LOWER LUNG FIELD TUBERCULOSIS - A CLINICAL STUDY

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ABSTRACT: Lower Lung field tuberculosis (LLFT) is an atypical presentation of tuberculosis which often poses difficulty in making diagnosis. This study was carried out at department of Tuberculosis and chest diseases RMCH & RC Kanpur from October 2012 to June 2013 to study the prevalence and clinical presentation of LLFT. Diagnosed patients of pulmonary tuberculosis with lesions below an arbitrary line across the hila of their chest skiagram, considered LLFT, were included in this study. Routine laboratory testing including sputum for acid fast bacillus (AFB), HIV screening, blood sugar, serum creatinine, liver function tests were performed in each patients. Out of a total of 574 patients with pulmonary tuberculosis 9.4% had lower lung field tuberculosis. It was more common in elderly patients and more in female as compared to male. Unilateral disease and right side involvement was more common than left. Cavitations and consolidation were the chief radiological presentations. To conclude, LLFT is fairly common in India. It is more common in younger females, HIV infection and diabetes mellitus increase the risk of LLFT. Clinical presentation is similar to that of classical upper lung field tuberculosis and short course chemotherapy is equally effective as in classical upper zonal disease.

KEY WORDS: Tuberculosis, Lower lung field tuberculosis, Mycobacterium tuberculosis, Acid fast bacilli

INTRODUCTION: Tuberculosis is one of the oldest diseases known to mankind. Despite availability of specific and potent anti tubercular drugs, it continues to be one of the most prevalent infections in the world. According to the World Health Organization (WHO) and International Union Against Tuberculosis and Lung Disease (IUALTD) every year 8 million new cases occur with 3 million of them being contagious and about one third of the world's population is infected with Mycobacterium tuberculosis.² It has been estimated that in India every year 1.8 million person develop the disease, of which about 0.8 million are infectious and, until recently 0.4 million died of it, approximately 1000 everyday¹.

The classic definition of post-primary pulmonary tuberculosis is a disease located predominantly in the upper lobes. Since Laennec's era lower lung field tuberculosis was considered a rarity. In fact Laennec himself opined that tuberculosis hardly developed in the middle or lower lobes of the lungs.³ In 1886, Kidd stated that "the apex of lower lobe is very prone to tuberculosis and may be attacked prior to the apex of the upper lobe"⁴ Fowler in 1888 stated that "the upper and posterior part of the lower lobe is a spot only second in point of vulnerability to the apex itself"⁵ Except these two earliest reports, the literature is almost silent over the occurrence of LLFT.

It is important to know the meaning of lower lung field tuberculosis. Previously the term 'basal tuberculosis' was frequently used^{4,5}. However with the advent of lateral radiographs of the chest 'lower lobe tuberculosis' has been used by some authors. The lower lung field is defined as that

area on the postero-anterior (PA) chest radiograph, which extends below an imaginary horizontal line traced across the hila and includes the para hilar regions.⁹

Prevalence of LLFT varies from 0.003 to 17% in various studies.⁶ Some studies reported its prevalence as much as 18.3% in their study⁷. Prevalence of LLFT in studies reported from India has been observed to be higher than that in western studies. This may be due to the fact that majority of Indians tie their clothes e.g. women their sarees and men their loin cloth tightly around the upper abdomen and this results in impaired movement of diaphragm.⁸ LLFT appears to be more common in patients having diabetes mellitus, renal diseases, hepatic disease, silicosis, kyphoscoliosis and persons receiving corticosteroids.^{9,10,11,12}

Since pulmonary tuberculosis commonly affects the upper lung fields and LLFT is not very common. One should be cautious that sometimes signs and symptoms of LLFT are similar to other non-tubercular lung diseases, therefore most of the times making an accurate diagnosis is very difficult in such cases. HIV epidemic has also considerably increased the incidence of smear negative middle and lower lung field tuberculosis due to lower bacillary load.^{13,14} Moreover, As we know that early diagnosis and prompt treatment plays an important role in the prevention and control of tuberculosis, it is very necessary to know various presentations of this disease. In view of the foregoing considerations, the present clinical study was conducted to determine the incidence of lower lung field tuberculosis in various clinical settings.

MATERIAL AND METHODS: This retrospective study was carried out at the department of tuberculosis and chest diseases, RMCH & RC Kanpur. A total of 574 diagnosed patients of pulmonary tuberculosis of both the sexes and various age groups were included in this study. Diagnosis of pulmonary tuberculosis was made by detailed clinical history, clinical examination, X-ray chest PA view and lateral view as and when necessary, sputum for acid fast bacilli (AFB) examination by Ziehl-Neelsen method and culture on Lowenstein Jensen (LJ) media. Those patients, whose sputum was negative for AFB by direct smear on three consecutive days, and also by culture, were diagnosed as cases of sputum negative pulmonary tuberculosis on the basis of suggestive clinical and radiological findings. An arbitrary horizontal line across the hila in a PA chest film was taken as the dividing line between upper and lower lung fields.⁹ Para hilar regions were considered in lower lung fields. Lower lung fields included middle lobe and the lingula in addition to the lower lobes.^{9,15}

In the study pediatric patients and patients with concomitant involvement of both upper and lower lung fields were excluded. Patients were also assessed for associated diseases like diabetes mellitus, renal diseases, hepatic diseases, HIV infection and chest deformities. Chi-square test was used to find out significant association between variables in present study.

RESULTS: Out of total 574 patients with pulmonary tuberculosis, 54 (9.4%) had lower lung field tuberculosis (LLFT). Among females ((12%) prevalence of LLFT was significantly more common as compared to male patients (7.0%) ($X^2=4.16$, $P<0.05$) [Table 1]

The highest incidence of LLFT (38.8%) was observed in age group of 25-34 years. In 15-24 years age group female patients had higher incidence (24.2%) than in male patients (14.2%) [Table 2]

In HIV infected persons, incidence was higher than in non HIV-infected persons. Two out of 6 HIV infected patients (33.33%) of pulmonary tuberculosis had lower lung field tuberculosis.

