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Case Report

# Co-Isolation of *Mycobacterium Abscessus* and *Mycobacterium Riyadhense* in a Patient with Previous History of Pulmonary Tuberculosis; Case Report

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**Abstract:** Non-tuberculous mycobacteria are increasing around the globe and can affect immunocompetent individuals. To date, more than 160 species have been identified, including multiple human pathogens. Subsequent isolation or co-existence of several non-tuberculous mycobacteria in the same individual has been reported, yet, the clinical importance remained incompletely understood. Co-isolation of *Mycobacterium abscessus* and *Mycobacterium riyadhense* is extremely rare, and to our knowledge, this is the first case to report co-isolation/existence. This is because the initial is rapidly growing, and the latter is slowly growing. We hereby present a case of *Mycobacterium riyadhense* isolation in a male patient, followed by *Mycobacterium abscessus*.

**Objectives:** This case report addresses the importance of repeating sputum culture for tuberculosis if the patient does not improve on the standard therapy as co-existence of multiple NTM is emerging globally.

**Keywords:** Non-tuberculous Mycobacteria, *Mycobacterium abscessus*, *Mycobacterium riyadhense*, Co-isolation, Nontuberculous mycobacteria species change

## Introduction

Non-tuberculous Mycobacteria [NTM] are ubiquitous mycobacteria of low virulence and cause infections mainly in immunocompromised hosts. [1] *Mycobacterium abscessus (M. abscessus)* complex is a rapidly growing NTM with the lung as the most common site of infection. [1] It is reported to be the third most

commonly recovered respiratory NTM in the United States and accounts for a majority of the rapidly growing respiratory mycobacterial isolates. [2] The range of infections caused by *M. abscessus* is from asymptomatic to bronchiectasis and cavitary lung disease with significant mortality and morbidity. Pulmonary involvement is often seen among non-smokers, most frequently among older women with no previous documented lung disease. [2]

Recently, *M. abscessus* lung infections were also reported as opportunistic infections following infection with the SARS-CoV-2 Virus. *M. abscessus* is considered the most pathogenic species among rapidly growing mycobacteria and is inherently multi-drug resistant, posing serious challenges for treatment. Additionally, it is associated with intrinsic and acquired resistance to most anti-mycobacterial agents, including macrolides [2-3]. Current recommendations for treatment include multi-drug therapy with a combination of oral and intravenous agents and/or surgery [2].

*Mycobacterium riyadhense (M. riyadhense)* is a newly described NTM species that was first isolated from a patient in Riyadh, Kingdom of Saudi Arabia, who presented with a maxillary sinus infection [4-5]. Cases of *M. riyadhense* were subsequently reported from Bahrain, France, and South Korea [4-5]. Pulmonary manifestations resembling tuberculosis and extrapulmonary manifestations were reported from patients infected with the novel *M. riyadhense*. [4-5] Literature review suggests that infections with *M. riyadhense* usually respond well to standard first-line anti-TB therapy [4-5]. Importantly, M. riyadhense can be misidentified by commercially available line probe assays as M. tuberculosis complex due to confusing banding patterns [6].

## Case Presentation

This is a 67-year-old male with a previous history of treated pulmonary Tuberculosis (TB) for 6 months in 2012, presented to the infectious disease clinic with progressive shortness of breath on exertion associated with lethargy, productive cough with greenish sputum, and weight loss (5 kg in less than a month) for a couple of months. His activity tolerance was limited to one flight of stairs. He had a history of severe numbness and tingling secondary to isoniazid in his previous pulmonary TB treatment. He has no other past medical history, in particular, no history of exposure to asbestos, silica, or beryllium. Also, no personal or family history of connective tissue disease, interstitial lung disease, obstructive airway disease, venous thromboembolism, or substance abuse. He has been a former smoker for almost 30 years and quit in 2019. He is unknown to have an allergy to drugs or food.

