile and radiological lesions being consistent with diagnosis of Pulmonary tuberculosis. Those sputum smear negative cases are undiagnosed and also under treated or lately treated in advanced stages. Even culture of sputum may be non-contributory. The difficulty is further compounded by the fact that culture of mycobacterium requires6-8wks.[5]

Early diagnosis of pulmonary tuberculosis prevents progression of disease, morbidity, spread of disease and permanent damage by fibrosis. Culture of sputum for acid fast bacilli takes long time and a reliable serological test is not at available. So in such condition bronchoscopy has been tried for rapid diagnosis of tuberculosis in smear negative cases.

Flexible fiberoptic bronchoscopy and bronchial washing analysis have an extensive diagnostic potential in pulmonary tuberculosis. The fiberoptic bronchoscopy with bronchial washing analysis for AFB including culture for mycobacterium tuberculosis has significant role to establish the diagnosis in those cases where the extensive search for AFB in expectorated sputum has repeatedly failed or those cases where sputum expectoration is absent or the sputum induction has failed.

The present study was undertaken to make a definitive diagnosis of tuberculosis by post bronchoscopic sputum to compare the yield of tuberculosis.

AIM: To study the role of Fibreoptic bronchoscopy in sputum Smear Negative Tuberculosis.

Material & Methods:

Study Design: A prospective observational study.

Study area: The study was done at Pulmonary Medicine department, Government Medical College, Ananthapur, Andhra Pradesh.

Study Period: Feb. 2020 – Jan.2021(1 year).

Study population: Patients who were attending the dept.of.pulmonary medicine with symptoms of TB.

Sample size:50

Sampling method: Simple Random sampling method.

Inclusion Criteria:

1.Age is more than 15years.

2.Both sexes are included.

3.Clinically suspected cases of pulmonary tuberculosis with cough of more than 2 weeks, fever, loss of appetite &weight

4.Two sputum smear negative for acid fast bacilli (spot, overnight)

5.Chest X-ray suspicion of pulmonary tuberculosis.

Exclusion Criteria:

1. Positive Sputum smear cases.

2.Patients with history of ATT for more than 1 month / Defaulters / Failures /Relapses.

3.Children with pulmonary tuberculosis less than 15 years of age.

4.Immuno compromised individuals .

5.Patients with severely Hypoxic/Dyspnoeic.

6. Patients with resent history of myocardial infarction/arrhythmias

7. Patients who are not cooperative for bronchoscopy

Ethical consideration: Institutional Ethical committee permission was taken prior to the commencement of the study.

Study tools and Data collection procedure:

Patients were selected after screening of inclusion and exclusion criteria and taken up for the bronchoscopy. Procedure was carried out in patients with nil orally for 4 to 6 hours. Written consent was obtained from the patients. Procedure was explained to the patient in his own language. Patients were pre medicated 30 mints prior to bronchoscopy with 0.6 mg Atropine and Nebulization was done with 4% Xylocaine via ultrasonic nebulizer. Bronchoscopy was carried out under local anesthesia, 4%lignocaine was sprayed to both nostrils and mouth with 26 G syringe. OLYMPUS BF type E2 bronchoscope was used. The tip of the bronchoscope was lubricated with lignocaine jelly and was advanced into the nostril under direct vision along the floor of the nose of the widest visible opening between the turbinates and lateral wall of the nostril. Patients who had narrow nostril, to pass the bronchoscope this procedure was done through oral route by asking to hold bite block between the teeth. The instrument was advanced till glottis and larynx were in view, the movement of vocal cord with respiration was observed and 2% lignocaine was pushed through the suction channel of bronchoscope to anesthetize the vocal cords.

The tip of bronchoscope was centered with regard to vocal cords and was quickly advanced through the opening. Once crossed the vocal cords 2ml of 2% lignocaine was given and bronchoscope was passed into the normal bronchial tree first and then on the abnormal side. If bilateral lesion were present bronchoscope was maneuvered first on the right side, scope was maneuvered up to sub segmental bronchi and observed for mucosal irregularity, ulcerations, granulations and any growth. Bronchial washing was performed by instillation of 0.9% isotonic saline at room temperature through the internal channel of FOB and aspirated into a trap connected to suction tubing. Usually 20ml of fluid was instilled with each washing and about 5-10ml of fluid was retrieved in the suction trap. While doing procedure it is important to observe any bronchospasm, oxygensaturation, pulse rate, blood pressure by pulse oximeter. If necessary oxygen was given during the procedure.

After processing the collected sample was sent for investigations. After the procedure patient was observed for any shortness of breath, fever, and haemoptysis or chest pain.

The first sputum sample after bronchoscopy (post bronchoscopic sputum) was collected and sent for analysis along with bronchial washings. About 10 ml of bronchial washings was sent for cytology/AFB in a sterile bottle. The fluid was transferred in a silicon test tube and centrifuged at 2000 rpm for 10 minutes. Smear was prepared from the sediment and examined after Ziehl- NeelsenStaining.