Similarly among diabetic patients (n = 17) had high incidence of lower lung field tuberculosis in 3 (17.64%) patients than in non-diabetic patients (9.15%).

Most common clinical features in lower lung field pulmonary tuberculosis was cough, with or without expectoration (85.18% patients) followed by fever, weight loss (75.92% patients), anorexia (64.81% patients) and hemoptysis (16.66.7% patients). In diabetic patients, clinical presentation of upper and lower lung field tuberculosis was almost similar.

Most common radiological presentation of LLFT was cavity in 23 (42.59%) patients followed by nodular opacities in 17 (31.48%) patients and consolidation in 14(25.92%) patients. 14 (60.86%) patients had single cavity and 9 (39.13%) had multiple cavities. Cavitation was less common in HIV infected patients. In these, nodular opacities were more common. In diabetic patients, consolidation was more common than in non-diabetic patients. Right lung was more frequently affected in patients.

Table.1: Gender wise distribution of patients of LLFT

Sex	Patients having Classical TB	Patients having LLFT	Total cases of TB
Male	278 (92.9%)	21 (7.0%)	299
Female	242 (88.0%)	33 (12.0%)	275
Total	520 (90.6%)	54 (9.4%)	574

((X² = 4.16; df=1, p < 0.05))

Table. 2: Age wise distribution of patients of LLFT

Age Groups	Total Patients	15-24	25-34	35-44	45-54	55-65	65 and above
Male	21	3(14.2%)	9(42.8%)	4(19.0%)	2(9.5%)	2(9.5%)	1(4.7%)
Female	33	8(24.2%)	12 (36.3%)	5(15.1%)	5(15.1%)	2(6.0%)	1(3.0%)
Total	54	11(20.3%)	21(38.8%)	9(16.6%)	7(12.9%)	4(7.4%)	2(3.7%)

Table.3: Comorbid conditions

Diseases	No of patients having pulmonary TB	Patients having LLFT	%
Diabetes mellitus	17	3	17.64
Hepatic Disease	6	1	16.66
Renal Diseases	5	1	20
Kyphoscoliosis	11	3	27.27
Chronic steroid intake	12	2	16.66
Silicosis	1	0	0
HIV/AIDS	6	2	33.33

Table.4: Clinical Presentations

Symptoms	No of patients	%
Cough	46	85.18
Fever	41	75.92
Chest pain	6	11.11
Hemoptysis	9	16.66
Weight loss	41	75.92
Breathlessness	6	11.11
Anorexia	35	64.81

Table.5: Comparison of sputum positivity for AFB in Upper and Lower Lung Field Tuberculosis

Type of Tuberculosis	Total Patients	Sputum Positivity	Percentage
Classic Upper Zone Tuberculosis	520	28	53.8%
Lower Lung Field Tuberculosis	54	22	40.7%

DISCUSSION: As we know that there is great variation in the incidence of LLFT in the literature.⁶In present study we observed an incidence of 9.4%. The variation in the reported incidences may be due to variation or confusion in terminology used, such as basal, lower lobe, or lower lung field tuberculosis.¹⁶ HIV/AIDS epidemic has also caused an increase in the incidence of LLFT. Most of the studies in our country including present study showed female predominance^{15, 17}. This may be explained on the hypothesis that females have costal type of respiration which results in poor aeration of lower lobe and higher chances of tuberculosis.^{18,19} In our study, majority of the patients (38.88%) were in the age group of 25-34 years which was followed by 15-24 years age group (20.3%). Many other studies had also reported similar figures.^{6,15,16} In the age group of 15-24 years, we observed a significantly high (24.2%) incidence in females than in males (14.2%). This higher incidence of LLFT in females in younger age group may be attributed to early pregnancies²⁰.

In HIV infected persons, radiological presentation of tuberculosis depends upon level of extent of immunodeficiency. As the immunodeficiency progresses, more and more cases having mid- and lower lung zone tuberculosis are encountered. ^{21,22}In our study, 2 (33.33%) out of 6 HIV infected pulmonary tuberculosis patients were found to have lower lung field tuberculosis. An Indian study also reported mid and lower lung field tuberculosis in more than 50% of HIV infected cases.²³

Diabetes mellitus was associated in 17 (2.96%) of pulmonary tuberculosis patients in our study. Out of these, 3 cases (17.64%) had lower lung field tuberculosis. Few other studies had also reported high incidence of lower lung field tuberculosis in diabetics.^{9,17,20} Thus our observations in HIV infected and diabetic patients were consistent with previous studies.

The reported incidence of sputum positivity for AFB was higher in lower lung field tuberculosis as compared to all the cases of pulmonary tuberculosis.²⁰ We also observed significantly higher positivity (53.8%) than in classical upper lung field tuberculosis as shown in table.5 (40.7%). Higher bacillary load due to pooling of mucous in lower lung field because of less efficient expectoration may be attributed to higher AFB positivity.²⁰

All the patients were treated according to WHO guidelines²⁴. Success rate of more than 98% was similar to that in classical upper lung field tuberculosis. In conclusion, lower lung field tuberculosis is quite common entity and should be looked for in HIV infected persons, diabetics, and young women having lower lung field lesions. Sputum for AFB offers the easiest way of diagnosis. The condition is similar to the adult type of apical pulmonary tuberculosis in all aspects, except in HIV infected persons where weight loss is the prominent symptom and cavitation is less common. Short course chemotherapy is equally effective in this condition as in classical pulmonary tuberculosis.

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