Mycobacterium szulgai Infection after Carpal Tunnel Release Requiring Extensive Debridement and ALT Flap Reconstruction

Ayman Saeed^{1,✉} Nitisha Narayan² Nikos Karmiris³ Luigi Troisi^{4,✉}

¹Department of Plastic and Reconstructive Surgery, Royal Victoria Infirmary, Newcastle upon Tyne, United Kingdom

²Department of Plastic and Reconstructive Surgery, Oxford University Hospitals NHS Foundation Trust, United Kingdom

³Department of Plastic and Reconstructive Surgery, Salisbury NHS Foundation Trust, United Kingdom

⁴University Department of Hand Surgery and Rehabilitation, San Giuseppe Hospital, IRCCS MultiMedica Group, Milan, Italy

Address for correspondence Ayman Saeed, MBCh BAO, MRCSI, Department of Plastic and Reconstructive Surgery, Royal Victoria Infirmary, Queen Victoria Road, Newcastle upon Tyne NE1 4LP, United Kingdom (e-mail: aymantsaeed@gmail.com).

J Hand Microsurg 2021;13:252–254.

Abstract

Keywords

- *Mycobacterium*
- nontuberculous
- ALT
- reconstruction
- infection

Nontuberculous mycobacteria (NTM) refer to all mycobacteria species not associated with the *Mycobacterium tuberculosis* complex. NTM have been shown to cause superficial and deep tissue infections of the hand, the vast majority of which are attributed to *Mycobacterium marinum*. There have been only eight cases of *Mycobacterium szulgai*-associated infections of the hand described in the English literature, none requiring surgical reconstruction. We describe a severe case of *M. szulgai*-associated carpal tunnel infection reported in an immunocompetent patient requiring extensive soft tissue debridement and reconstruction. This case illustrates the importance of a multidisciplinary team approach with microbiology specialists when managing severe soft tissue infections of the hand.

Introduction

Nontuberculous mycobacteria (NTM) refer to all mycobacteria species not associated with the *Mycobacterium tuberculosis* complex.¹ NTM have been shown to cause superficial and deep tissue infections of the hand, and vast majority of which are attributed to *Mycobacterium marinum*.² *Mycobacterium szulgai* is a rare scotochromogen first described in 1972 and named after Polish microbiologist T. Szulg.³ Sources of *M. szulgai* infections are mainly environmental and have been shown to be found in aquarium water, tropical fish, and swimming pool water.^{4,5} There have been only eight cases of *M. szulgai*-associated infections of the hand described in the English literature, none requiring surgical reconstruction.^{6–12} We describe a severe case of *M. szulgai*-associated carpal tunnel infection reported in an immunocompetent patient requiring extensive soft tissue debridement and reconstruction.

Case

A 73-year-old Caucasian retired engineer presented to a neighboring hospital with a 2-week history of a painful, swollen right wrist that was discharging pus from a unilateral, open carpal tunnel release incision site that had dehisced. The release was performed 5 months prior to this admission for chronic median nerve-related symptoms. He had continued carpal tunnel symptoms on presentation with associated deterioration in hand function but did not describe any systemic symptoms, denying fevers, night sweats, hemoptysis, or weight loss. He had no previous history of immunosuppressive disorders and was not on any medications that would compromise his immunity. After initial debridement of the wound and microbiology specimens taken, he was transferred from the referring unit to our institution for reconstruction.

The patient underwent an initial examination under anesthesia in the operating room, where frank pus was evident

published online
April 28, 2020

© 2020. Society of Indian Hand & Microsurgeons. All rights reserved.
Thieme Medical and Scientific
Publishers Pvt. Ltd., A-12, 2nd Floor,
Sector 2, Noida-201301 UP, India

DOI <https://doi.org/10.1055/s-0040-1709215>
ISSN 0974-3227.

in the carpal tunnel tracking proximally along palmaris longus (►Fig. 1). All longitudinal structures in the wrist were covered in thickened synovium and granulation tissue with surrounding fluid. The median nerve was evidently contused but structurally intact, therefore, not requiring reconstructive intervention. Fluid and tissue samples were sent for microbiology investigations. The initial laboratory staining results showed evidence of acid-fast bacilli, consistent with a mycobacterial infection. However, further cultures were required to identify the exact organism.