STATISTICAL METHODS:

Data will be analyzed using SPSS V 21.0. Continuous data will be summarized as Mean with SD or Median with Inter Quartile range. Categorical data will be summarized as frequency with percentage.

Observations & Results:

Table 1: Sex distribution in the study population

Gender	Frequency	Percentage
Males	32	64%
Females	18	36%
Total	25	100%

A total of 50patients were studied of which 32(64%) were males and 18(36%) were females.

AGE IN YEARS	NUMBER OFCASES"n"(%)
15-30	21(42.0)
31-45	14(28.0)
46-60	9(18.0)
>60	6(12.0)

Table 2: Age distribution in the study population

The most common age group involved in this study was in between 15-30 years (42%).The youngest patient was aged 18 years and the oldest was 72 years.

Table 3: Duration of symptoms in the study population

DURATION (months)	NUMBER OF PATIENTS "n"	PERCENTAGE (%)
<2month	21	42.0
2-6months	17	34.0
>6months	12	24.0

Most of the patients presented to hospital in less than 2 months of onset of symptoms, that is in42.0%.

TABLE 4: BRONCHOSCOPICFINDINGS IN THE STUDY POPULATION

FINDING	NUMBER OF PATIENTS (n)	PERCENTAGE (%)
Congestion/Hyperemia	41	82.0%
Erosions, ulcerations	16	32.0%
Bleeding	8	16.0%
Growth	2	4.0%

The most common 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 & ulceration in 16(32%), intra bronchial bleeding 8(16%) and intra bronchial growth 2(4%) was observed.

Table 5: POST BRONCHOSCOPY SPUTUMRESULTS IN THE STUDY POPULATION

Age in years	Number of cases	Post bronchoscopy sputum for AFB	
		Positive(%)	Negative(%)
15-30	21	5(23.80)	16(76.19)
31-45	14	2(14.24)	12(85.71)
46-60	9	1(11.11)	8(88.88)
>60	6	-	6(100)
Total	50	8(16.00)	42(84.00)

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

Table 6: POST BRONCHOSCOPIC SPUTUM SMEAR EXAMINATION AND BRONCHIAL WASHINGS

Total no of smear negative pulmonary tuberculosis cases(N)	Post bronchoscopic washing positive cases	Post bronchoscopic sputum smear positive cases	Bothbronchial washings& post bronchoscopic sputumsmear positivecases	Overall yield of positivity in smear negative cases (%)
50	16(32%)	8(16%)	5(10%)	19(38.00)

Bronchial washings smear for AFB was positive in 16/50 (32%) cases, and 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.

YIELD OF BRONCHOSCOPY:

And the overall yield of bronchoscopy in sputum smear negative pulmonary tuberculosisis:- 16+8-5=19

And the percentage of overall yield is: - 19/50*100=38

Discussion:

The initial diagnostic approach to suspected case of pulmonary tuberculosis is to demonstrate mycobacterium tuberculosis in stained smears of expectorated sputum. However, in a large proportion of patients, repeated sputum smear examination for acid fast bacilli may remain negative inspite of clinical profile and radiological lesion being consistent with the diagnosis of pulmonary tuberculosis. Even the culture of sputum may be non-contributory; the difficulty is further compounded by the fact that culture of mycobacterium requires 6-8weeks.

Various methods have been investigated for isolating Mycobacteria more efficiently. In the earlier days of rigid bronchoscopy patients with tuberculosis were seldom subjected to bronchoscopy for diagnostic purpose. With advent of fiberoptic bronchoscopy, smear and culture for Mycobacteria from the bronchial aspirate,Bronchial brushings, Bronchial washing, Bronchoalveolar lavage fluid, Post bronchoscopic sputum and biopsy material have all been used in various studies for diagnosing pulmonary tuberculosis.

In our study fiberoptic bronchoscopy was done in 50 patients presented with typical clinical and radiological features of pulmonary tuberculosis who were sputum smear negative on both the samples and fulfilling other inclusion and exclusioncriteria.

Kulpati et al[5], conducted a study in 20 patients, in which 12(60%) patients were male and remaining 8 (40%) were female. A similar study was conducted by Arshad AltafBachh et al[6], in 2010, in 75 patients, in which 50 (66.66%) patients were male and remaining were female (25/75, 33.33). In our present study conducted in 50 patients,64%(32/50) male patients and 36%(18/50) were female patients.

In Purohhit et al[7], nearly half of the patients had illness for less than 2 months and only 30% had illness of six months duration. In Arshad AltafBachh[6] et al study,68 of patients had developed symptoms in less than 2 months only. In present study 21/50 (42%) patients had symptoms of less than 2 months, followed by 17/50 (34%) patients had symptoms 2-6 months duration.

