

Original Article

Chest Radiographic Findings in Primary Pulmonary Tuberculosis

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ABSTRACT:

Background: The study was conducted to describe the radiographic findings of primary pulmonary tuberculosis (TB) in previously healthy adolescent patients. **Materials and Methods:** The chest radiographs from 100 subjects with identical strains of TB had been analysed by 2 independent examiners. Lesions of nodule(s), consolidation, or cavitation in the upper lung zones were classified as typical TB. Mediastinal lymph node enlargement; lesions of nodule(s), consolidation, or cavitation in lower lung zones; or pleural effusion were classified as atypical TB. **Results:** Of the 100 patients that underwent chest radiographs, three had normal chest radiographs. Cavitory lesions were present in 71(71%) students. Pleural effusion was not observed in any patient, nor was mediastinal lymph node enlargement. Hilar lymph node enlargement was seen in only 11 subjects (11%). Lesions with upper lung zone predominance were observed in 69 (69%) patients and lesions with lower lung zone predominance were observed in 27 (27%) patients. Remaining 19(19%) patients had lesions in both upper and lower lung zones. Bilateral involvement of lung lesions was observed in 11(11%) patients. Overall, 42 (42%) students had the typical form of reactivation TB and 21 (21%) had TB lesions of the atypical form, based on chest radiograph findings. **Conclusion:** Upper lung lesions, which were traditionally assumed to be radiographic indications of reactivation pulmonary TB by remote infection, are the most frequent radiographic findings in primary pulmonary TB by recent infection in previously healthy adolescents.

Keywords: Adolescent, Mycobacterium tuberculosis, Pulmonary tuberculosis, Thoracic radiography

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INTRODUCTION

Pulmonary tuberculosis (TB) has been classified into primary and reactivation (post-primary) forms. In about 5% of individuals infected by Mycobacterium tuberculosis (*M. tuberculosis*), the infection progresses to active disease within two years after infection. This progressive primary TB is considered to occur typically in childhood. An additional 5% develop active disease at some later point in their lives, and this reactivation TB is considered to occur typically in adults.^{1,2}

Traditionally, it has been thought that the radiographic manifestations of primary TB infection are distinct from those of reactivation TB. Mediastinal lymph node enlargement, lower lobe lesions, and pleural effusions are considered to be characteristics of primary TB infection, whereas upper lobe lesions, cavitation, and fibrosis are considered to be typical of reactivation TB.³ However, recent studies using genotyping methods for *M. tuberculosis* isolates have shown that the radiographic features are often similar in patients who apparently have primary disease by recent infection and those who have reactivation TB by remote infection.⁴⁻⁶ Hence, this study was conducted to evaluate the radiographic findings of

primary pulmonary TB in previously healthy adolescents.

MATERIAL AND METHODS

Restrictions fragment length polymorphism analysis has been performed on the chest radiographs of 100 individuals who shared the same TB strains. Typical TB was defined as nodular, consolidation, or cavitation lesions in the upper lung zones. Atypical TB was defined as lesions with nodule, consolidation, or cavitation in the lower lung zones, as well as pleural effusion. In the first grade of middle or high school for every participant in our study, a chest radiography examination was also performed. We classified the recent infection identified by RFLP analysis as primary TB because all of these students were previously healthy and had normal chest radiographs at their previous student medical examinations.

RESULTS

Of the 100 patients that underwent chest radiographs, three had normal chest radiographs. Cavitory lesions were present in 71(71%) students. Pleural effusion was not observed in any patient, nor was mediastinal lymph node enlargement. Hilar lymph node enlargement was seen in only 11 subjects (11%).

Lesions with upper lung zone predominance were observed in 69 (69%) patients and lesions with lower lung zone predominance were observed in 27 (27%) patients. Remaining 19(19%) patients had lesions in both upper and lower lung zones. Bilateral

involvement of lung lesions was observed in 11(11%) patients. Overall, 42 (42%) students had the typical form of reactivation TB and 21 (21%) had TB lesions of the atypical form, based on chest radiograph findings.

