A 22-Year-Old Immunocompetent Woman With Cavitary Lesions in Both Lungs Resulting From Nontuberculous Mycobacterial Infection - A Case Report

Ewelina Bornio[1], Hanna Plata[2], Marcin Muza[3-5]*, Krzysztof Batycki[2,6]

[1]*Mazovian Specialized Hospital, Poland*
[2]*Faculty of Medical and Health Sciences, Kazimierz Pulaski University of Radom, Poland*
[3]*Puck Hospital, Poland*
[4]*Faculty of Health Sciences, University of Powiśle, Poland*
[5]*Szpitale Pomorskie, Poland*
[6]*Affidea, Poland*

***Correspondence:** Marcin Muza, Faculty of Health Sciences, Powislanski University 11 Listopada 29, 82-500 Kwidzyn, Poland

m.muza1@powislanska.edu.pl

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Ethics Statement
The study does not meet criteria of medical or terapeutic experiment as it does not intervene into the treatment process. The informed consent therefore is not required.

Consent
The study contains only de-identified data, including anonymized images. The study does not contain any data or images that would de-anonymize the patient.

Conflict of Interests
Authors do not declare any conflict of interests.

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ABSTRACT

Non-tuberculous mycobacteria (NTM) causing atypical mycobacteriosis is a common pathogen in the environment. Atypical mycobacteriosis and Mycobacterium tuberculosis are considered in parallel in the diagnosis based on the clinical and radiological picture in patients. Establishing the diagnosis is possible only at the stage of microbiolgical examination. The majority of patients infected with mycobacteriosis have concomitant pulmonary disease, smoking or immune impairment, i.e. HIV infection. Above that, the infection more often affects men aged about 45-62 years. We report the case of a 22-year-old woman who, despite her young age and lack of health burdens or addictions, was diagnosed with atypical mycobacteriosis (Mycobacterium kansasii) infection by visualizing large cavitary and nodular lesions in both lungs.

CASE REPORT

BACKGROUND

Atypical mycobacteriosis, caused by non-tuberculous mycobacteria (NTM), usually occurs in immunocompromised individuals or those with an unhealthy lifestyle. However, there may be an atypical pattern of occurrence in young, healthy women, suggesting a non-random susceptibility. Although the exact cause remains unclear, the paper aims to highlight the need not to ignore symptoms that may suggest a serious disease in potentially healthy and young individuals.

INTRODUCTION

Mycobacterioses are a group of diseases caused by so-called non-tuberculous mycobacteria, also known as atypical, which are widely distributed in the environment. One of the six most commonly isolated species of nontuberculous mycobacteria worldwide is Mycobacterium kansasii. Mycobacterium kansasii, which are abundant in open bodies of water, tap water and also in soil, cause pulmonary and extrapulmonary infections in immunocompromised or immunocompetent individuals [1,2].

Infectivity is low in endemic areas and infection is presumed to occur via the aerosol route [3]. Those infected with M.kansasii are mostly men aged 45-62 years [4]. Most infected patients (69.3%) are HIV-positive [3]. Both the clinical and radiological manifestations of atypical mycobacteriosis infection are mostly indistinguishable from those caused by Mycobacterium tuberculosis. Distinguishing between the two disease entities requires microbiological diagnosis [5]. It is noteworthy that the incidence of non-tuberculous mycobacterial infections is steadily increasing compared to tuberculosis, the incidence of which has decreased over the last few decades [3].

