CASE REPORT

Dual Mycobacterial Infection with Tuberculosis and Leprosy: A Case Highlighting Diagnostic and Programmatic Challenges in Endemic Settings

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ABSTRACT

Introduction: Tuberculosis (TB) and leprosy are chronic infectious diseases caused by *Mycobacterium* species and remain significant public health concerns in endemic countries like India. According to the World Health Organization Global TB Report 2025, India continues to carry one of the highest TB burdens globally. Although both diseases are well known individually, their simultaneous occurrence is rarely reported in modern literature. Co-infection poses diagnostic and therapeutic challenges, particularly due to the shared use of rifampicin in treatment regimens.

Case Presentation: A 62-year-old female farmer presented with fever, multiple painless cervical swellings with yellowish discharge, swelling of the right thumb, and multiple ulcerative skin lesions over the extremities. Clinical examination revealed matted cervical lymphadenopathy, nodular swellings on the hand, hypo- and hyper-pigmented macular lesions on the back, and thickened ulnar nerve. Investigations showed anemia and raised inflammatory markers. Ziehl-Neelsen staining and histopathology confirmed lepromatous leprosy, while fine needle aspiration cytology and CBNAAT of cervical lymph nodes confirmed tuberculous lymphadenitis without rifampicin resistance. Imaging revealed osteomyelitis of the right thumb consistent with tubercular involvement. The patient was treated with multidrug therapy for leprosy along with standard antitubercular therapy and showed clinical improvement on follow-up.

Conclusion: Concurrent TB and leprosy, though uncommon, require early recognition and evaluation for rifampicin resistance to ensure appropriate treatment and prevent drug resistance. Routine screening for TB in patients diagnosed with leprosy is recommended in endemic regions.

Keywords: Tuberculosis, Multidrug-Resistant, Lepromatous Leprosy, Osteomyelitis, Lymphadenopathy

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Introduction

As per the Global Tuberculosis (TB) Report data analysis, published on 12th November, 2025 by the World Health Organization (WHO), India recorded 27.1 lakh new TB cases and over three lakh TB related deaths in the year 2024. Although, India's TB treatment coverage improved to 92% in 2024, it is still a country with one of the highest TB burdens globally. Globally, India accounts for nearly one-third of all Multi drug-resistant TB cases.[1] Tuberculosis and Leprosy are the infectious diseases known to the mankind since ancient times.[2] Although, both are caused by Mycobacterium species, the interaction between them has relatively been neglected in the modern medical literature.[3] There are no guidelines regarding the treatment of co-infection but generally monthly rifampicin is skipped in patients already on Anti-Tuberculosis Treatment from the MB-MDT (Multi Bacillary - Multi Drug Therapy) regimen that is used for leprosy treatment to prevent overlap. Undiagnosed TB in leprosy patients represents a public health risk. We present an interesting case of dual mycobacterial infections in a 62-year-old female. The objective of presenting this report is to make the clinicians aware of the coexistence of mycobacterial infections, and to underscore the importance of pre-treatment testing for Rifampicin sensitivity so that emergence of Rifampicin-resistant Mycobacterial strains can be avoided.

Case History

A 62-years old female patient, presented to a tertiary care centre, farmer by occupation, with complaints of fever with multiple painless swellings on the right side of the neck for two months with a yellowish white discharge from a swelling in the right supraclavicular area. She also complained of a swelling of the right thumb and multiple ulcerative lesions on the extremities for one month.

On examination, there were multiple palpable, non-tender, matted cervical lymph nodes of various sizes with the largest measuring 2.5X2cm and yellow-white discharge from the right supraclavicular swelling (Figure.1: 3x4cm swelling on the right side of neck with yellowish-white discharge).

There were nodular, non-tender swellings on the dorsum of the right hand and a soft non-tender swelling involving the proximal right thumb with serous discharge from punctum (Figure.2 -Swelling involving proximal right thumb with serous discharge from the punctum). Multiple, non-tender ulcers in different phases of healing were present on extensor aspect all four limbs, largest measuring 3.5x3 cm (Figure. 3 Figure 1.5x3cm well-defined ulcer over lateral aspect of right mid-leg, with reddish granulation tissue in the floor, sloping edge. Surrounding area shows hyperpigmented rim).