Table 1: Demonstrates summarized abnormal chest radiographic findings in remaining 100 subjects

Variables	Number of subjects
Small nodules	83
Large nodules	79
Cavity	71
Consolidation	25
Hilar lymph node enlargement	11
Mediastinal lymph node enlargement	00
Pleural effusion	00

DISCUSSION

Primary TB has been considered to be mainly a disease of infancy and childhood.⁷⁻¹⁰ The most common radiographic abnormalities of primary TB in infancy and childhood are intra-thoracic lymph node enlargement, pleural effusion, and lower lobe lung lesions. Primary TB can also occur in adults and hence a shift toward delayed presentation in adults may be related to a decrease in childhood exposure and an increasing number of immunocompromised hosts. Primary tuberculosis in adolescents and adults tends to manifest itself as lung parenchymal lesions in the upper lobes or superior segments of the lower lobes.¹¹⁻¹³ In addition, pleural effusion or mediastinal lymph node enlargement is occasional. Cavitation, usually within area of consolidation, can also occur in adolescent or adult primary TB as in our cases. Early cavitation in primary TB is more common and occurs more quickly in adults than in any other age group. Therefore, primary TB in adolescents and adults can manifest upper lobe cavitory consolidation without mediastinal or hilar lymph node enlargement or pleural effusion, and thus show traditionally-regarded typical chest radiographic findings of reactivation TB with remote infection.^{13,14}

In our study, of the 100 patients that underwent chest radiographs, three had normal chest radiographs. Cavitory lesions were present in 71(71%) students. Pleural effusion was not observed in any patient, nor was mediastinal lymph node enlargement. Hilar lymph node enlargement was seen in only 11 subjects (11%). Lesions with upper lung zone predominance were observed in 69 (69%) patients and lesions with lower lung zone predominance were observed in 27 (27%) patients. Remaining 19(19%) patients had lesions in both upper and lower lung zones. Bilateral involvement of lung lesions was observed in 11(11%) patients. Overall, 42 (42%) students had the typical form of reactivation TB and 21 (21%) had TB lesions of the atypical form, based on chest radiograph findings. The radiographic findings observed in our study concur with those examined in the study of Sant'Anna et al,¹⁴ who evaluated radiographic findings of pulmonary TB observed in

the adolescent age group. In their study, although mode (primary, endogenous reactivation or exogenous reinfection) of infection was not clearly mentioned, lung parenchymal lesions were located in the upper lobes in 57% of patients, whereas cavitory lesions occurred in 183 (32%) of 564 patients (28% [67 of 243 patients] consisting of 10 to 15 year old adolescents and 36% [116 of 321] consisting of 16 to 19 adolescents).¹⁴ Eini, Peyman et al determined the radiological changes in patients with smear positive pulmonary tuberculosis. 325 patients with smear positive pulmonary TB was enrolled. The affected lobe or lobes of the left or right lung were recorded. The types of involvement were categorized based on patchy consolidation, cavitation, collapse consolidation and bronchopneumonia. The data were collected and analyzed. From the 325 patients, 116 (35.7%) were males and 209 (64.3%) were females. The most frequent involved site was the left upper lobe in 175 (53.8%) followed by the right upper lobe in 134 (41.2%) cases. The most frequent radiographic finding was bronchopneumonia in 242 (74.4%) cases. Patchy consolidation was detected in 99 (30.4%) patients. Cavitory lesion and pleural effusion were observed in 68 (20.9%) and 35 (10.7%) patients, respectively. The results show that pulmonary upper lobes were the most frequent involved sites.¹⁵

CONCLUSION

Upper lung lesions, which were traditionally assumed to be radiographic indications of reactivation pulmonary TB by remote infection, are the most frequent radiographic findings in primary pulmonary TB by recent infection in previously healthy adolescents.

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