In present study 82% of cases showed with hyperemia of bronchial mucosa on bronchoscopy, 32% of cases had erosion and ulceration. In Kulpati et al[5] observed coating of mucosa of involving segment with yellowish white secretions in almost all patients and also revealed mild to moderate hyperemia after bronchial wash. Intra bronchial growth and erosion, ulceration was seen in 30% and 25%respectively. In Arshad AltafBachh et al[6] study congestion, hyperemia was found in 70.7% of cases followed by ulceration in 32% and intrabronchial growth in 4% of cases.

In Arshad AltafBachh et al[6] study, the overall yield of bronchoscopy in sputum smear negative PTB was 83.33% (50/60, bronchial washings for AFB culture was positive in 65%,smear in 35%,post bronchoscopy sputum smear positivity in18.33%). In Kulpati et al[5] study, the overall yield of bronchoscopy was 60.60%.(bronchial washing smear positive in 40% of cases and culture positive in 65% of cases, post bronchoscopy sputum smear positivity 15% and culture positive in25%).

In Arshad AlthafBachh et al[6] study, the overall yield of bronchoscopy was 83.33% (Bronchial washings smear for acid-fast bacilli (AFB) was positive in 21 patients(35%) , while culture of bronchial washings was positive in 39 (65%) patients.)

In present study the overall yield of bronchoscopy in sputum smear negative PTB was 38% (bronchial washings positive in 32% and post bronchoscopy sputum was positive in 16% of cases. This disparity compared with other studies, may be because only bronchial washings and post bronchoscopic sputum smear has been done but culture was not done in this study. In their study culture, Transbronchial biopsy was responsible for higher yield.

CONCLUSION:

This study proved that Fiberoptic Bronchoscopy though little cost effective, is an effective tool in the diagnosis of sputum negative pulmonary tuberculosis. It has shown that additional yield of 38% more than direct sputum smear examination, which helps to initiate early treatment of tuberculosis to cut off the epidemiological cycle as we know one sputum positive case can infect 15 cases. So prevention of these cases will neutralize the cost of bronchoscopy. Therefore this procedure is useful in the diagnosis of sputum negative pulmonary tuberculosis.

REFERENCES:

1. Global tuberculosis control: epidemiology, strategy, financing. Geneva, switzerland:

woridhealth organization. WHO/HTM/TB/2015.411WHO/HTM/TB/2015.411.

2. Global Tuberculosis Report. Geneva, World Health, 2015(WHO/HTM/TB/2015.13).

3. Fanning A. Tuberculosis: Extra pulmonary disease. CMAJ 1999;160:1597- 603.

4. WHO an expanded DOTS framework for effective tuberculosis control. WHO/CDS/TB/2002;297:4-5.

5. Kulpati DDS, Heera HS. Diagnosis of smear negative pulmonary tuberculosis by flexible fiberoptic bronchoscopy. IndianJ.Tuberc.1986;33:179-82.

6. ArahadAltafBachh et, Fiber optic bronchoscopy play a significant role in the diagnosing sputum smear negative pulmonary tuberculosis. Lung India;2010,220- 225.

7. PurohitSD, Sisodia RS, Gupta PR et al: fiberoptic bronchoscopy in the diagnosis of smear negative pulmonary tuberculosis. Lung India1983;1:143-146.

8. Panda BN, Rajan KE, Jena J, Nema SK, Patil AP. Diagnostic yield from flexible fiberopticbronchoscopy in sputum smear negative pulmonary tuberculosis cases. Ind J Tub1995;42:207-209.

9. Mc Williams T, Wells AU, Harrison AC, et al. Induced sputum and bronchoscopy in the diagnosis of pulmonary tuberculosis. Thorax2002;57:1010-1014

10.SaifQuaiser,Anil Agarwal et al Fiberoptic bronchoscopy, as a valuable diagnostic option in sputum negative pulmonary tuberculosis: A prospective study Int J Appl Basic Med Res. 2012 Jul-Dec;2(2):123–127.

11. Adesh Kuma et al Role of flexible fiberoptic bronchoscopy in suspected sputum smear negative pulmonary tuberculosis cases at microscopy centre under RNTCP Int J Med SciPublic Health.2014; 3(1):31-34.

12. Chan CH, Chan RC, Arnold M, et al. Bronchoscopy and tuberculostearic acid assay in the diagnosis of sputum smear negative pulmonary tuberculosis: a prospective study with the addition of transbronchial biopsy. O J Med 1992;82:15-23.

13. S Jalleh RD, Kuppuswamy I, Parameswary V, et al, Fiberoptic bronchoscopy in the diagnosis of pulmonary tuberculosis a Malasian experience. Singapore Med J.1993;34:55-57

14. Anderson C, Inhaber N, MenziesD.Comparison of sputum induction with fiberoptic bronchoscopy in the diagnosis of tuberculosis. Am J RespirCrit Care Med 1995;152:1570-1574.

15. NavioP,JimenezD,Perez-Rodriguez E. et al. Atypical location of pulmonary tuberculosis and the influence of the roentgenographic patterns and sample type in its diagnosis. Respiration1997;64:296-297.