Multiple well defined, hypo and hyper-pigmented, dry macular lesions were present all over the back. Ulnar nerve at medial epicondyle was palpable and thickened.

Following were our differential diagnosis Disseminated Tuberculosis, Lymphoma, Sarcoidosis, and Hansen disease.

Patient was started after confirming drug sensitivity to rifampicin with Cartridge Based Nucleic Acid Amplification Test (CBNAAT - GeneXpert) on daily dose of Clofazimine (50mg) and Dapsone (100mg) and once a month Clofazimine (300mg) dose for leprosy as per National Leprosy Eradication Program (NLEP). First line anti-tubercular drugs (4 drugs - Isonizid, Rifampicin, Pyrazinamide and Ethambutol - HRZE according to the patient's body weight) for TB were also started.

Patient came for follow up after 2 months and had good compliance and tolerance to both regimes and had improved clinically.

Discussion

According to the World Health Organization, India has the highest numbers of new cases of TB as well as leprosy.[4,5] Historically, there are many reported incidences of concomitant TB and Leprosy infection.[6] Modern medicine explains this association due to impaired Cell mediated immunity in a genetically predisposed individuals and cross immunity between the two infections.[7]

A case was recorded in Nepal where the patient was initially diagnosed with TB lymphadenopathy like our patient and later on developed Lepromatous leprosy with Erythema Nodosum Leprosum.[8] Further literature search did not reveal many cases of extrapulmonary TB with leprosy detected simultaneously. Also, our patient had two extrapulmonary sites involvement by TB - cervical TB lymphadenitis and bone TB osteomyelitis which is rare. Simultaneous diagnosis of all sites of TB involvement and coinfection with other mycobacterial species like M. Lepra is important because if anything is missed, it will lead to inadequate treatment for the patient as different extrapulmonary site of TB requires different treatment approach.[9] 2012 research done in India showed that out of 156 total recorded cases of TB-Leprosy co-infection, Leprosy preceded TB in 90.4% (141/156) cases and extra pulmonary TB was found in only 2.6% (4/156) patients.[10] A recent Sri-Lankan case series of six patients with TB-Leprosy co-infection showed that majority of cases (5/6) had pulmonary TB and only one patient had extrapulmonary TB (TB-lymphadenopathy).[11] Our patient had extra-pulmonary involvement of two sites - tubercular affection of bones (Thumb osteomyelitis) as well as cervical lymphadenitis. Usually, the leprosy infection precedes the TB infection as reported by several researchers.[10,11] The co-infection was diagnosed simultaneously in our patient. Ours was a female patient with coinfection however, in few similar report majority patients were males.[12]

Table 1: Shows laboratory and radiological investigations with results

Test	Site of tissue sampling	Results
Haemoglobin	Venous blood	9.8 gm/dl
Total leucocyte count	Venous blood	7800 cells/µl
Platelets	Venous blood	167000/µl
ESR	Venous blood	32 mm/hr
CRP	Venous blood	6.3 mg/dl
Liver function test	Venous blood	Normal
Kidney function test	Venous blood	Normal
Dengue	Venous blood	Negative
Malaria	Venous blood	Negative
Human immunodeficiency virus (HIV)	Venous blood	Negative
Hepatitis B virus	Venous blood	Negative
Hepatitis C virus	Venous blood	Negative
Blood sugar levels - Random	Venous blood	122 mg/dl
Urine routine analysis and microscopy	Urine	Normal
X ray	Chest	Normal
X ray	Right hand	Lytic destruction of the proximal phalanx of thumb with soft tissue swelling suggestive of infective dactylitis (Figure.4)
Magnetic Resonance Imaging (MRI)	Right hand and wrist	Destruction of the proximal phalanx of the thumb along with soft tissue swelling - representing osteomyelitis
Ziehl-Neelsen (ZN) stain	Split skin smear of the ear lobule	Positive for acid-fast bacilli (AFB) with bacteriological index of 4(+), Morphological index of 50% suggestive of M. Leprae infection
Histopathological examination	Skin biopsy of hyperpigmented patch from lower back	Atrophic epidermis, superficial dermal epithelioid cell granuloma, foamy histiocytes with infiltration of nerve fibres by histiocytes. Special stain with 5%H_2SO_4 was strongly positive for AFB (M. Leprae). These findings were suggestive of Lepromatous Leprosy.
Fine Needle Aspiration Cytology (FNAC)	Enlarged cervical lymph node	Well-formed epithelioid cell granulomas and caseous necrosis in the background of acute on chronic inflammation suggestive of Tuberculous (TB) Lymphadenitis
Ziehl-Neelsen (ZN) stain	FNAC of enlarged cervical lymph node	Positive for acid-fast bacilli (AFB)
Cartridge Based Nucleic Acid Amplification Test (CBNAAT - GeneXpert)	FNAC of enlarged cervical lymph node	Mycobacterium tuberculosis detected with no resistance to Rifampicin
Ziehl-Neelsen (ZN) stain	Sputum	Negative for acid-fast bacilli (AFB)
Histopathological examination	Amputated right thumb	Tubercular osteomyelitis

