Case Report

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Case Report: Mycobacterium Senegalese Infection After Lumbar Surgery

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ABSTRACT

Mycobacterium senegalis (*M. senegalis*) is an environmental non-tuberculous mycobacterium that is rarely implicated in human infections. This case report details a postoperative *M. senegalis* infection in the L1 segment of the lumbar spine in a 54-year-old male presenting with low back pain and space-occupying lesions at the L1 level. Following surgical resection, the patient developed swelling, erythema, and palpable fluctuation at the surgical site two weeks after discharge. Imaging revealed subcutaneous inflammation and fluid accumulation, though the spinal canal was unaffected. *M. senegalis* was isolated from drainage fluid cultures. The infection was successfully managed with repeated wound irrigation, continuous drainage using hydrogen peroxide and iodophor, daily debridement, and antibiotic therapy with amoxicillin–clavulanate and cefuroxime. This case highlights the importance of recognizing *M. senegalis* infections in immunocompetent hosts and strengthens the necessity of surgical debridement combined with a multimodal antibiotic regimen to enhance treatment outcomes.

Keywords: Mycobacterium Senegalensis; Infection; Non-Tuberculous Mycobacterium

Abbreviations: MRI: Magnetic Resonance Imaging; HIV: Human Immunodeficiency Virus; ITS: Internal Transcribed Spacer; NTM: Non-Tuberculous Mycobacteria; mNGS: Metagenomic Next-Generation Sequencing

Introduction

Mycobacterium senegalis (*M. senegalis*) is a non-tuberculous mycobacterium that is widely distributed in the environment. In cattle, this pathogen typically causes chronic granulomatous inflammation of the cutaneous lymphatic vessels and lymph node drainage, accompanied by plaque formation. However, human infection with *M. senegalis* is extremely rare. The absence of typical clinical manifestations and the low sensitivity of routine diagnostic methods pose significant challenges to its clinical detection [1,2]. In 2005, the first human case of *M. senegalis* infection was reported in South Korea, where the pathogen caused a catheter-associated bloodstream infection in a cancer patient-highlighting the zoonotic potential of this species [3]. To date, fewer than 30 cases of human *M. senegalis* infection have been documented in the literature. Herein, we report a case of *M. senegalis* infection involving the L1 lumbar vertebra in a 54-year-old male patient following surgery. Notably, subsequent culture results were negative for *M. senegalis*. Given the rarity of human *M. senegalis* infection, there is currently no standardized treatment protocol for this condition. The purpose of this case report is to enhance the clinical understanding of *M. senegalis* infection in humans and provide insights for the development of rational anti-*M. senegalis* treatment strategies.

Case Report

A 54-year-old male patient presented with low back pain and was found to have space-occupying lesions both inside and outside the L1-level spinal canal. He was admitted to our hospital for resection of the masses inside and outside the L1 spinal canal. The patient had no significant medical history, no history of contact with livestock or other animals, and no travel history to any epidemic areas. Surgical treatment was performed in April 2023, and the operation proceeded uneventfully. During the operation, the right half of the L1 lamina was resected, repositioned, and fixed with an implantable connector. The postoperative incision healed well, and a follow-up magnetic resonance imaging (MRI) scan showed no abnormalities. Two weeks after discharge, the patient noticed swelling and erythema of the skin

and soft tissue under the surgical incision, accompanied by a palpable fluctuant mass on palpation (Figures 1A & 1B). Ultrasonography and MRI examinations revealed subcutaneous tissue inflammation with fluid accumulation, which had not yet invaded the spinal canal. The local skin around the surgical incision was swollen, with a distinct fluctuant sensation. Upon incision of the skin, milky white secretions were observed, and subcutaneous cavities had formed, with no obvious bleeding. The vertebral accessory structures were palpable at the base of the cavity. After daily debridement and antibiotic therapy, the incision showed no signs of redness, swelling, ulceration, or exudation, and the skin healed well. Culture of the incision site did not detect *M. senegalis*. However, serial MRI examinations revealed persistent suspicious inflammatory signals in the subcutaneous tissue (Figures 1C & 1D).

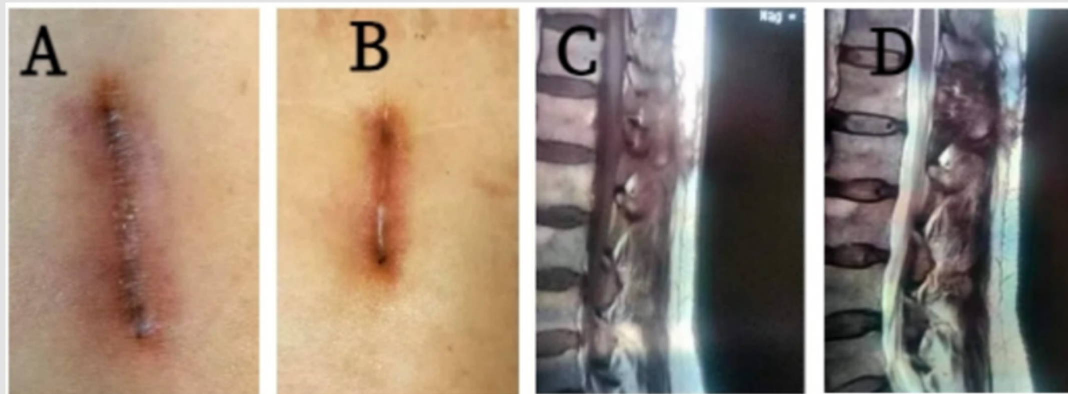

Figure 1: Radiographic images.
A. (A-B) Tissue imaging.
B. (C-D) MRI examination.