Given the patient's initial presentation, the main differential diagnosis was a pyogenic surgical site infection caused by common pathogens such as *Staphylococcus* or *Streptococcus* organism. There was no intraoperative evidence of extra-articular rice bodies that would have raised the suspicion of a mycobacterial infection. Once the laboratory results confirmed the presence of acid-fast bacilli, this narrowed down the differentials to a mycobacterial tuberculosis or NTM infection. On further investigation, it was found that the patient would regularly tend to his fish tank at home. An initial suspicion of *M. marinum* was made. It was only after prolonged incubation did our microbiology colleagues confirm the diagnosis of *M. szulgai*.

A total of three explorations, washouts and debridement of the wound were performed during the patient's admission alongside triple antibiotic therapy. Nonviable skin and subcutaneous fat were debrided back to healthy tissue, alongside a nonviable palmaris longus tendon, resulting in a longitudinal defect spanning 18×7 cm and exposing the superficial flexors of the forearm which were devoid of healthy paratenon (►Fig. 2). Once the debrided area was clear of signs of gross infection and specimens showed no organism growth, an autologous free anterolateral thigh (ALT) tissue transfer to his right forearm was performed to reconstruct the defect. The fasciocutaneous ALT flap was raised on a single perforator via intramuscular dissection to the descending branch of the lateral circumflex femoral artery. An end-to-side anastomosis to the radial artery and an end-to-end to its venae comitans were performed, providing adequate perfusion. No further returns to the operating room were required.

The decision to proceed with a free tissue transfer using the ALT flap was made after careful consideration.

Fig. 1 Carpal tunnel defect during initial debridement. (A) Palmaris Longus tendon. (B) Frank pus tracking proximally along the palmaris longus.

In reconstructive surgery, the ALT flap is a workhouse, utilized all over the body to provide a durable reconstruction. The senior author felt that his experience with this flap meant he could achieve adequate coverage of the sizeable 18×7 cm defect, and using Gillies concept of replacing like with like, provide a layer of fascia over the exposed upper limbs flexor tendons to aid with tendon gliding. Other options such as the free gracilis flap may not have been able to provide sufficient soft tissue coverage, and although a thinner flap, commits to needing a split-thickness skin graft to cover the muscle. Pedicle flap reconstruction was also considered, such as the pedicled superficial circumflex iliac perforator flap to reconstruct the defect in stages. The drawback with this option was the period of immobilization required, alongside the inability to match the dimensions of the defect.

On review in clinic 8 months postprocedure, there were no signs of disease recurrence. The patient's ALT flap on the volar aspect of his right forearm was healthy and had healed without issue (►Fig. 3). He had persistent evidence of longstanding wasting of his thenar eminence, present prior to his initial decompression, but felt that this was improving. He exhibited full range of motion of his wrist and all digits including his thumb, with good power against resistance on examination. There was also improving areas of paraesthesia on the radial aspect of his index and middle fingers which were subjectively 8/10. Sensation to the remainder of his hand was normal. Discussions with the patient regarding a flap thinning procedure to improve the contour of the flap were had; however, the patient was satisfied with the result and decided against it.

Fig. 2 Carpal tunnel defect clear of gross signs of infection exhibiting the exposed structures in the forearm.

Fig. 3 Anterolateral thigh flap on review in clinic 8 months postoperatively.

The patient also had followed up with the microbiology team while on ethambutol 1,100 mg once daily, clarithromycin 500 mg twice daily, and rifampicin 600 mg once daily. He completed a total of 5 months of antibiotics, which were then stopped due to an adverse drug reaction.

Discussion

Hand infections caused by atypical mycobacteria are uncommon in an immunocompetent population, with sporadic cases described in the literature. Due to this paucity of cases, a lack of awareness can lead to a delay in diagnosis and treatment, contributing to prolonged distress, inefficient use of resources, and long-term morbidity.