CASE REPORT

In this manuscript, we describe a 22-year-old woman who presented to a pulmonologist because of persistent for about six months symptoms such as stabbing, well-located pain between the shoulder blades and the spine, a productive cough occurring only in the evening after assuming a supine position, subfebrile states, weight loss of about 6 kg and deterioration of exercise tolerance. The patient had no chronic diseases, was not a smoker, did not consume alcohol, had no contact with tuberculosis patients, had no history of lung disease, no family history of lung disease and very good social conditions. Our patient's physical examination showed no auscultatory changes or enlarged peripheral lymph nodes. The patient presented for the visit with an outpatient chest X-ray, which showed macular and cavernous lesions in the upper fields of both lungs (Figure 1). The patient, due to suspected tuberculosis, was referred to the pulmonology department for further diagnosis. In laboratory tests performed during hospitalization, the inflammatory markers were normal. As part of the hospital diagnosis, the patient had the following performed CT scan of the chest with contrast, which showed cavitary lesions and nodules in both lungs. In segment 1/2 of the left lung, there was a cavity measuring 44x39 mm with segmentally thickened pleura (Figure 2), a pleural cavity measuring 12x7 mm and in segment 3 a cavity measuring 6.3 mm communicating with the dilated bronchi. At the apex of the right lung was a cavity measuring 46x18 mm (Figure 3). Partially confluent fine nodular lesions were also visible mainly in the upper lobes of both lungs and nodules in segments 3,10 of the left lung up to 6.3mm. Bronchial dilatation was present in the right lung in segment 2. Of the additional findings an accessory lobe v. azygos of the right lung was visualised. The above image was in favour of pulmonary tuberculosis. The patient subsequently underwent bronchoscopy, in which, apart from a small anthracosis, no other changes were observed. Direct examination of the bronchoaspirate for tuberculosis BK was negative, while Middlebrook's culture for Mycobacterium was positive. The mycobacterial strain that was identified by molecular testing and that caused non-tuberculous mycobacteria (NTM) in our patient was Mycobacterium kansasii. After the results were obtained, the patient was treated with a three-drug therapy: Rifampicin TZF (600 mg/day), Ethambutol teva (750 mg/day) and Klabax (1000 mg/day divided in two doses). After 3 months of treatment at the next hospitalisation, a repeat bronchoscopy was performed with a bronchoaspirate culture, in which a negative result was obtained, and continued the same treatment for the next 12 months. A follow-up chest CT scan showed partial regression of the nodular lesions and slightly smaller dimensions of the cavernous lesions. The patient was diagnosed for cystic fibrosis and HIV infection, which were both negative. A blood test was also drawn for alpha 1 antitrypsin deficiency, but the result was within normal limits. The patient completed treatment in October 2021 and she is under regular follow-up with a pulmonologist. The last follow-up visit was in May 2024, and the patient is currently without recurrence and without any complaints.

DISCUSSION

It is assumed that almost everyone is exposed to non-tuberculous mycobacteria , but most do not develop clinical signs of infection. Atypical mycobacteriosis primarily affects patients with cystic fibrosis, chronic obstructive pulmonary disease, HIV and other immunodeficiency syndromes. It is worth mentioning that although most infections occur in immunocompromised patients, our patient is immunocompetent [6]. In patients without immune deficiencies, NTM more often affects men of at least middle age who abuse alcohol and tobacco.

Radiologically, there are two main patterns of NTM lung infection. The first form is characterised by fibrocavitary lesions of the upper lobe, which occur mainly in older men with other lung diseases such as chronic lung disease (COPD), silicosis, pneumoconiosis or previous tuberculosis. The second form is characterised by nodular bronchial dilatation occurring mainly in older, thin women without coexisting lung disease, often with a funnel chest, scoliosis and mitral valve prolapse. Less common is 'hot tub lung', resulting from a hypersensitivity syndrome following exposure to Mycobacterium avium (MAC) associated with exposure to bathing or indoor recreational water [7].

Lady Windermere syndrome is a rare syndrome that affects middle-aged women infected with MAC, causing lingual and right middle lobe bronchodilation without apparent immunodeficiency and coexisting lung disease. One possible pathogenesis of the syndrome is voluntary cough suppression, which was described based on Wilde's play by Dr Reich and Dr Johnson in 1992. The pathogenesis is due to decreased clearance of secretions from the right middle lobe and lingual segments, which have long and narrow bronchi with an acute angle, predisposing the patient to MAC infection [6,8,9]. Anatomical factors that may contribute to Lady Windermere syndrome include slender body stature, low BMI and skeletal abnormalities [10]. Our patient was a young woman, infected with mycobacterium kansasii, with bronchial dilatation in the right lung but only in segment 2 and without predisposing lung disease. Interestingly, our patient reported voluntary suppression of coughing and sneezing, was tall with a low BMI of about 17.5kg/m2 and had slight scoliosis.

CONCLUSIONS

It is difficult to say why an immunocompetent patient developed NTM with multiple cavitary lesions and nodules in the lungs despite her young age, healthy lifestyle, no respiratory burden and no addictions. It is important not to underestimate symptoms in young apparently healthy patients that may suggest tuberculosis or NTM.

TEACHING POINT

Atypical mycobacteriosis can occur in young, healthy women, suggesting the existence of unknown predisposing factors. Early diagnosis is crucial as symptoms can be non-specific and delaying treatment can lead to complications.

QUESTIONS

1. NTM infection

(a) is more common in young men

(b) is more common in immunocompetent patients

(c) is more common in HIV-positive patients

(d) is caused by mycobacteria commonly found in the aquatic environment

(e) presents clinically and radiologically as Mycobacterium tuberculosis infection

[Mycobacterium kansasii, which are abundant in open bodies of water, tap water and also in soil, cause pulmonary and extrapulmonary infections in immunocompromised or immunocompetent individuals [1,2]. Infectivity is low in endemic areas and infection is presumed to occur via the aerosol route. [3] Those infected with M.kansasii are mostly men aged 45-62 years.[4] Most infected patients (69.3%) are HIV-positive. [3] Both the clinical and radiological manifestations of atypical mycobacteriosis infection are mostly indistinguishable from those caused by Mycobacterium tuberculosis.**]**

