

Revisiting Asymptomatic Pulmonary Tuberculosis with Cavitory Lesion Detected During Routine Chest Radiography in a Healthcare Worker: A Case in Point

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Abstract

This report describes a 39-year-old female clinical nurse working in an intensive care unit diagnosed with bacteriologically confirmed subclinical pulmonary TB after an abnormal chest radiograph was detected during a routine annual health examination at her hospital. The chest radiograph demonstrated reticulonodular opacities in the right upper lung zone. Correspondingly, subsequent chest computed tomography revealed a cavitory lesion with surrounding centrilobular nodules with a tree-in-bud pattern involving the apical and posterior segments of the right upper lobe, despite the absence of TB-related symptoms. Sputum microbiology later confirmed *Mycobacterium tuberculosis*. This case in point provides some interesting learning points and highlights the importance of recognising subclinical TB and the potential role of routine chest radiography screening in detecting otherwise unrecognised disease in high-risk populations such as healthcare workers.

Keywords: *Mycobacterium tuberculosis*, health personnel, radiography, mass chest x-ray, asymptomatic diseases

Tuberculosis (TB) remains a major global public health concern and continues to pose significant challenges to disease control efforts. The World Health Organization (WHO) estimated that 10.7 million people developed TB worldwide in 2024, corresponding to an incidence of 131 per 100,000 population, and that approximately 1.23 million people died from the disease. Of the estimated cases, 8.3 million were diagnosed and notified, leaving a gap of approximately 2.4 million people who were not diagnosed or officially notified.¹ Consequently, the goal of reducing TB incidence by 90%, or to fewer than 10 per 100,000 population by 2035, remains a significant challenge.² Notably, Thailand is among the high TB burden countries and has established a National Strategic Plan aligning with the WHO goals. This plan aims to reduce TB incidence from 143 per 100,000 population in 2021 to 89 per 100,000 population by the end of 2027.³

Traditionally, TB has been classified into latent TB infection and active TB disease. However, recent evidence suggests that TB exists along a spectrum of disease states, including an intermediate stage known as subclinical TB, in which individuals have microbiological or radiological evidence of disease without typical clinical symptoms.⁴ The WHO refers to this disease state as “asymptomatic TB” or “subclinical TB”.⁵ In this report, the term “subclinical TB” will be consistently used. Research data indicate that more than half of patients diagnosed with pulmonary TB are asymptomatic.⁶⁻⁹ Furthermore, subclinical TB has gained increasing attention because individuals in this stage may still contribute to disease transmission despite the absence of symptoms.^{4,5,10}

Healthcare workers represent a particularly high-risk population for TB infection due to occupational exposure and have a threefold higher risk of developing TB compared to the general population.¹¹ Routine health check programs that include periodic chest radiography are therefore implemented in many healthcare institutions, with early detection of TB

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being one of their objectives, as outlined in Thailand's National Strategic Plan.³ Therefore, this report aims to exemplify subclinical pulmonary TB detected during routine screening in an asymptomatic healthcare worker, with accompanying characteristic radiologic images.

Case Report

A 39-year-old Thai female nurse with 18 years of professional experience working in an intensive care unit underwent a routine annual health check at her hospital in 2023. She had a history of diabetes mellitus but had not received medical follow-up for three years. The patient reported no respiratory or constitutional symptoms, including cough, fever, weight loss, or night sweats. Additionally, she was a nonsmoker and denied a history of close TB contact. There was no history of TB among her colleagues and family members. Physical examination was unremarkable.

A screening chest radiograph revealed reticulonodular opacities in the right upper lung zone (Figure 1). Comparison with a previous radiograph obtained in 2019 showed no abnormalities. Due to the suspicious radiographic finding, further evaluation with chest computed tomography (CT) was performed. CT imaging demonstrated a thick-walled cavitary lesion with surrounding centrilobular nodules with a tree-in-bud pattern in the apical and posterior segments of the right upper lobe (Figure 2), raising suspicion for pulmonary TB.

