

Flexor Tenosynovitis of the Hand Caused by *Mycobacterium tuberculosis*

Samuel Cohen-Tanugi, BA
Margart L. Wright, MD
R. Kumar Kadiyala, MD, PhD

From the Department of Orthopaedic Surgery, Columbia University Irving Medical Center, New York, NY.

None of the following authors or any immediate family member has received anything of value from or has stock or stock options held in a commercial company or institution related directly or indirectly to the subject of this chapter: Mr. Cohen-Tanugi, Dr. Wright, and Dr. Kadiyala.

JAAOS Glob Res Rev 2018;2:e083

DOI: 10.5435/
JAAOSGlobal-D-17-00083

Copyright © 2018 The Authors. Published by Wolters Kluwer Health, Inc. on behalf of the American Academy of Orthopaedic Surgeons. This is an open-access article distributed under the terms of the Creative Commons Attribution-Non Commercial License 4.0 (CCBY-NC), where it is permissible to download, share, remix, transform, and buildup the work provided it is properly cited. The work cannot be used commercially without permission from the journal.

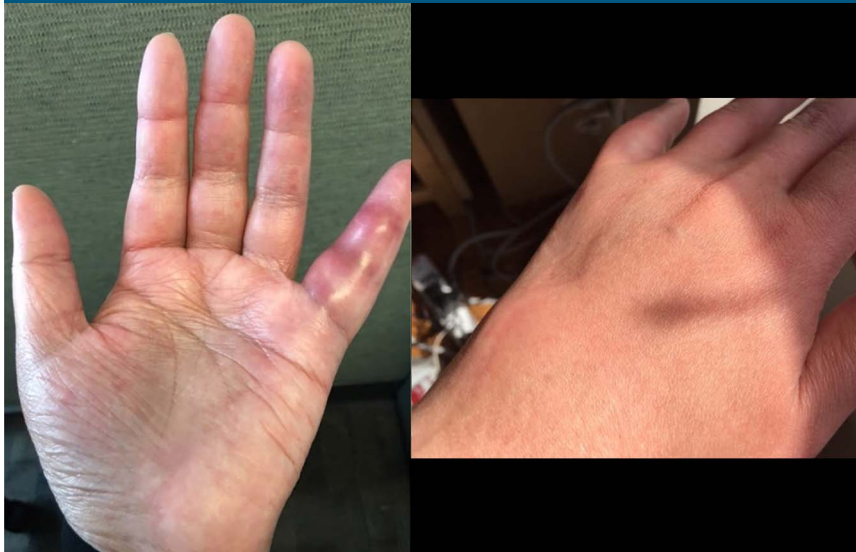
Abstract

Infectious tenosynovitis of the hand is a serious condition with a high risk of morbidity. *Mycobacterium tuberculosis* is a rare cause of tenosynovitis, especially in regions where tuberculosis is no longer endemic, and presents significant diagnostic challenges. We present the case of a 42-year-old woman with no known history of or exposure to tuberculosis and a medical history of systemic lupus erythematosus on chronic immunosuppressive therapy who presented with swelling and erythema in the fifth finger of the left hand of 1-month duration. She underwent tenosynovectomy, and intraoperative cultures grew *M tuberculosis*. The patient completed an appropriate antibiotic regimen, and systemic workup revealed ring-enhancing lesions on brain MRI consistent with tuberculoma. We review the literature and current trends in the management of mycobacterial tenosynovitis, as well as the important teaching points of the case.

Tenosynovitis—inflammation within a tendon sheath—is a common hand condition, resulting from both infectious and noninfectious processes. Infectious tenosynovitis is associated with the potential for tendon necrosis and destruction, spread to contiguous structures, and compartment syndrome.^{1,2} Identification of an infectious etiology has traditionally relied on clinical suspicion based on Kanavel signs: tenderness, fusiform appearance of a digit, flexed digit, and pain with passive motion. Surgical intervention has remained a standard of care for both diagnostic and therapeutic purposes; however, the possibility of antibiotics alone as an alternative has recently been raised

in the literature, making the accurate and rapid identification of the causative organism a potentially critical element of treatment.¹⁻³ Mycobacterial species, including *Mycobacterium tuberculosis*, are a rare cause of hand and wrist tenosynovitis and continue to present notable diagnostic challenges, especially in countries in which tuberculosis is less prevalent.^{4,5} In particular, extrapulmonary tuberculosis without pulmonary disease is rare, accounting for only 20% of tuberculous infections, and of these, only 11% of cases affects the musculoskeletal system.⁴ We report the case of a middle-aged woman with systemic lupus erythematosus (SLE) and no associated pulmonary

Figure 1



Preoperative clinical photographs demonstrating physical examination findings.

tuberculosis in whom flexor tendon tenosynovitis caused by *M tuberculosis* was diagnosed.