2. Nodular bronchial dilatation in NTM infection is more characteristic of:

a) older, thin women without coexisting lung disease

b) women often with a funnel chest

c) women often with scoliosis and mitral valve prolapse

d) older men with other lung diseases

e) older, thin men without coexisting lung disease

[The second form is characterised by nodular bronchial dilatation occurring mainly in older, thin women without coexisting lung disease, often with a funnel chest, scoliosis and mitral valve prolapse]

3.NTM infection:

(a) is diagnosed similarly to Mycobacterium tuberculosis

(b) is becoming more common than tuberculosis over the last few decades

(c) occurs more frequently in smokers

(d) nodular bronchial dilatation is more common in older, obese men

(e) may be predisposed by chronic lung disease (COPD), silicosis, pneumoconiosis or previous tuberculosis

[Distinguishing between the two disease entities requires microbiological diagnosis. [5] It is noteworthy that the incidence of non-tuberculous mycobacterial infections is steadily increasing compared to tuberculosis, the incidence of which has decreased over the last few decades. [3]

(...) The majority of patients infected with mycobacteriosis have concomitant pulmonary disease, smoking or immune impairment, i.e. HIV infection. (...) Radiologically, there are two main patterns of NTM lung infection. The first form is characterised by fibrocavitary lesions of the upper lobe, which occur mainly in older men with other lung diseases such as chronic lung disease (COPD), silicosis, pneumoconiosis or previous tuberculosis. The second form is characterised by nodular bronchial dilatation occurring mainly in older, thin women without coexisting lung disease, often with a funnel chest, scoliosis and mitral valve prolapse. Less common is 'hot tub lung', resulting from a hypersensitivity syndrome following exposure to Mycobacterium avium (MAC) associated with exposure to bathing or indoor recreational water [7].**]**

4. The Lady Windermere syndrome:

(a) mostly involves infection with Mycobacterium kansasii

(b) affects middle-aged women

(c) affects patients with a high BMI and a postural defect

(d) may be caused by cough suppression

(e) most commonly causes lingual and right middle lobe bronchodilation

[Lady Windermere syndrome is a rare syndrome that affects middle-aged women infected with MAC, causing lingual and right middle lobe bronchodilation without apparent immunodeficiency and coexisting lung disease. One possible pathogenesis of the syndrome is voluntary cough suppression, which was described based on Wilde's play by Dr Reich and Dr Johnson in 1992. The pathogenesis is due to decreased clearance of secretions from the right middle lobe and lingual segments, which have long and narrow bronchi with an acute angle, predisposing the patient to MAC infection [6,8,9]. Anatomical factors that may contribute to Lady Windermere syndrome include slender body stature, low BMI and skeletal abnormalities [10].**]**

5. Fibrocavitary lesions of the upper lobe **in NTM infection are more characteristic of:**

(a) older men with other lung diseases

(b) older women with other lung diseases

(c) older, thin women without coexisting lung disease

(d) older, obese women without coexisting lung disease

(e) older, thin men without coexisting lung disease

[The first form is characterised by fibrocavitary lesions of the upper lobe, which occur mainly in older men with other lung diseases such as chronic lung disease (COPD), silicosis, pneumoconiosis or previous tuberculosis.**]**

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FIGURES

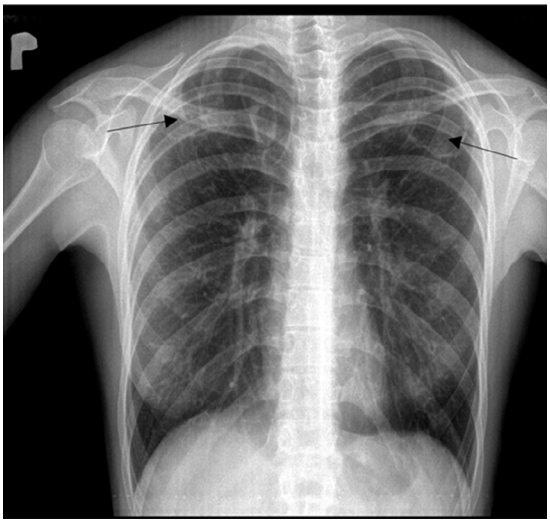

Figure 1: Chest X-ray showing cavernous lesions (black arrows) and nodules.

Figure 2: Chest CT scan showing the largest dimensions of the cavity in the left lung 4.4x3.9 cm.

Figure 3: Chest CT showing the largest dimensions of the right lung cavity 4.6x1.8 cm and the left lung cavity again.

KEYWORDS

atypical mycobacteriosis, NTM, non-tuberculous mycobacteria, Mycobacterium kansasii, pulmonary disease, tuberculosis, Lady Windermere syndrome

ABBREVIATIONS

NTM: NON-TUBERCULOUS MYCOBACTERIA

COPD: CHRONIC OBSTRUCTIVE PULMONARY DISEASE