Discussion

M. senegalis is a member of the non-tuberculous mycobacteria (NTM), and to date, more than 200 NTM species have been identified [4,5]. These ubiquitous bacterial pathogens are primarily transmitted via skin contact, inhalation, ingestion, or direct inoculation [6]. As opportunistic pathogens, they typically infect immunocompromised patients with underlying chronic conditions, such as chronic lung disease, human immunodeficiency virus (HIV) infection, or malignancy [7]. However, several studies have also reported that *M. senegalis* infection is not restricted to immunocompromised individuals. For instance, a 67-year-old man with normal immune function in Hong Kong developed a prosthetic joint infection caused by *M. senegalis* following total hip replacement [8]. Additionally, two other cases have been reported in which patients with normal immune function developed *M. senegalis* infection after traumatic injury [5,9]. *M. senegalis* infections predominantly occur postoperatively or following trauma, and can involve bone, soft tissue, or even long-term intravascular catheter sites. In the present case, the main clinical manifestations of the patient were swelling and erythema of the skin and soft tissue at the lower portion of the surgical incision, accompanied by a fluctuant sensation upon palpation. Ultrasonographic and magnetic resonance imaging (MRI) examinations revealed subcutaneous tissue inflammation with fluid accumulation, which had not yet invaded the spinal canal. The diagnosis of *M. senegalis* infection is challenging due to the no specificity of its clinical manifestations, which overlap with those of other mycobacterial infections. Therefore, specialized laboratory techniques are required for the accurate identification of *M. senegalis*.

The gold standard for diagnosing *M. senegalis* infection involves culturing clinical specimens (e.g., sputum or tissue samples) followed by species identification using molecular methods. On initial culture, *M. senegalis* appears as smooth, colorless, rapidly growing acid-fast organisms. Morphologically, *M. senegalis* forms short to long branched filamentous bodies that are curved, and may cluster or interweave into web-like structures. Unlike many other bacteria, it does not fragment into bacilli in diseased pus and is Gram-positive. Over the past few decades, molecular diagnostic methods-including matrix-assisted laser desorption ionization time-of-flight (MALDI-TOF) mass spectrometry, 16S ribosomal RNA (rRNA) sequencing, and sequencing of the rpoB and hsp65 genes-have become powerful tools for identifying NTM in clinical microbiology laboratories. Studies have demonstrated that the single 16S-23S ribosomal DNA internal transcribed spacer (ITS) sequence confirms *M. senegalis* as a distinct, separate species [10]. It can be differentiated from pathogenic mycobacteria based on its unique biochemical activities, growth rate, and DNA homology.

MALDI-TOF mass spectrometry is widely used for the identification of common clinical pathogens by analyzing differences in bacterial protein profiles [11]. When applied to NTM detection, this method offers advantages of high resolution, rapidity, and accuracy, with relatively low bacterial quantity requirements. However, the complex pre-identification process of NTM and the large diversity of NTM species impose specific operational technical requirements, which have limited its widespread application. Metagenomic next-generation sequencing (mNGS) is the highest-resolution method for strain identification, capable of accurately identifying pathogens within 48 hours, with sensitivity and specificity exceeding those of traditional culture methods. For example, in a case involving an insulin-dependent diabetic patient with a prior organ transplant, an open wound from insulin injection led to pathogen invasion and infection, and *M. senegalis* was identified via rpoB gene sequencing [12].

In clinical practice, empirical treatment based on the susceptibility patterns of other NTM species is typically initiated until specific drug susceptibility results for *M. senegalis* are available. When managing *M. senegalis* infections, healthcare providers must carefully consider antibiotic selection and treatment duration, local epidemiological data, patient-specific factors, and antimicrobial stewardship principles. In the present case, *M. senegalis* was found to be sensitive to the following antibiotics: amikacin (MIC 0.5 μg/mL), clarithromycin (MIC 0.5 μg/mL), ciprofloxacin (MIC 0.25 μg/mL), doxycycline (MIC 0.25 μg/mL), cefoxitin (MIC 8 μg/mL), imipenem (MIC 2 μg/mL), and trimethoprim/sulfamethoxazole (MIC 0.5/8.5 μg/mL) [13,14]. Consequently, *M. senegalis* infections are usually treated with a combination of three to four antibiotics to avoid the development of resistance associated with monotherapy, and the antibiotic combination and dosage are adjusted based on clinical experience and the patient's condition until resolution of infectious manifestations. In this case report, we describe a successful management strategy for *M. senegalis* infection. The patient achieved a favorable prognosis following comprehensive clinical treatment. Moving forward, it is crucial to enhance diagnostic techniques and standardize treatment protocols to improve both treatment outcomes and patient prognoses for M. Senegalese infections.

Informed Consent

The patient's family provided written informed consent for the publication of the patient's case details.

Declaration of Competing Interest

The authors have no competing interests to declare.

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