On clinical examination, he was poorly groomed, cachectic, mildly fatigued, and sitting comfortably without any signs of distress. No clubbing, nicotine staining, or skin rash was present. Chest examinations revealed right apical coarse inspiratory and expiratory crepitations with no other significant clinical findings. Moreover, his laboratory findings showed monocytosis, microcytic anemia, elevated erythrocyte sedimentation rate (ESR), and C-reactive protein (CRP) (**Table 1**). Subsequently, a CAT scan of his chest showed right apical fibrobronchiectatic changes with areas of cavitations and extensive bilateral emphysematous and fibrotic changes (**Figure 1**).

Hence, the patient underwent bronchoalveolar lavage, for which a TB culture sample grew *M. riyadhense*. He was started accordingly on rifampicin, ethambutol, and azithromycin for a total of six months. Two months later, upon his regular follow-up for laboratory monitoring, he still experienced exertional dyspnea, easy fatigability, productive cough, and further weight loss. High-resolution computerized topography showed progressive worsening of the fibro bronchiectatic changes compared to the previous CAT scan.

Thereafter, sputum was sent for three Acid Fast Bacilli (AFB) samples, TB polymerase chain reaction (PCR), and cultures for TB, bacteria, and fungi. As a result, three AFB samples returned positive, TB PCR was negative, and bacterial/fungal cultures were negative, but TB culture grew *M. abscessus* with inducible-resistent to clarithromycin, azithromycin, imipenem, doxycyclin, and moxifloxacin. Consequently, he started on intravenous tigecycline and amikacin in addition to oral linezolid for 12 months with close monitoring of his complete blood count, liver and kidney profile every 3 days for two weeks, then weekly for one month.

