Sputum AFB smear positivity in leprosy – confounding the diagnosis

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Abstract

Tuberculosis and leprosy remain among the devastating infectious diseases of the world. Both share common epidemiological characteristics such as overcrowding and poverty. TB-leprosy co-infection is a well-known association, however sometimes establishing the accurate diagnosis can be difficult. Although the detection of acid-fast bacilli (AFB) is considered as an initial clue in the diagnosis of pulmonary TB, non-tuberculous mycobacteria (NTM) also can exhibit positivity towards sputum AFB.

We present 2 cases of sputum AFB positivity in lepromatous leprosy which baffled the diagnosis.

Key words: sputum AFB, acid-fast bacilli, Mycobacterium tuberculosis, Mycobacterium leprae, tuberculosis, leprosy, Ziehl-Neelsen stain.

Introduction

Tuberculosis (TB) and leprosy are two ancient pathogens, which have been identified as infecting humans thousands of years ago, and yet remain among the devastating infectious diseases of the world. Despite the development of effective multidrug therapy, these diseases remain global health threats even in the 21st century. TB is endemic throughout Sri Lanka, while leprosy clusters in some areas of the island.

Both diseases are chronic granulomatous infections caused by intracellular aerobic gram-positive acid-fast bacilli that multiply slowly and have long incubation period. Pulmonary TB infects lung parenchyma, whereas leprosy affects all tissues of the body except lung parenchyma and the central nervous system

TB-leprosy co-infection is a well-known association, however sometimes establishing the accurate diagnosis can be difficult.

The detection of acid-fast bacilli (AFB) on stained sputum smears is the quickest, easier and inexpensive diagnostic tool for Mycobacterium tuberculosis (MTB). Although it is considered as an initial clue in the diagnosis of pulmonary TB, the test is not disease specific. Non tuberculous mycobacteria (NTM) also can exhibit positivity towards sputum AFB. Mycobacterium leprae is one of them.

Here in we present 2 cases of sputum AFB (Acid fast bacilli) positivity in lepromatous leprosy (LL) which confounded the diagnosis

Case 1

A 35-year-old previously healthy Sri Lankan male from a leprosy endemic suburban area of the island presented with bilateral forefoot ulceration with numbness of 3 months duration. He had no contact history of leprosy or TB. Examination findings were in keeping with lepromatous leprosy (LL) with ulcerated Type 2 reaction involving both feet and ear lobes (Figure 1a and 1b). Clinical diagnosis of LL was confirmed with strongly positive slit skin smear (SSS) with +6 bacillary index (BI) and 25% morphology index (MI) and skin biopsy. His sputum for AFB also showed 1+ positivity on two occasions with normal chest x-ray. We carried out further investigations to rule out TB coinfection, but sputum for Xpert MTB nucleic acid amplification test (NAAT) by polymerase chain reaction method (PCR), sputum for MTB culture and Mantoux became negative. He had normal lung fields on HRCT chest (High-resolution computed tomography). Multidrug therapy for multi bacillary leprosy (MDT-MB) was commenced along with treatment for lepra reaction with prednisolone. After 2 weeks of treatment, repeat sputum AFB became negative and 0% MI in SSS.

Case 2

A 57-year-old male, diagnosed patient with LL who had defaulted leprosy treatment for nine months was admitted with fever, productive cough along with

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flare of erythema nodosum leprosum (ENL). Examination findings were in keeping with LL with ulcerated ENL. He also had features of lower respiratory tract infection. SSS from skin lesions showed +5 BI and 0% MI and a positive skin biopsy with multiple granulomata and diffuse collections of foamy histiocytes. Wade-Fite stain revealed multiple acid-fast bacilli. His sputum for bacterial culture was negative but sputum AFB was 1+ positive in one sample. Further investigations for TB, mantoux, sputum gene Xpert and TB culture became negative. Initial chest x-ray was favor of right middle zone consolidation, which cleared after 14 days of antibiotic therapy. As repeat sputum for AFB also became negative, TB coinfection was ruled out and he was restarted on MDT-MB and treatment for ENL later.