Microbiological investigation later confirmed the diagnosis. The sputum acid-fast bacilli smear was positive, and sputum culture subsequently confirmed *Mycobacterium tuberculosis*. As a result, the patient was diagnosed with bacteriologically confirmed subclinical pulmonary tuberculosis and initiated on the six-month standard anti-tuberculosis therapy along with diabetes control. Following completion of the treatment course, the patient remained entirely asymptomatic, and follow-up chest radiography showed complete resolution of the previously observed lesion (Figure 3).

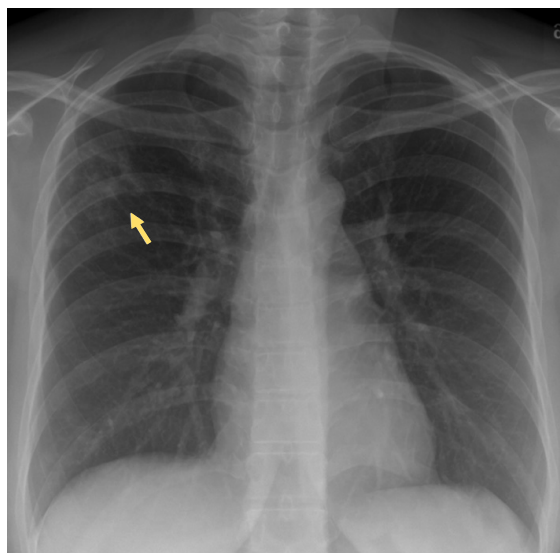


Figure 1: Posteroanterior chest radiograph showing reticulonodular opacities in the right upper lung zone (arrow).

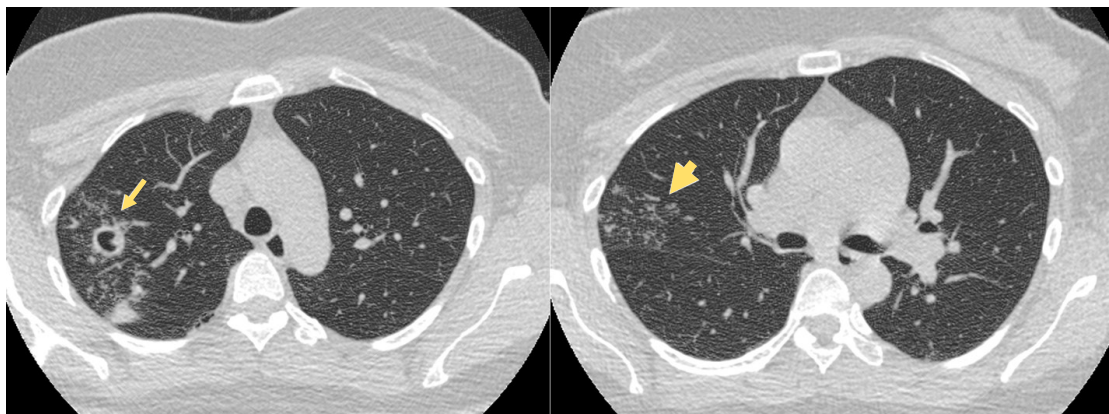


Figure 2: Axial chest CT (lung window setting) demonstrating a thick-walled cavitary lesion (arrow) with adjacent centrilobular nodules and a tree-in-bud pattern (arrowhead) involving the apical and posterior segments of the right upper lobe.

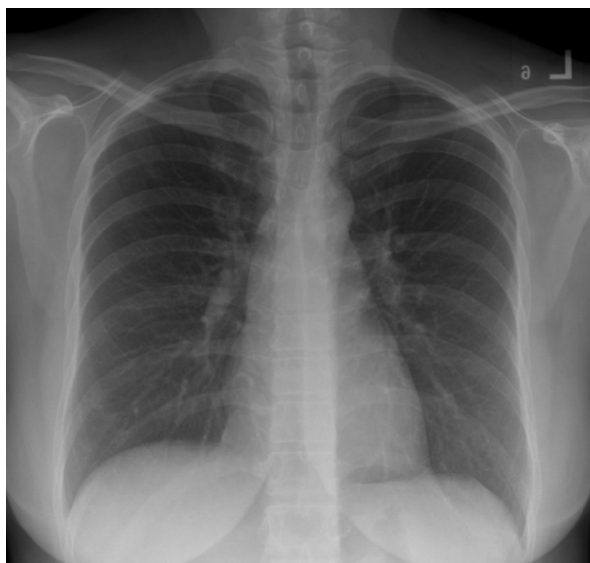


Figure 3: Follow-up chest radiograph after completion of anti-tuberculosis therapy demonstrating complete resolution of the previous right upper lung opacities.

