ORIGINAL RESEARCH

Chest Radiographic Findings in Primary Pulmonary Tuberculosis

[1]Dr. Manish Kumar, [2]Dr. Anurag Yadav

[1,2]Professor, Department of TB & Chest, Dr S S Tantia Medical College & Hospital, Shri Ganganagar, Rajasthan, India

Corresponding author
Dr. Anurag Yadav
Professor, Department of TB & Chest, Dr S S Tantia Medical College & Hospital, Shri Ganganagar, Rajasthan, India

Received: 11 January, 2023 Accepted: 16 February, 2023

ABSTRACT

Background: The goal of this research was to report the primary pulmonary tuberculosis (TB) radiographic characteristics in formerly healthy adolescents. **Materials and Methods:** Two independent examiners had examined the chest radiographs of 100 participants who had the same TB strains. Typical TB was defined as nodule(s), consolidation, or cavitation-like lesions in the upper lung zones. Atypical TB was defined as having lesions of nodule(s), consolidation, or cavitation in lower lung zones, as well as pleural effusion. **Results:** Of the 100 patients that underwent chest radiographs, three had normal chest radiographs. Cavitary lesions were present in 63(63%) subjects. Pleural effusion was not observed in any patient, nor was mediastinal lymph node enlargement. Hilar lymph node enlargement was seen in only 16 subjects (16%). Overall, 59 (59%) subjects had the typical form of reactivation TB and 32 (32%) had TB lesions of the atypical form, based on chest radiograph findings. **Conclusion:** The most common radiographic features in primary pulmonary TB by recent infection in previously healthy teenagers are upper lung lesions, which were long thought to represent radiographic markers of reactivation pulmonary TB by remote infection.

Keywords: Mycobacterium tuberculosis, Pulmonary tuberculosis, Thoracic radiography

INTRODUCTION

Tuberculosis (TB) is one of the important leading causes of death in humans and it remains a serious public health obstacle in the developing countries.[1] Early detection and correct treatment of MDR strains of mycobacteria are the most effective measures for the management of multidrug-resistant (MDR) TB.[2] Drug resistance is the capability of organisms to stay viable or to multiply within the presence of the concentration of the drug that may ordinarily destroy or inhibit cell growth.[3] With the introduction of the first anti-tuberculosis in the world in 1943, drug resistance began to rise and became a major problem and threat for TB control programs in many countries.[4]

Among immigrants to the West from the Indian subcontinent, sub-Saharan Africa, South East Asia, the Baltic states and Russia, the prevalence of tuberculosis is much higher than among the native white population.[5,6] In the native population, tuberculosis is most commonly found among people living in poor conditions and in deprived areas, especially in elderly people and those with unstable social or psychiatric backgrounds, such as hostel dwellers, street dwellers, alcoholics, and drug misusers, as well as in immunocompromised patients.[7-9]

Multi-detector CT (MDCT) is an important tool in the detection of radiographically occult disease, differential diagnosis of parenchymal lesions, evaluation of mediastinal lymph nodes (LNs), assessing disease activity, and evaluating complications. It not only enables earlier and more accurate diagnosis of pulmonary lesions, but also can be used to differentiate the etiologies of pneumonia.[10,11]

Hence, this study was conducted to evaluate the radiographic findings of primary pulmonary TB in previously healthy adolescents.

MATERIAL AND METHODS

On the chest radiographs of one hundred individuals who had the identical TB strains, restrictions fragment length polymorphism analysis was done. Nodular, consolidation, or cavitation lesions in the upper lung zones were regarded as typical TB lesions. Lesions with nodules, consolidation, or cavitation in the lower lung zones, and pleural effusion, were considered to be signs of atypical TB. Every subject in this study underwent a chest radiography examination in the first

grade of middle or high school. Since all these subjects were formerly healthy as well as had normal chest radiographs at their earlier student medical checkups, we defined the most recent infection discovered by RFLP analysis as primary TB.

RESULTS

Of the 100 patients that underwent chest radiographs, three had normal chest radiographs. Cavitary lesions were present in 63(63%) subjects. Pleural effusion was not observed in any patient, nor was mediastinal lymph node enlargement. Hilar lymph node enlargement was seen in only 16 subjects (16%). Overall, 59 (59%) subjects had the typical form of reactivation TB and 32 (32%) 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	89
Large nodules	74
Cavity	63
Consolidation	29
Hilar lymph node enlargement	16
Mediastinal lymph node enlargement	04
Pleural effusion	02

Table 2: involvement of lungs in Tb

Involvement	Number of subjects
Bilateral	16
Unilateral	84
Total	100

Bilateral involvement of lung lesions was observed in 16(16%) patients.

DISCUSSION

Pulmonary Tuberculosis (TB) is a specific infectious disease caused by Mycobacterium tuberculosis. TB is one of the major public health problems in the developing countries like India. TB has experienced resurgence in the world since the pandemic of Acquired Immunodeficiency Syndrome (AIDS). HIV infection alters the cell mediated immunity and increases the risk of progression of latent tuberculosis infection to active tuberculosis disease.[12] In HIV positive patients with CD4 counts <200/mm3, the features of pulmonary tuberculosis are often atypical.[13] Diabetics are more prone to TB due to decreased immunity.[14] Diabetes mellitus and active tuberculosis intensifies each other and combination of these two diseases forms a lethal combination.[15]

Radiology remains one of the most important diagnostic modalities of tuberculosis infection. Radiological manifestations of pulmonary tuberculosis are dependent on several host factors, including underlying immune status. Impaired host immunity like HIV infection, diabetes mellitus etc., have been regarded as a predisposing factor in tuberculosis.[16]

Of the 100 patients that underwent chest radiographs, three had normal chest radiographs. Cavitary lesions were present in 63(63%) subjects. Pleural effusion was not observed in any patient, nor was mediastinal lymph node enlargement. Hilar lymph node enlargement was seen in only 16 subjects (16%). Overall, 59 (59%) subjects had the typical form of reactivation TB and 32 (32%) had TB lesions of the atypical form, based on chest radiograph findings.

