



Occupational tuberculosis at a healthcare laboratory – case report

Milorad Spanovic^{1,2,A-F}, Ivan Mikov^{1,3,A-F}✉^{*}, Sonja Pericevic Medic^{1,2,A,C,E-F}, Nada Maric^{4,5,A,C,E-F}, Aleksandra Lovrenski^{6,7,A-B,E-F}, Tijana Vukovic^{1,2,A-B,E-F}, Miroslav Ilic^{8,9,A,C,E-F}

¹ Department of Occupational Medicine, Faculty of Medicine, University of Novi Sad, Serbia

² Department for Occupational Healthcare, Institute of Occupational Health, Serbia

³ Outpatient Clinic, University Clinical Centre, Vojvodina, Serbia

⁴ Department of Occupational Medicine, Faculty of Medicine, University of Banja Luka, Bosnia and Herzegovina

⁵ Centre of Occupational Medicine, Institute of Occupational Health and Sports Medicine, Bosnia and Herzegovina

⁶ Department of Pathology, Faculty of Medicine, University of Novi Sad, Serbia

⁷ Department of Pathology, Institute for Pulmonary Diseases, Vojvodina, Serbia

⁸ Department of Internal Medicine, Faculty of Medicine, University of Novi Sad, Serbia

⁹ Clinic for Granulomatous and Interstitial Pulmonary Diseases, Institute for Pulmonary Diseases, Vojvodina, Serbia

A – Research concept and design, B – Collection and/or assembly of data, C – Data analysis and interpretation,

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* Shared first authorship, these authors (MS and IM) contributed equally to this work

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Abstract

Tuberculosis (TB) is a complex health problem, which occurs more frequently in healthcare workers. However, TB is rarely recognized as an occupational disease. The report presents a case of occupational tuberculosis in a medical microbiologist, initially misinterpreted as lung cancer. A 59-year-old microbiologist at healthcare laboratory, smoker, underwent lung lobectomy. Histopathological analysis suggested tuberculosis. Follow-up revealed positive mycobacterium tuberculosis culture. Occupational exposure was confirmed and criteria for occupational disease were met. This case highlights the importance of vigilance, accurate tuberculosis diagnosis, and implementation of preventive measures for healthcare workers at increased risk. Tuberculosis remains a global health concern, sometimes mimicking malignancies. Comprehensive diagnostic approaches, protective measures, and collaboration between occupational health services and pulmonologists are essential to reduce risks at the workplace, and ensure early detection.

Key words

healthcare worker, lung tuberculosis, occupational lung disease

INTRODUCTION

Tuberculosis (TB) not only causes a high number of deaths, but also has a devastating impact on social and economic aspects of many societies and broader economies [1]. The most powerful tool in the fight against tuberculosis is knowledge. It is very important to promote awareness about TB, including TB transmission routes and symptoms, especially among chronic patients, refugees, and the socially vulnerable, in order to help them recognize the disease and seek medical attention as soon as possible [2].

The risk for the TB among healthcare workers is higher than that of the general population worldwide [3]. Compared to the general population, healthcare workers face a significantly higher risk of latent tuberculosis infection (LTBI), with odds more than double, and the incidence of active TB nearly three times greater [4]. Regarding diagnostic methods, the odds ratio for detecting LTBI is higher when using the interferon-gamma release assay compared to the tuberculin skin test [5]. Overall, healthcare workers continue to be at a considerably increased risk of both latent and active TB [4].

Occupational medicine facilities can play a key role in minimizing the TB risk among healthcare workers through LTBI surveillance, early diagnosis of TB, and workers' training on TB risk [6]. The traditional method of sputum smear microscopy, developed over a century ago, remains widely used for TB diagnosis in low- and middle-income countries. However, it is increasingly being replaced with rapid diagnostic tests. Despite these advancements, culture testing remains the gold standard for TB diagnosis and will continue to be used [7].