**Figure 1.** CAT scan of the Chest

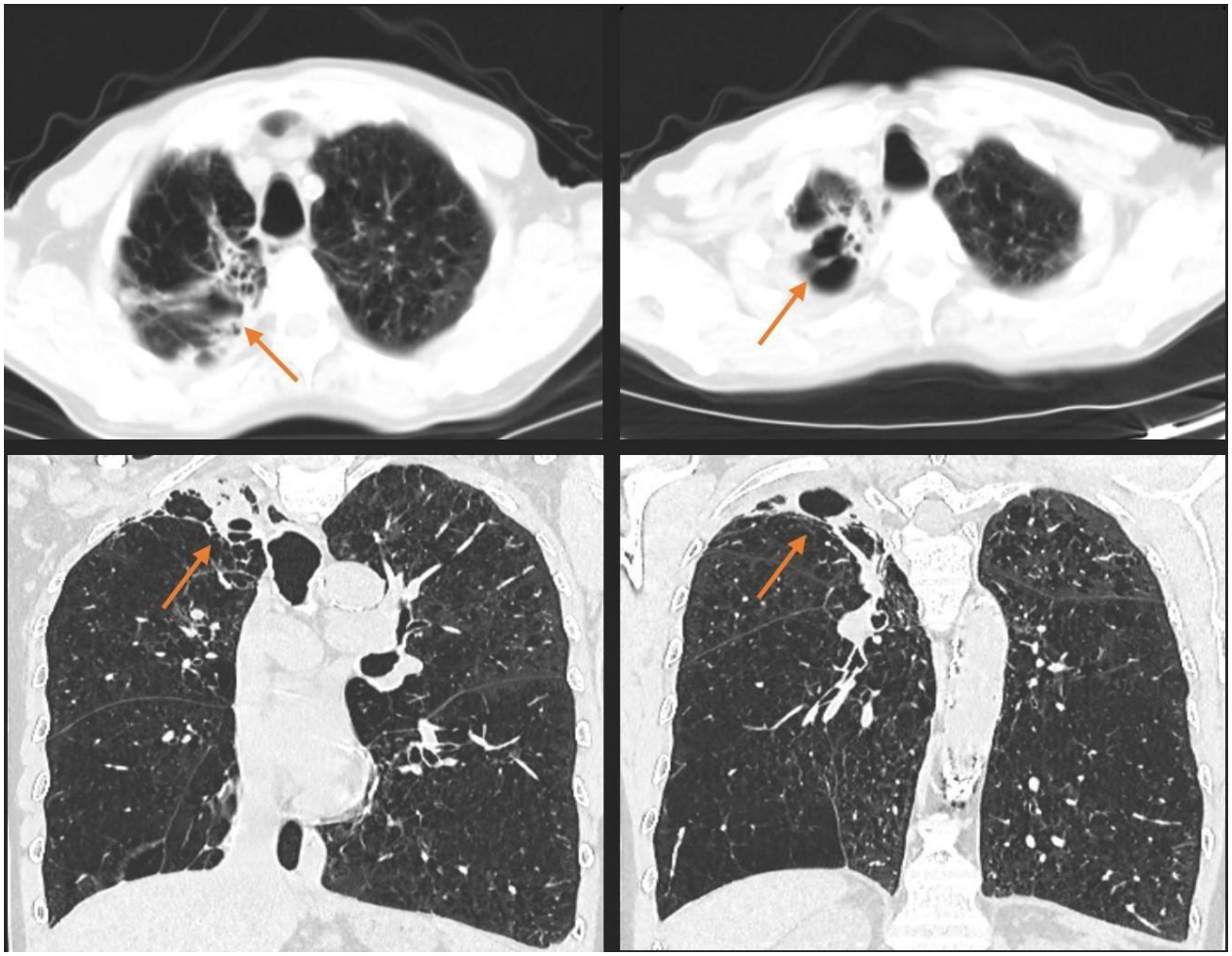

**Table 1.** Laboratory Investigations

| Description | Result | Reference | Description | Result | Reference |
|---|---|---|---|---|---|
| **Creatinine** | 68.5 | 63 - 110.5 | **ESR** | 83 | < 15 |
| **AST** | 29 | < 40 | **CRP** | 16.7 | < 5 |
| **ALT** | 26 | < 41 | **Procalcitonin** | 0.04 | < 0.01 |
| **WBC** | 5.08 | 4 - 11 | **Hb** | 11.5 | 13 - 17.4 |

## Discussion

Over the last decade, the number of NTM cases has significantly increased worldwide, even among immunocompetent individuals. Based on a nationwide prospective exploratory study for 12 months in Saudi Arabia, 52 NTM cases have been discovered among children from 0-14 years. More notably, *M. simiae* was the most predominantly identified species, followed by *M. abscessus* and *M. fortuitum*. Extra-pulmonary involvement was more commonly reported than pulmonary involvement, and the lymph nodes were the highest affected site (6).

There are limited published reports in the literature on the isolation of multiple NTM species in the same patient and co-infections with other NTM species during or after treatment of the initial NTM species. In one such study conducted by Masato Asaoka et al., multiple NTM isolates were more common in women than men and in patients without cavity lung lesions than in those with such lesions. This study suggested the possibility of having different NTM in different ectatic bronchi or nodules. Co-isolation has not been observed in patients with *M. szulgai* infection and was rare in patients with *M. kansasii* infection. In cases of *M. abscessus* infection, co-isolation was relatively common, and only Mycobacterium avium complex [MAC] was co-isolated. Dual isolation of MAC and *M. abscessus* was reported as the most common pattern of multiple NTM species isolation, and this study also showed that NTM species conversions were likely to occur while on therapy or within two years of therapy [7].

In another study done by K. Morimoto et al., approximately 25% of the patients had a positive culture result for another NTM after a diagnosis of *Mycobacterium abscessus* complex. This study also highlighted that previous history of or concomitant infection with a pulmonary NTM, especially MAC disease, complicates the patient's clinical management because of different drugs and treatment strategies that are needed to resolve these different conditions [8].

Also, another prospective six-year study showed that 473 patients were affected by NTM lung disease, but 164 (34.6%) were only treated. Additionally, 16 patients underwent NMT species changes during or within two years of completing the course of treatment. Importantly, all isolated *M. abscessus* species *abscessus* had shown inducible resistance to clarithromycin, similar to our case. Patients with MAC changes to M. abscesses species *abscessus* developed worsening symptoms and radiological findings (9).

## Conclusion

We hereby describe an unusual case, probably the first of its kind to our knowledge, of co-isolation of *M. riyadhense* and *M. abscessus* infection in a male with a history of treated pulmonary TB. We believe the patient's symptoms were caused by *M. abscessus*, and *M. riyadhense* was concomitantly co-isolated. We recommend repeating the tuberculosis workup if the patient does not show signs of improvement, as the co-isolation or existence of NTM is increasing globally.

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