

Wrist Tenosynovitis due to *Mycobacterium bovis* Infection: Case Series and Review of the Literature

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Summary: Tuberculosis infections are still one of the most important public health problems among developing countries. Musculoskeletal involvement represents 10–15% of all extrapulmonary cases. Tuberculosis tenosynovitis is usually misdiagnosed as nonspecific tenosynovitis. To avoid misdiagnosis and mistreatment, it is important to be alert for mycobacterial infections. This article presents 3 patients with wrist tenosynovitis, which was caused by *Mycobacterium bovis* infection. The article also includes review of the literature. (*Plast Reconstr Surg Glob Open* 2014;2:e262; doi: 10.1097/GOX.000000000000238; Published online 9 December 2014.)

Tuberculosis infections are still one of the most important public health problems among developing countries. Musculoskeletal involvement represents 10–15% of all extrapulmonary cases. Upper extremity involvement is extremely rare.¹ Tuberculosis tenosynovitis of the wrist is uncommon, and this may cause misdiagnosis, which will be discussed further.

Mycobacterium canettii, *Mycobacterium tuberculosis*, *Mycobacterium africanum*, *Mycobacterium microti*, *Mycobacterium pinnipedii*, *Mycobacterium caprae*, and *Mycobacterium bovis* are the members of the *Mycobacterium tuberculosis* complex (MTC). *Mycobacterium marinum*

is another microorganism, which causes hand infections among fishermen and cooks. *M. bovis* displays the broadest spectrum of host infection, including humans and domestic or wild bovines and goats.^{2,3} Main contamination source for humans is the usage of unpasteurized milk; however, direct contact with infected animals and inhalation of contagious aerosols are causes of infection in humans.

Transmission from human to human is extremely rare; on the other hand, this would be seen in immunosuppressed patients.⁴ After developing of the advanced pasteurization techniques, contamination by gastrointestinal system became less important. However, milkers, livestock farmers, and slaughterhouse workers are still at risk for contamination with inhalation and direct contact. In Western Europe, only a few bacteriologically proven human tuberculosis cases have been reported due to *M. bovis*.^{5–7}

Mycobacterial culture is still one of the most sensitive ways to diagnose mycobacterial infections. There are several methods for molecular typing of MTC isolates. Restriction fragment length polymorphism based on IS6110 polymorphism is current “gold standard” in molecular epidemiological studies of mycobacterial infections.⁸ Polymerase chain reaction is another genetic test to differentiate MTC members.

M. bovis is thought to be responsible for 5–10% of all tuberculous infections. This report presents 3 patients with wrist tenosynovitis caused by *M. bovis*

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infection. The article also includes review of the literature. Principles outlined in the Declaration of Helsinki were followed in this study.

CASE REPORTS

Surgical procedures were performed under tourniquet and standard general anesthesia. Samples were sent for pathological and microbiological examinations. Tuberculous granulomas and Langhans giant cells were seen at histological sections. After diagnosing the tuberculosis infection histologically, isoniazid, rifampicin, pyrazinamide, and ethambutol were administered. Aerobic and anaerobic cultures were negative for all 3 patients' samples. We have isolated the acid-resistant bacillus with BACTEC Mycobacteria Growth Indicator Tube 960 system (Becton, Dickinson Company, NJ). Molecular analysis of *M. bovis* was made with restriction fragment length polymorphism technique. At the end of the second month of antituberculosis therapy, pyrazinamide and ethambutol were stopped, and chemotherapy was continued for a 9-month period with isoniazid and rifampicin combination.

Case 1

A 56-year-old butcher was presented with loss of extension of the index and the third finger of his left hand. Approximately 6 months ago, the patient realized a swelling at left wrist. He has taken some painkillers and antibiotics. As swelling did not provide relief,

local corticosteroid injection was administered. The patient's disability (loss of extension due to tendon rupture) suddenly started 1 week after steroid injection. History of tuberculosis and trauma were negative.