Leung AN et al.[17] who observed nodular opacities in 81% of tuberculosis-HIV positive patients and in 90% of HIV negative tuberculosis patients. de Almeida LA et al.[18] observed that 35.5% patients presented with ill-defined nodular opacities with centrilobular distribution. Naseem et al[19] observed centrilobular nodules (92%) was the most common CT finding in new tuberculosis cases.

Study conducted by Singla R et al.[20] concluded that there is higher involvement of lower lung fields in diabetic patients than immunocompetent patients (23.5% versus 2.4%). Study done by Perez-Guzmen C et al.[21] concluded that lower lung field lesions are significantly higher in tuberculosis patients with DM than tuberculosis patients without DM. (19% versus 7%). Ahmad Z et al.[22] in their study concluded that in HIV-TB cases lower lung fields were more involved than non-HIV TB patients (46.15% versus 9.75%).

CONCLUSION

The most common radiographic features in primary pulmonary TB by recent infection in previously healthy teenagers are upper lung lesions, which were long thought to represent radiographic markers of reactivation pulmonary TB by remote infection.

REFERENCES

1. Maartens G, Wilkinson RJ. Tuberculosis. *Lancet.* 2007;370:2030–43.
2. Bwanga F, Hoffner S, Haile M, Joloba ML. Direct susceptibility testing for multidrug resistant tuberculosis: a meta-analysis. *BMC Infect Dis.* 2009;9:67.

3. Kant S, Maurya AK, Kushwaha RA, Nag VL, Prasad R. Multi-drug resistant tuberculosis: an iatrogenic problem. *Biosci Trends.* 2010;4:48–55.
4. Yew WW, Leung CC. Management of multidrug-resistant tuberculosis: Update 2007. *Respirology.* 2008;13:21–46.
5. Dye C. Global epidemiology of tuberculosis. *Lancet* 2006;367: 938-40.
6. National Institute for Health and Clinical Excellence. *Tuberculosis: clinical diagnosis and management of tuberculosis, and measures for its prevention and control*. London: NICE, 2006.
7. Snider DE, Roper WL. The new tuberculosis. *N Engl J Med* 1992;326: 703-5.
8. Cantwell MF, Snider DE Jr, Cauthen GM, Onorato IM. Epidemiology of tuberculosis in the United States, 1985 through 1992. *JAMA* 1994; 272: 535-9.
9. Raviglione MC, Snider DE, Kochi A. Global epidemiology of tuberculosis: morbidity and mortality of a world-wide epidemic. *JAMA* 1995;273: 220-6.
10. Ito I, Ishida T, Togashi K, Niimi A, Koyama H, Ishimori T, et al. Differentiation of bacterial and non-bacterial community-acquired pneumonia by thin-section computed tomography. *Eur J Radiol.* 2009;72:388–95.
11. Heussel CP, Kauczor HU, Heussel G, Fischer B, Mildenberger P, Thelen M. Early detection of pneumonia in febrile neutropenic patients: Use of thin-section CT. *AJR Am J Roentgenol.* 1997;169:1347–53.
12. Tuberculosis India 2013. RNTCP status report, TB: Burden of the disease in India. Central TB Division, Directorate General of Health Services. Ministry of Health and Family Welfare, NirmanBhawan, New Delhi 2013; 19-20, 43-44.
13. Sharma SK, Mohan A. *Tuberculosis.* Vol. 1. New Delhi: JayPee Brothers; 2004. Endocrine implications of tuberculosis; pp. 386–95.
14. Guptan A, Shah A. Tuberculosis and diabetes: An Appraisal. *Ind J Tub*. 2000;47:3.
15. Lata H, Kant S, Mishra AK, Natu SM. Verma NS. *An association between the poorglycemic level and severity of pulmonary tuberculosis. G.J.P and A Sc and Tech.* 2012;02(2):1–10.
16. Im JG, Itoh H, Han MC. CT of pulmonary tuberculosis. *Semin Ultrasound CT MR.* 1995;16:420–34.
17. Leung AN, Brauner MW, Gamsu G, Cabanne NM, Romdhane HB, Carette MF, et al. Pulmonary tuberculosis: Comparison of CT Findings in HIV-Seropositive and HIV-Seronegative Patients. *Radiology.* 1996;198:687–91.
18. de Almeida LA, Barba MF, Moreira AF, Bombarda S, de Felice AS, Calore EE. Computed tomography findings of pulmonary tuberculosis in adult AIDS patients. *Radiol Bras.* 2011;44(1):13–19.
19. Nassem A, Wasim S, Shamrez K. High resolution computed tomographic pattens in adults with pulmonary tuberculosis. *Journal of The College of Pysicians and surgeons Pakistan.* 2008;18(11):703–7.
20. Singla R, Khan N, Al-Sharif N, Ai-Sayegh MO, Shaikh MA, Osman MM. Influence of diabetes on manifestations and treatment outcome of pulmonary TB patients. *Int J Tuberc Lung Dis.* 2006;10(1):74–79.
21. Perez-Guzmen C, torres-Cruz A, Villarreal-Velarde H, Salazar-Lezama MA. A typical radiological images of pulmonary tuberculosis in 192 diabetic patients: a comparative study. *Int J Tuberc Lung Dis.* 2001;5(5):455–61.
22. Ahmad Z, Shameem M. Manifestation of Tuberculosis I HIV Infected Patients. *JIACM.* 2005;6(4):302–5.