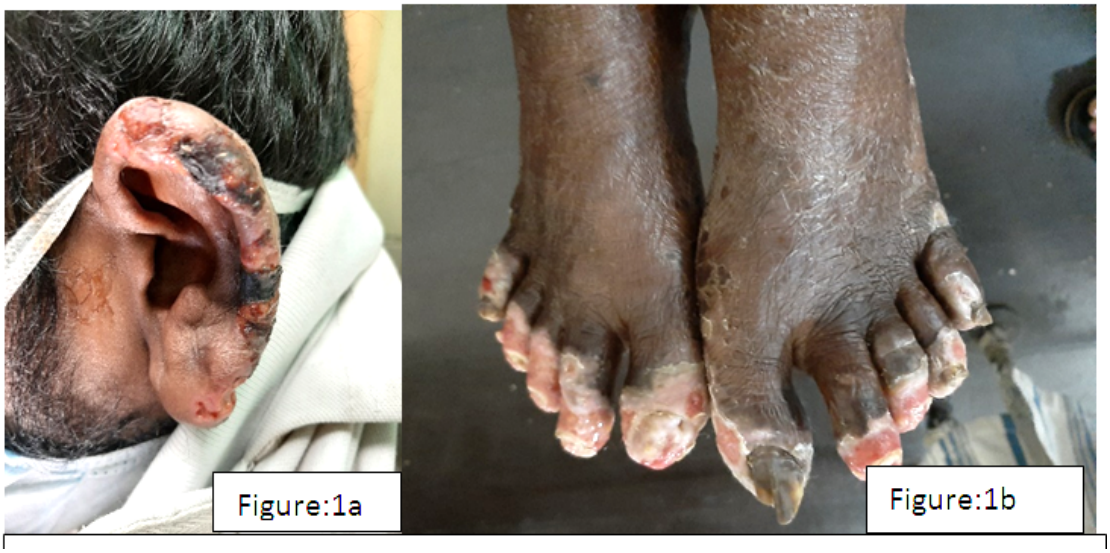

Figure 1a & b. *Ear lobes ulceration and ulcerated toes.*

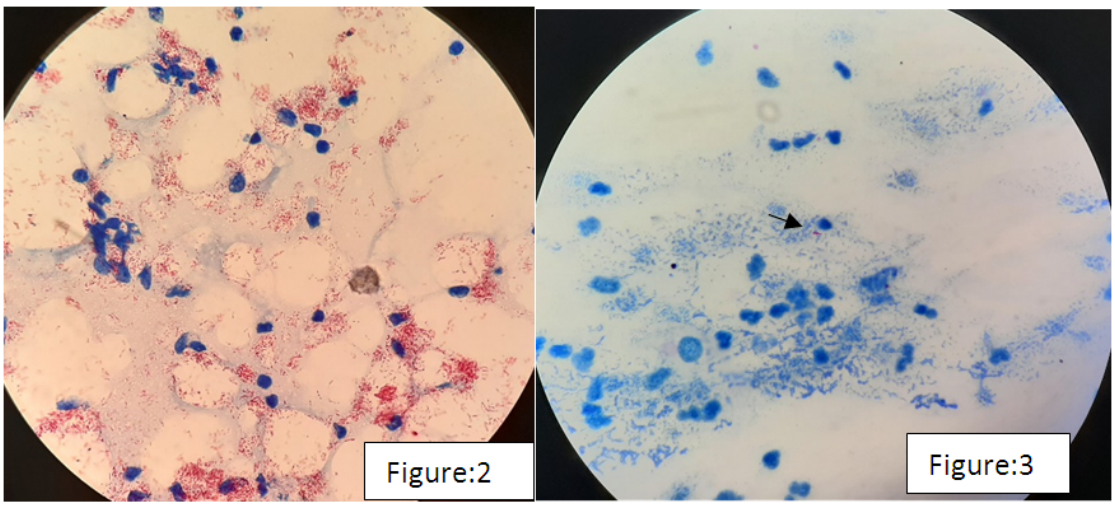

Figure 2. *6+ positivity in slit skin smear.*

Figure 3. *1+ positivity in sputum AFB (black arrow).*

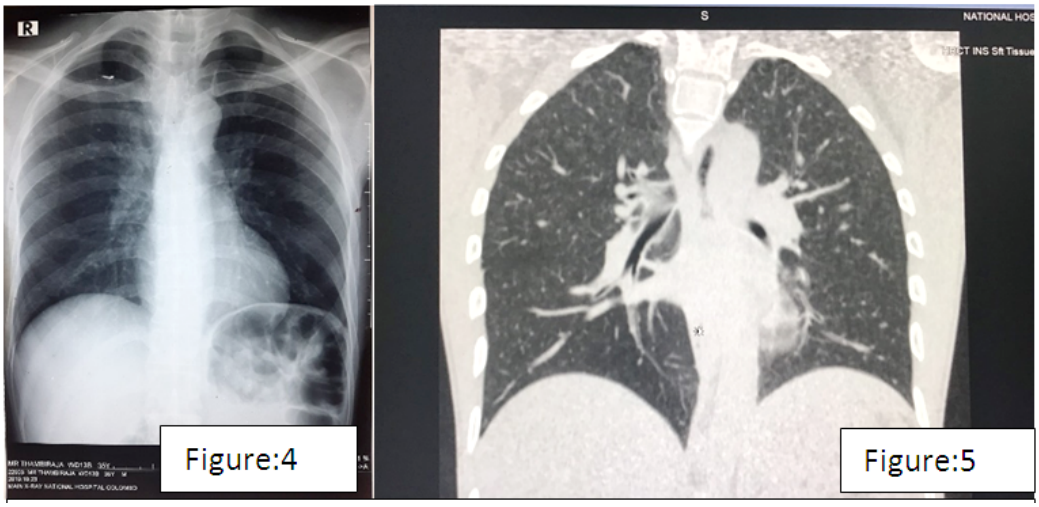

Figure 4, 5. *Normal chest x-ray and HRCT of first patient.*

Discussion

TB-leprosy coinfection is a well-known association with few reported cases world-wide as well as in Sri Lanka. TB needs to be ruled out in cases of leprosy where clinically suspected especially before starting MDT and lepra reactional treatment, as both have similar geographic endemicity.

Mycobacteria are immobile, slow growing rod-shaped bacteria with special staining characteristics under the microscope namely "acid-fast", which is mediated by mycolic acid cell wall. Because of large amount of lipoidal material in mycobacterial cell wall, they retain the red colour of Ziehl-Neelsen staining. Mycobacteria can be divided in to 3 groups; Mycobacterium tuberculosis complex – causative organism of tuberculosis, non-tuberculous mycobacteria (NTM) and Mycobacterium leprae – causative pathogen of leprosy.

AFB smear positive sputum is usually an initial clue in the diagnosis of pulmonary TB. Even though negative smear does not exclude TB, positive AFB permits only the presumptive diagnosis of TB because the acid-fast bacilli in a smear may be acid-fast organisms other than M. tuberculosis. As sputum AFB is a less sensitive investigation, TB culture is considered as gold standard, but unfortunately takes 3-8 weeks to give results. NAAT can reliably detect MTB by PCR method within hours and leads to earlier laboratory confirmation of TB.

Mycobacterium leprae is also an acid-fast bacterium with parallel sides and rod-shaped ends with size and shape closely resembling MTB. It occurs in large numbers in lesions of LL, demonstrated by SSS. Mycobacterium leprae's acid and alcohol fast properties are weaker than the MTB. The Ziehl-Neelsen stain is used universally to stain M. leprae with modifications on the standard staining technique called Wade-Fite staining technique and used for the demonstration of leprosy bacilli. The main difference between the technique for leprosy and tuberculosis is the strength of the decolourizer. Basically, both organisms are stained by similar methods.

It is recognized that nasal secretions and mucosa of the upper respiratory tract of LL patients can have large amounts of leprae bacilli. Hence their sputum and bronchial secretions may contain these bacilli as well, and it can appear as positive AFB in sputum as in our patients. Since it is difficult to differentiate both bacteria by morphology in Ziehl-Neelsen staining sputum, further investigations need to be carried out to rule out TB-Leprosy coinfection, to avoid further disease transmission and drug resistance.

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