In physical examination, he was unable to extend the index and third finger. Passive movements of these joints were normal. There was a mild swelling on the dorsal aspect of the wrist. Plain radiographies were normal. Sedimentation rate was 32 mm at 1 hour (0–24 mm). C-reactive protein (CRP) level was 0.6 mg/dL (0–0.5 mg/dL). Chest radiography was normal. Purified protein derivative (PPD) test and HIV tests were also negative.

An incision was made on the dorsal side of the wrist. Extensor retinaculum was incised. Thickened synovial tissues were removed and ruptured extensor tendons were found and repaired properly (Fig. 1). There were rice-like bodies around synovial tissues. Four years after the surgery, there were no signs of recurrence.

Case 2

A 66-year-old male patient was presented with pain and numbness on volar aspect of the right wrist. The patient's complaints were started 1 year ago. There was a history of minor penetrating trauma during slaughtering cattle about 18 months ago. The patient did not receive or apply for any treatment or medication. Family's history of tuberculosis is negative.

In his physical examination, there was a 0.5-cm puncture scar, which was located at the ulnar side of

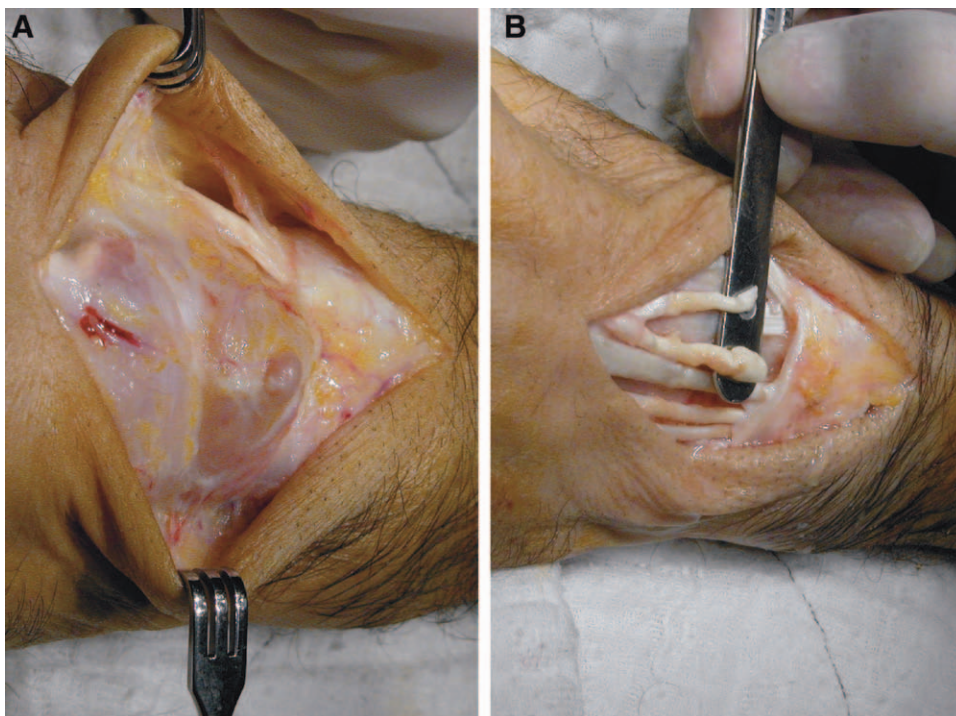


Fig. 1. Intraoperative image of the synovectomy procedure (A) and ruptured tendons (B).

the volar aspect of the wrist. Phalen and Tinel tests were positive. The ulnar nerve examination was normal. The plain radiographies did not show any bone pathology. An electromyography (EMG) study revealed severe median nerve compression at right carpal tunnel. Sedimentation rate was 30mm at 1 hour (0–24mm). CRP level was 0.8 mg/dL (0–0.5 mg/dL). Chest x-ray was normal. PPD test and HIV test were negative.