In the past, several hypotheses have been put forward about the pathogenesis and epidemiology of concomitant TB and leprosy infection. The two major hypotheses being the cross-immunity hypothesis and the co-infection hypothesis. The cross-immunity hypothesis states that prior TB exposure or BCG (Bacillus Calmette - Geurin) vaccination is protective against leprosy and there is a level of cross immunity between the two infections.[13] The co-infection hypothesis refutes this and states that the depressed cell mediated immunity in patients with lepromatous leprosy may be responsible for the re-activation of latent tubercular infection in certain genetically predisposed individuals.[14] Hohmann N et al. in 2013 postulated that the co-infection hypothesis better explains the epidemiological correlation between TB and leprosy. They suggested that the increased severity of an endemic of leprosy would make patients more susceptible to TB infection, and thus facilitating the elimination of leprosy in these regions.[15] Despite these attractive hypotheses, the exact epidemiological, pathological and clinical basis to explain the relation between TB and leprosy still remains elusive.[3]

A large Randomized controlled trial done by Wagenaar I et al. in 2016-17 which studied the effectiveness and the adverse effects of steroid therapy in neuro-leprosy, did not show reactivation of TB as a possible adverse event in any of the study participants.[16]

As per NLEP (National Leprosy Eradication Program), India, once a month dose of Rifampicin is used along with daily doses of Clofazimine and Dapsone in all types of Leprosy. Rifampicin is also a key drug in the anti-tubercular drug regimen for treatment of TB. Therefore, simultaneous evaluation of concurrent tuberculosis and leprosy infection is needed in highly suspected individuals. If the diagnosis of concomitant TB is missed and if the leprosy patient is started on monthly doses of Rifampicin, chances of emergence of Rifampicin resistant strains of TB are higher in such patients that is major public health

concern.[11,17] Therefore, in all co-infected patients, tests for Rifampicin resistance may help in detecting patients with Rifampicin resistance but further guidelines required for same.[18]

During last fifty odd years, several case reports and reviews have been published describing this co-infection but sadly none can fully explain the inter-relation between TB and leprosy. Several unanswered questions remain which needs to be pondered upon - 1) is it cross-immunity or co-infection theory which better explains this dual infection? 2) Whether steroid over-use in leprosy predispose the patients to develop TB? 3) Are missed concomitant infections giving rise to emergence of drug resistance in both TB and leprosy?[3,19]

Conclusion

Leprosy and TB co-infection is not as rare as it seems but its overall incidence seems to be low when compared with the absolute number of new cases detected with Leprosy or TB alone. Before initiating a newly diagnosed leprosy patient on once-a-month dose of Rifampicin or long course of steroids for Lepra reactions, a thorough search for pulmonary or extra-pulmonary TB is warranted to prevent reactivation of latent TB infection and emergence of MDR TB strains. New policies should emphasize the integration of services, with leprosy care delivered through the general healthcare system (PHCs, CHCs) rather than standalone clinics. Policy should include healthcare workers like ASHA workers for active, door-to-door screenings for both TB and leprosy, particularly in hotspot areas and educate for rifampicin resistance before starting drug therapy for leprosy and rule out co infection with tuberculosis. Implications of concomitant infection are severe, including high mortality and risk of developing rifampicin-resistant TB if undiagnosed. Screening for TB in leprosy patients (and vice versa) is vital, especially since steroids used to manage leprosy reactions can reactivate TB.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Availability of Data: The data supporting the findings of this study are available from the corresponding author upon reasonable request.

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