Case Report

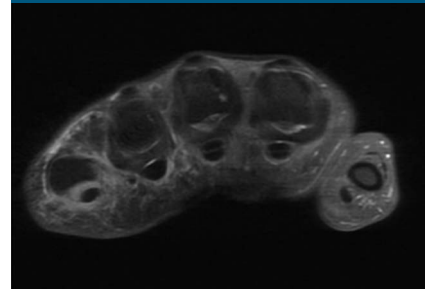
The patient is a 42-year-old Filipino woman with SLE. Chronic symptoms include discoid and malar rash, oral ulcers, photosensitivity, and polyarthritis. She has no history of renal or central nervous symptoms but has a history of pericarditis. She also has Raynaud disease, but no other notable medical problems. She denies an exposure to tuberculosis. Her medications include hydroxychloroquine, methotrexate, azathioprine, methylprednisolone, folate, pregabalin, and nifedipine.

At initial presentation to an outside provider, she noted new swelling and pain in her left fifth finger and the ulnar aspect of her left hand. She had a similar episode in the right hand 1 year prior, which was associated with a lupus flare and resolved with steroid treatment. Her left hand pain and swelling were also attributed to a lupus flare at the time of presentation, and methylprednisolone dosage was increased. When her symptoms did

not improve 1 month later, she presented to our orthopaedic clinic. Her examination was notable for diffuse erythema and swelling in the fifth finger, extending into the palm, as well as a small cyst on the ulnar side of her dorsal hand (Figure 1). She had a fusiform digit and pain over the flexor sheath but did not have pain with passive extension or a flexed digit at rest. A magnetic resonance image was obtained, and the results were consistent with tenosynovitis (Figure 2). She received a cortisone injection in the fifth finger, which resulted in only a mild decrease in swelling. One month later, she elected to proceed with synovectomy.

In the operating room, a Brunner-type incision was made over the fifth finger, and purulence was immediately expressed. The incision was extended to the distal finger and palm to thoroughly evaluate the extent of infection, and synovectomy, irrigation, and débridement were performed after cultures were obtained. No “rice bodies” were noted, and no purulence was found distally in the carpal tunnel. After the volar procedure was completed, a small dorsal incision was made over

Figure 2



Axial magnetic resonance image just distal to the metacarpophalangeal joint showing synovitis within the fifth finger flexor tendon sheath.

the cyst, and purulence was also expressed. The area was not contiguous with volar infection. The skin was loosely closed with nylon sutures, and a soft dressing was placed.

The intraoperative acid-fast culture grew *M tuberculosis*, and all other cultures were negative. Subsequent evaluation of the patient found no evidence of previous or active pulmonary tuberculosis. Because of a recent history of headaches, she underwent neurologic evaluation and brain MRI, which revealed ring-enhancing lesions consistent with tuberculoma. She had no other neurologic signs or symptoms at the time of diagnosis and required no additional treatment for these lesions. She was treated with a standard four-drug regimen, and her azathioprine was discontinued during this course. Her hand infection healed uneventfully without any sign of persistent infection (Figure 3).

Discussion and Summary

The patient ultimately received a diagnosis of *M tuberculosis* tenosynovitis and treatment was successful; however, several factors likely contributed to the difficulty in identifying the correct etiology: (1) the patient had a medical condition (SLE) that offered a more probable explanation;

(2) the progression of her symptoms was both mild and gradual, making infection, commonly caused by *Staphylococcus* and *Streptococcus* species, unlikely;¹ (3) she had no personal history or exposure to *M tuberculosis*; (4) the low prevalence of tuberculosis in developed countries such as the United States generally lowers its rank on the differential diagnosis; and (5) she denied an exposure history suggestive of a specific infectious agent, such as aquatic activities (*Mycobacterium marinum*).^{6,7}

As the overall annual incidence of tuberculosis has decreased in the United States, from >50/100,000 cases to <5/100,000 cases between the 1950s and early 2000s, the proportion of extrapulmonary tuberculosis infection has increased. Infections of the musculoskeletal system now account for 11.3% of extrapulmonary tuberculosis cases in the United States.⁴ The availability of effective and targeted treatments against *M tuberculosis* and the potential morbidity associated with untreated infection make timely diagnosis critical.

As was the case in our patient, previous reports of mycobacterial infections of the hand suggest that an important element of the presentation is timing: the onset of symptoms is gradual over months. In one case series, only 1 of 49 patients had symptoms that “were in any way acute.”⁸ Pain, swelling, and limited motion are the most common complaints in patients with tuberculosis infection of the hand, but a carpal tunnel syndrome is possible if the infection extends into the carpal tunnel.⁴ Extensor tendon involvement is uncommon, as one series found that only 2 of 32 patients had both extensor and flexor involvement, and there are very few reports of isolated extensor sheath infection.^{3,9}

The role of SLE and immunosuppression in the presentation of our patient are important to consider as well. Tenosynovitis due to SLE was an

Figure 3



Postoperative clinical photographs demonstrating early wound healing.

appropriate presumptive diagnosis; however, the lack of response to oral and injected glucocorticoid therapy suggests an alternative process. It is also possible that underlying SLE or its treatment influenced our patient's presentation. Previous reports have found that local glucocorticoid injection, long-term glucocorticoid use, and immunosuppression in general are risk factors or aggravating factors for tuberculous tenosynovitis.¹⁰ In addition, immunosuppression may mask some of the symptoms of infectious tenosynovitis.¹ There are conflicting reports of whether immunosuppression is associated with an increased incidence of extrapulmonary tuberculosis compared with pulmonary tuberculosis; however, Peto et al⁴ found no particular predilection for extrapulmonary tuberculosis among immunosuppressed patients in the United States.