In the operation, a volar incision was made. Transverse carpal ligament was incised and thickened synovial tissues were removed. There was severe synovial hypertrophy around the flexor tendons. Therefore, the incision was continued proximally to explore upper segments. Twenty-six months after the surgery, we did not find any signs of recurrence.

Case 3

A 57-year-old female patient was referred to our clinic with swelling and pain at the volar side of right wrist and at fourth finger. There was no history of trauma. The patient had been told that the problem could be due to tenosynovitis as she was working as a milker. The patient was treated with a static splint and nonsteroidal anti-inflammatory drugs. Patient's history of tuberculosis was negative. Family history was also negative.



Fig. 2. Magnetic resonance imaging of tuberculous tenosynovitis of the wrist and ring finger.

In the physical examination, there was a mass on the volar side of her wrist. Mentioned mass was extending along the volar side of her fourth finger. By palpation, there was tenderness on the mass. The mass was mobile by wrist movements. There was crepitation on the wrist with the finger movements. Only, soft-tissue swelling was observed on plain radiographs. Bone structure was normal. Magnetic resonance imaging showed tenosynovitis and soft-tissue edema at the volar side of the fourth finger and wrist (Fig. 2). Sedimentation rate was 62mm at 1 hour (0–24mm). CRP level was 0.77 mg/L (0–0.5 mg/dL). There was no pathology on chest x-ray, and PPD and HIV tests were negative.

In the operation, a volar incision was made. Thickened synovial tissues were dissected over the flexor tendons and the median nerve. Then a volar Z-incision was made to the fourth finger. Synovial tissue was removed (Fig. 3). Twelve months after the surgery, there were no signs of recurrence.

DISCUSSION

The patients who have tuberculous tenosynovitis are usually misdiagnosed as having nonspecific tenosynovitis. Rheumatoid synovitis is another condition that should be taken into consideration for differential diagnosis. The rice bodies in rheumatoid diseases are smaller than the ones that are in tuberculosis.¹ Misdiagnosing as rheumatoid or nonspecific tenosy-

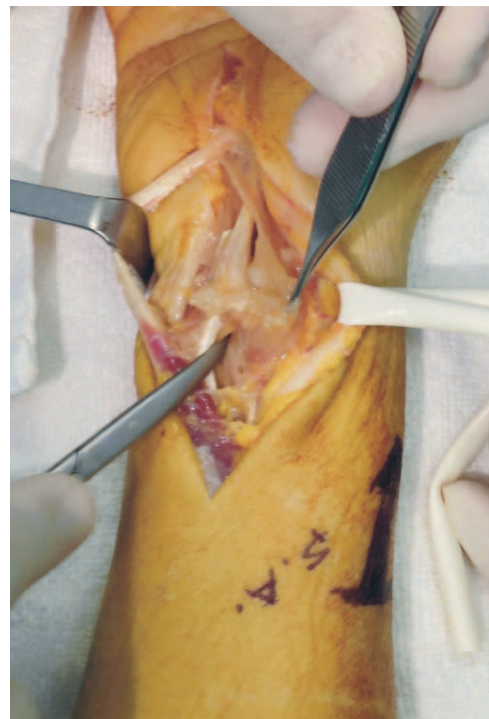


Fig. 3. Intraoperative image of the synovectomy procedure and "rice bodies."

Table 1. Published Hand and Wrist Infections due to *Mycobacterium bovis* in English Literature