Discussion

This patient was diagnosed with subclinical TB based on abnormal chest radiographic findings that were subsequently confirmed by sputum culture, despite the absence of clinical symptoms. This presentation is consistent with the definition proposed by Drain et al.¹², which describes subclinical TB as a stage of disease in which individuals lack typical symptoms but demonstrate radiological or microbiological evidence. The coexistence of certain risk factors likely increased this patient's susceptibility to TB. In addition to occupational exposure as a healthcare worker, the patient also had diabetes mellitus without regular medical follow-up, an established risk factor for TB infection and disease progression because it may impair immune responses against *Mycobacterium tuberculosis*.¹³

The WHO classifies subclinical TB according to microbiological confirmation; cases are categorised as either bacteriologically confirmed or bacteriologically unconfirmed.⁵ The present patient falls into the bacteriologically confirmed category, which carries epidemiological significance because individuals in this group may transmit *Mycobacterium tuberculosis* even without symptoms.^{4, 5, 10} Studies from China and South Korea have reported that a proportion of patients with subclinical TB may still be infectious, accounting for 31.9% and 46.2% of cases, respectively.^{14, 15} Similarly, a study conducted among healthcare workers at a university hospital in Thailand found that 22.2% of subclinical TB cases were considered potentially infectious.⁹ Furthermore, an individual patient data analysis across 14 countries in Asia and Africa estimated that approximately 68% of global tuberculosis transmission may originate from individuals with subclinical TB disease.¹⁰ Because asymptomatic individuals are often unaware of their illness, they may not seek medical care and may continue routine activities without infection control precautions. In healthcare settings, such undiagnosed cases may unintentionally expose both colleagues and patients to infection.

Current evidence suggests a substantial prevalence of subclinical TB. Studies from China and South Korea reported comparable proportions of subclinical cases at 18.2% and 19.3%, respectively.^{14, 15} A meta-analysis by Mahmoudi et al.⁶, which included studies primarily from Asia and Africa, found that approximately 52% of TB patients were subclinical at the time of diagnosis. In Thailand, a study conducted at a large tertiary hospital reported that nearly 85% of diagnosed cases of pulmonary TB at a health check-up clinic had no TB-related symptoms.⁷ Similar findings have also been observed among healthcare workers. Studies by Inchai et al.,¹⁶ Mingchay et al.,⁸ and Virojskulchai et al.⁹ reported that subclinical TB cases accounted for 22.9%, 43.5%, and 69.2% of all TB cases, respectively. Crucially, high proportions of subclinical TB among healthcare workers may be partly attributable to routine chest radiography performed as part of annual health examinations. These findings indicate that symptom-based screening alone may be insufficient for detecting TB. Therefore, active case-finding strategies, such as routine chest radiography screening in high-risk populations, including healthcare workers and individuals with diabetes mellitus, may help improve the early detection of TB.

Learning points

- Pulmonary TB may present with radiologic evidence of disease despite the complete absence of TB-related symptoms, a condition known as subclinical TB.
- Routine chest radiography as part of periodic health check-ups may help detect subclinical TB earlier in at-risk groups, such as healthcare workers.
- Marked radiologic abnormalities, including cavitory lesions, may still occur in patients with subclinical TB.

Conclusion

This case illustrates that subclinical pulmonary TB can be detected through routine chest radiography in asymptomatic individuals. Note that despite bacteriological confirmation and relatively extensive pulmonary involvement, including a cavitary lesion on imaging, the patient remained entirely asymptomatic. These findings revisit the potential role of active TB case-finding in high-risk populations, particularly among healthcare workers.

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Conflicts of interest

None declared

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