CASE REPORT

A 59-year-old female medical doctor, a specialist in microbiology, smoker for 37 years (20 cigarettes a day), was admitted to the Institute of Occupational Health. She had been employed at the microbiological laboratory of the Special Hospital for Pulmonary Diseases for the last 20 years. Descriptions of work tasks were obtained from the patient and from her employer. Her position as head of the microbiology laboratory was determined as a workplace with increased risk due to exposure to mycobacterium tuberculosis (direct microscopy on Ziehl-Neelsen staining, culture by conventional Lowenstein-Jensen media and BacT/

✉ Address for correspondence: Ivan Mikov, Department of Occupational Medicine, Faculty of Medicine, University of Novi Sad, Novi Sad, Serbia
E-mail: ivan.mikov@mfn.uns.ac.rs

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Alert system). Although she had used a Filtering Face Piece 2 (FFP2) respiratory mask, a biological safety cabinet was not used. She had no employee health surveillance or TB testing. The present illness began at the end of April 2023, presenting as back pain and night sweating that lasted a few days. A dull pain persisted throughout the day and night. There were neither cough nor expectoration.

Due to pain in the left side of the back, she consulted a pulmonologist and a chest X-ray (CXR) was performed and compared with her radiograph from October 2022 (COVID-19 infection was suspected). The CXR showed a left paracardiac and retrocardiac less homogeneous oval shadow (Fig. 1). A chest computed tomography (CT) revealed an irregular dense mass measuring 30mm (left segments S7–8) (Fig. 2). Since this lesion was not accessible to bronchoscopic examination, nor to percutaneous fine needle biopsy, thoracic surgery was performed as for the treatment of a tumor – resection of inferior left lung lobe in May 2023. Frozen section analysis showed disrupted alveolar tissue structure due to poorly formed granulomas composed of epithelioid cells, lymphocytes, and giant cells of the Langhans type. Granulomas contained abundant, finely granular, caseous necrosis (Fig. 3). Imprint cytology of the surgical specimen showed numerous granulomas composed of epithelioid cells and lymphocytes (Fig. 4). Ziehl-Neelsen staining showed no presence of acid-fast bacilli. The diagnosis of necrotic granulomatous inflammation of lung tissue was made.

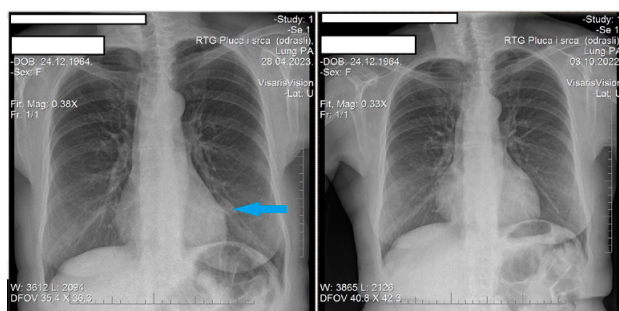


Figure 1. Chest X-rays – postero-anterior (PA), April 2023 and October 2022

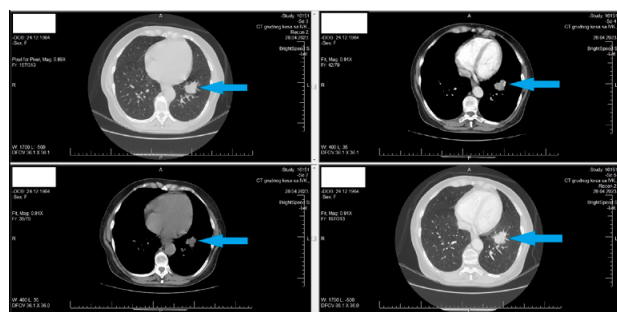


Figure 2. Chest computed tomography (CT), April 2023

Positive culture for *Mycobacterium tuberculosis* (10 colonies) was obtained in June 2023. The strain was drug susceptible. The patient was treated for the next six months with four first-line TB medications, namely isoniazid, rifampicin, ethambutol and pyrazinamide, recommended for the treatment of drug-susceptible TB [8].

No similar cases had occurred at the facility. Household contacts were negative (spouse and daughter). The diagnosed lung tuberculosis was recognized as occupational disease in November 2023.

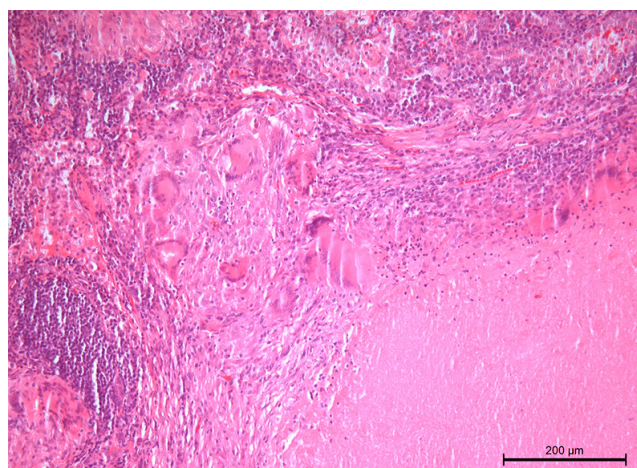


Figure 3. Surgical specimen of lung tissue – granulomas made up of epithelioid cells, lymphocytes and giant cells of the Langhans type, with the presence of finely granular, caseous necrosis, HE $\times 100$