Mycobacterium szulgai itself is a rare cause of NTM infections, isolated in less than 0.5% of human cases,⁵ with the vast majority described in immunocompromised patients, contributing to pulmonary disease, bursitis, osteomyelitis, cutaneous, and urinary infections.¹¹ A review by Zenone et al in 1999 identified 10 nontuberculous *Mycobacterium* species as causative pathogens in hand infections, with the most common offenders being *M. marinum* and *Mycobacterium kansasii*, while *M. szulgai* a rarity.¹³ After reviewing the English literature, we identified eight cases of *M. szulgai*-related infections of the hand described. This included five cases of carpal tunnel syndrome caused by *M. szulgai*, while three further cases reported *M. szulgai* tenosynovitis involving the flexor sheath of the right index finger.⁶⁻¹²

Patients who develop nontuberculous mycobacterial hand infections are typically middle aged, affecting both males and females equally. It has been associated with inoculation into superficial abrasions, puncture wounds, or cuts in water or marine environments,¹³ with the *M. szulgai* strain identified in aquarium and swimming pool water.^{4,5} We believe our patient contracted *M. szulgai*, through his surgical site while handling his fish tank at home. He described cleaning the tank in the weeks following his carpal tunnel decompression, which would explain the method of inoculation. To the best of our knowledge, this is the only case of *M. szulgai*-associated hand infection requiring extensive surgical debridement and reconstruction.

This case also illustrates the importance of having early suspicions for nontuberculous *Mycobacterium* as a cause for chronic, nonhealing wounds. Clinicians should also have a high index of suspicion in subjects at risk such as fishermen or aquarium enthusiasts. It is essential that adequate microbiology specimens are taken with the appropriate laboratory investigations requested to identify the pathogen involved.

We also demonstrate the importance of a multidisciplinary team approach including the plastic surgery and microbiology departments, alongside hand therapy, to achieve good outcomes in patients with severe soft tissue infections of the hand. Early diagnosis and treatment are essential to prevent complications such as tendon rupture, joint infection, or secondary osteomyelitis.

Note

The patient provided written informed consent for the publication and the use of his images.

Conflict of Interest

None declared.

References

- 1 Falkingham JO II. Epidemiology of infection by nontuberculous mycobacteria. *Clin Microbiol Rev* 1996;9(2):177–215
- 2 Balagué N, Uçkay I, Vostrel P, Hinrikson H, Van Aaken I, Beaulieu JY. Non-tuberculous mycobacterial infections of the hand. *Chir Main* 2015;34(1):18–23
- 3 Marks J, Jenkins PA, Tsukamura M. *Mycobacterium szulgai*—a new pathogen. *Tubercle* 1972;53(3):210–214
- 4 Abalain-Colloc ML, Guillerme D, Salâun M, Gouriou S, Vincent V, Picard B. *Mycobacterium szulgai* isolated from a patient, a tropical fish and aquarium water. *Eur J Clin Microbiol Infect Dis* 2003;22(12):768–769
- 5 Tortoli E, Besozzi G, Lacchini C, Penati V, Simonetti MT, Emler S. Pulmonary infection due to *Mycobacterium szulgai*, case report and review of the literature. *Eur Respir J* 1998;11(4):975–977
- 6 Bartolf A, Cosgrove CA. *Mycobacterium szulgai* infection in the flexor sheath of the right index finger in an immunocompetent patient. *BMJ Case Rep* 2017;2017:bcr2016217722
- 7 Hill CE, Soueid A, Srivastava S. *Mycobacterium szulgai* tenosynovitis: a fishy tale. *Surg Infect (Larchmt)* 2012;13(1):67–67
- 8 Baca-Atlas MH, Barzin AH. Oyster-related tenosynovitis: a rare case of *Mycobacterium szulgai* in the immunocompromised. *BMJ Case Rep* 2017;2017:bcr-2017-bcr-221942
- 9 Stratton CW, Phelps DB, Reller LB. Tuberculous tenosynovitis and carpal tunnel syndrome caused by *Mycobacterium szulgai*. *Am J Med* 1978;65(2):349–351
- 10 Merlet C, Aberrane S, Chilot F, Laroche JM. Carpal tunnel syndrome complicating hand flexor tenosynovitis due to *Mycobacterium szulgai*. *Joint Bone Spine* 2000;67(3):247–248
- 11 Maloney JM, Gregg CR, Stephens DS, Manian FA, Rimland D. Infections caused by *Mycobacterium szulgai* in humans. *Rev Infect Dis* 1987;9(6):1120–1126
- 12 Harvey J, Russell P. *Mycobacterium szulgai* infection as a cause of carpal tunnel syndrome in a patient who kept a Mississippi mud turtle. *J Hand Surg Eur Vol* 2019;44(5):543–545
- 13 Zenone T, Boibieux A, Tigaud S, et al. Non-tuberculous mycobacterial tenosynovitis: a review. *Scand J Infect Dis* 1999;31(3):221–228