| | Age | Gender | Agent | Region | Treatment | Medication | Chemotherapy Duration (mo) | Follow-up | Recurrence |
|-------------------------------------|-----|--------|-----------------|----------------|------------------------|-----------------------|----------------------------|-----------|------------|
| Bagatur and Bayramiçli ⁹ | 23 | Male | <i>M. bovis</i> | Wrist+ palm | Surgery + chemotherapy | INH + Rif | 5 | 5 mo | No |
| Cooke et al ¹² | 44 | Female | <i>M. bovis</i> | Finger | Surgery + chemotherapy | INH + Rif + Eth | 9 | 9 mo | No |
| Mersa et al ¹⁰ | 27 | Male | <i>M. bovis</i> | Palm + finger | Surgery + chemotherapy | INH + Rif + Eth + Pyr | 9 | 1 y | No |
| Valença-Filipe et al ¹¹ | 55 | Male | <i>M. bovis</i> | Wrist + palm | Surgery + chemotherapy | INH + Rif + Eth | 12 | 3 y | No |
| Güner et al (this study) | 56 | Male | <i>M. bovis</i> | Wrist | Surgery + chemotherapy | INH + Rif + Eth + Pyr | 9 | 48 mo | No |
| Güner et al (this study) | 66 | Male | <i>M. bovis</i> | Wrist | Surgery + chemotherapy | INH + Rif + Eth + Pyr | 9 | 26 mo | No |
| Güner et al (this study) | 57 | Female | <i>M. bovis</i> | Wrist + finger | Surgery + chemotherapy | INH + Rif + Eth + Pyr | 9 | 10 mo | No |

Eth, ethambutol; INH, isoniazid; Pyr, pyrazinamide; Rif, rifampicin.

novitis could lead to steroid injections, which aggravates the infection.

There are only a few reports regarding *M. bovis* infections of the hand and the wrist (Table 1). Bagatur and Bayramiçli,⁹ Mersa et al,¹⁰ and Valença-Filipe¹¹ have isolated *M. bovis* as the responsible pathogen of 3 cases of butcher's hand flexor tenosynovitis. Cooke et al¹² have presented a flexor tenosynovitis case combined with carpal tunnel syndrome in a veterinarian hand, which occurred after necropsy of an infected animal. In 1982, Janier et al¹³ have published a chronic tenosynovitis case with carpal tunnel syndrome, which occurred after an injury with a Pasteur pipette containing Bacillus Calmette-Guerin (BCG) cultures. Munding et al¹⁴ reported an acute flexor tenosynovitis in a healthcare worker who had accidental BCG inoculation while treating a urinary bladder tumor. Atiyeh et al¹⁵ have also isolated the *M. bovis* BCG in a surgical resident's ring finger (extensor tenosynovitis), who was working on urinary bladder tumor. Similar to last 2 reports, Vigler et al¹⁶ presented a chronic first dorsal web space infection due to *M. bovis* BCG in a health worker's hand, following an intervention for urinary bladder tumor.

There are different reports about the treatment options of hand and wrist tuberculosis. Surgical treatment without antituberculous chemotherapy often results in recurrence.¹⁷ Bush and Schneider,¹⁷ Cramer et al,¹⁸ and Regnard et al¹⁹ had reported good clinical results with surgical treatment and antituberculosis chemotherapy combination. Visuthikosol et al²⁰ had compared antituberculous chemotherapy and surgery-chemotherapy combination. No recurrence occurred in both groups. Kotwal and Khan²¹ had reported successful clinical results with only antituberculous chemotherapy. Dlimi et al²² have emphasized the success of conservative treatment, including chemotherapy, rehabilitation, and immobilization. Surgery should be considered if there is no response up to 8 weeks of antituberculous chemotherapy.²¹ However, in daily clinical practice, most of these cases are diagnosed after histological examination following the surgical debridement and synovectomy.

Initially, isoniazid, rifampicin, pyrazinamide, and ethambutol should be given for 2 months. At the end of the second month, pyrazinamide and ethambutol should be stopped. Chemotherapy should continue until the end of the ninth month with isoniazid and rifampicin. Treatment might be extended up to 2 years in the presence of drug resistance disease.

A detailed medical history including patient occupation and work status should be taken to prevent misdiagnosis. Probably, most of these cases seem to be assessed as nonspecific tenosynovitis during

clinical practice. As in one of our cases, sometimes contraindicated interventions such as corticosteroid injections might be performed.

Management of mycobacterial infections requires multidisciplinary approach. Although rarely seen, mycobacterial infections should be kept in mind if chronic synovitis is around the wrist.

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