Nontuberculous mycobacterial tenosynovitis also presents subacutely; however, the infection generally results from direct inoculation of a wound.⁶ By far, the most common species is *M marinum*: Balague et al⁶ found it to be the causative agent in 82% of the 241 cases of nontuberculous mycobacterial

hand infections worldwide. *Mycobacterium chelonae*, *Mycobacterium kansasii*, and *Mycobacterium intracellulare* are less common and are responsible for 5%, 2%, and 2% of nontuberculous mycobacterial hand infections, respectively.⁶ In a case series of *M marinum* hand infections, Johnson and Stout¹¹ reported an 87% rate of known aquatic exposure at their institution and a range of 24% to 100% in the literature.⁶ Invasive infection, including tenosynovitis, resulted more often from deeper wounds sustained during activities such as fishing and boating, rather than superficial trauma.⁶ The antibiotics of choice for *M marinum* are two among azithromycin/clarithromycin, ethambutol, and rifampin for 3 to 4 months.⁷

In recent years, questions about the optimal surgical and medical management of mycobacterial tenosynovitis have been raised. The definitive diagnosis and extent of the infection are often assessed intraoperatively, making the condition de facto a surgical issue, but the success of antibiotics alone has been documented in the literature. A series of 13 patients with tuberculosis of the hand found

that all patients returned to full activity by an average of 4.8 months without surgical intervention.³ Antibiotic treatment in these patients, with or without surgery, typically includes quadruple antimicrobial drug therapy with isoniazid, ethambutol, rifampin, and pyrazinamide for 3 to 4 months, followed by isoniazid and rifampin only for an additional period of time, which was the case with our patient.

A recent review of the management of pyogenic flexor tenosynovitis found similarly varied practices in treatment, ranging from surgery without antibiotics to antibiotics without surgery.² This suggests that it may be time for establishment of rigorous, evidence-based protocols for the management of mycobacterial tenosynovitis; however, this is extremely difficult because of the relative rarity of this condition.³ Our case highlights the importance of

maintaining *M tuberculosis* in the differential diagnosis of a subacute presentation of flexor tenosynovitis or carpal tunnel syndrome of the hand, even in nonendemic areas and in the absence of past tuberculosis infection or exposure.

References

1. Draeger R, Bynum D: Flexor tendon sheath infections of the hand. *J Am Acad Orthop Surg* 2012;20:373-382.
2. Giladi AM, Malay S, Chung KC: A systematic review of the management of acute pyogenic flexor tenosynovitis. *J Hand Surg Eur Vol* 2015;40:720-728.
3. Kabakaş F, Uğurlar M, Turan DB, Yeşiloğlu N, Mersa B, Özçelik İB: Flexor tenosynovitis due to tuberculosis in hand and wrist. *Ann Plast Surg* 2015;77:169-172.
4. Peto HM, Pratt RH, Harrington TA, LoBue PA, Armstrong LR: Epidemiology of extrapulmonary tuberculosis in the United States, 1993-2006. *Clin Infect Dis* 2009;49:1350-1357.
5. Vijay PG: Retrospective analysis of varied clinical presentations and delayed diagnosis in tuberculosis affection of extremities. *J Orthop Case Rep* 2016;2:12-16.
6. Balague N, Ukay I, Vostrel P, Hinrikson H, Van Aaken I, Beaulieu JY: Non-tuberculous mycobacterial infections of the hand. *Chir Main* 2015;34:18-23.
7. Harris DM, Keating MR: *Mycobacterium marinum*: Current recommended pharmacologic therapy. *J Hand Surg Am* 2009;34:1734-1735.
8. Pimm LH, Waugh W: Tuberculous tenosynovitis. *J Bone Joint Surg Br* 1957;39:91-101.
9. Probst FA, Koch M, Lohmeyer J, MacHens HG, Schantz JT: Tuberculous extensor tenosynovitis of the hand. *Arch Orthop Trauma Surg* 2012;132:1141-1145.
10. Lee SM, Lee WJ, Song AR: Tuberculous tenosynovitis and ulnar bursitis of the wrist. *Ann Rehabil Med* 2013;37:572-576.
11. Johnson MG, Stout JE: Twenty-eight cases of *Mycobacterium marinum* infection: Retrospective case series and literature review. *Infection* 2015;43:655-662.