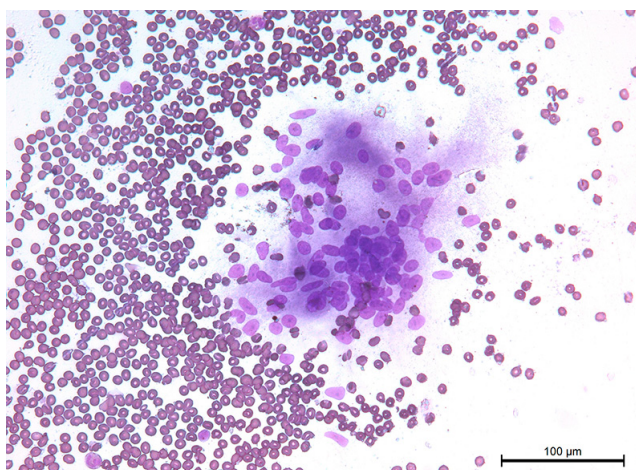


Figure 4. Lung imprint cytology – a granuloma made of epithelioid cells, MGG $\times 200$

DISCUSSION

TB is a significant occupational health concern in healthcare. It is therefore crucial to take a detailed work history from a healthcare worker employed in areas where TB patients are treated, such as TB wards, sputum analysis laboratories, and bronchoscopy units. These employees face a much higher risk of contracting TB compared to other healthcare workers, and special attention should be given to their health history to better understand and reduce the risks [9]. Improving ventilation with high-efficiency particulate air filters, controlling movement, restricting access for attendants and staff, enforcing strict precautions, and fumigating high-risk areas, can reduce infection rates in healthcare facilities. At the laboratory in question, microbial counts were within normal limits after disinfection and the recommended measures implemented [10]. TB screening in healthcare workers will remain an important issue in the near future, even in low incidence countries, as active TB in healthcare workers is often due to workplace exposure [5].

The presented case showed that differentiation between lung cancer and pulmonary TB is complex. Therefore, an accurate etiological diagnosis of lung diseases requires a comprehensive approach, integrating imaging, clinical

symptoms, biological markers, histopathological finding, and continuous observation. This helps prevent misdiagnosis and inappropriate treatment [11]. TB is often referred to as a diagnostic chameleon because its symptoms can mimic those of other conditions, including malignancies. Sometimes, TB presents as pulmonary infiltrates and/or mediastinal lymphadenopathy, frequently displaying abnormal chest CT findings and increased glucose uptake, which closely resemble lung cancer. In countries with low TB incidence but a high prevalence of lung cancer, TB is often misdiagnosed due to its wide range of clinical manifestations. This misdiagnosis can lead to delays in treatment initiation and unnecessary diagnostic procedures [12, 13]. CT is widely utilized in clinical practice for the initial evaluation of diseases. However, its limitations can lead to diagnostic uncertainty.

Ultimately, the definitive diagnosis is made by a pathology specialist after a microscopic examination of the specimen, as happened in the presented case. This case report highlights the complexity of diagnosing TB, as the initial clinical and radiological findings suggested malignancy, necessitating surgical intervention.

CONCLUSIONS

The presented case emphasizes the need for continued vigilance, accurate differentiation between TB and malignancies, and adherence to preventive protocols to safeguard healthcare workers from occupational TB exposure, and misdiagnosis. TB remains a significant global health issue, particularly among healthcare workers who are at an increased risk due to occupational exposure. Despite declining incidence rates, TB continues to pose diagnostic challenges, often mimicking other diseases, such as lung cancer. Ultimately, in this case, histopathological examination suggested TB, underscoring the importance of comprehensive diagnostic approaches.

Healthcare workers in high-risk environments, such as microbiological laboratories and pulmonary disease departments, require stringent protective measures, as well as pre-employment interferon-gamma release assay TB testing. Also, regular health monitoring, collaboration between occupational health services and pulmonologists,

and enhanced diagnostic techniques are essential in risk reduction.

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