

Flexor Tenosynovitis Due to Tuberculosis in Hand and Wrist Is Tenosynovectomy Imperative?

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Abstract: The treatment of flexor tenosynovitis in the hand and wrist due to tuberculosis is controversial. Although some authors recommend the antituberculous chemotherapy, the others recommend the surgical treatment. In this article, 12 patients with synovial tuberculosis of the flexor aspect of the hand and the wrist were evaluated with respect to diagnosis and treatment modalities. None of the patients had a history of tuberculosis, concomitant disease, immunosuppressive drug use, drug abuse, and human immunodeficiency virus positivity. A chest x-ray and family screening were performed in all of the cases, none had evidence of tuberculosis in the lung. The biopsy, histopathological examination, acid-fast bacillus staining, and BACTEC tuberculosis culture were performed. Antituberculous chemotherapy was initiated in patients diagnosed with tuberculosis by either histological or microbiological examinations. The patients did not undergo any further surgery after biopsy procedures. The lesions regressed totally in all patients after 3 months of treatment. Carpal tunnel syndrome symptoms and signs recruited at five months of treatment. In patients with flexor tuberculosis tenosynovitis, it is possible to achieve good results by applying only medical therapy after a biopsy, and without the need for further surgery.

Key Words: hand tuberculosis, flexor tenosynovitis, extrapulmonary tuberculosis

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Tuberculosis is still a global problem. Although the incidence of pulmonary tuberculosis in the world decreased in recent years, the number of patients with extrapulmonary tuberculosis has increased.¹ The musculoskeletal system is one of the regions affected by extrapulmonary tuberculosis.² Flexor tenosynovial manifestation is the most common presentation of hand tuberculosis.^{3,4} Although antituberculous chemotherapy remains the cornerstone of the treatment of hand and wrist tuberculous tenosynovitis,⁵ synovectomy is also suggested by surgeons.⁶ In this article, we evaluated the patients with synovial tuberculosis of the flexor aspect of the hand and the wrist, treated with antituberculous chemotherapy without applying synovectomy.

PATIENTS AND METHODS

Thirteen patients (8 men and 5 women) diagnosed with and treated for synovial tuberculosis of the hand and the wrist in our clinic between 2001 and 2010 were evaluated retrospectively. The study was approved by our institutional review board and ethics committee. This is our whole, consecutive series, and we have no inclusion or exclusion criteria.

The main complaints were painless swelling, discharge, and restriction in the range of motion in the hand and the wrist. All patients

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had limitation of the affected joints (wrist and fingers). Three patients had suppurative open wounds, 2 in the hand and 1 in the wrist. There were no open wounds or discharge in the others.

Four patients had mild symptoms and signs of carpal tunnel syndrome (CTS), such as pain, numbness, and tingling of the radial fingers. Four patients had axillary lymphadenopathy, and one had lymphangitis of the upper extremity. There were no tendon ruptures.

Mean duration of the lesions was 4.8 months (range, 3–11). Mean age was 32 years (range, 23–56). Mean follow-up was 42 months (range, 28–124). Pretreatment mean Disabilities of the Arm, Shoulder and Hand (QuickDASH) score was 63.6 (range, 52.3–81.8).

Radiologic studies did not reveal any osseous lesions; however, soft tissue changes were observed (Figs. 1, 2, and 3A, B). All patients had expansive signaling masses on magnetic resonance (MR) imaging with entire invasion around the soft tissues (Figs. 1, 2, and 3A, B). Rice bodies were recognized on MR images of the 4 patients (Figs. 1 and 4). The flexor tenosynovitis was seen in the wrist and the hand of all cases. In 2 cases, the thumb; in 3 cases, the middle finger; in 3 cases, the ring finger; and in 2 cases, the little finger were also involved. One thumb and one little finger at the same hand was simultaneously affected at one of these patients.

Complete blood count, erythrocyte sedimentation rate, C-reactive protein, and electrolyte level analysis were performed in all patients. Four patients had lymphocytosis and 5 had increased erythrocyte sedimentation rate. All other laboratory parameters were within normal range.

None of the patients had a history of tuberculosis, concomitant disease, immunosuppressive drug use, drug abuse, or human immunodeficiency virus positivity. A chest x-ray and family screening were performed in all of the cases. Pulmonary tuberculosis was determined in only 1 patient's husband and medical treatment was initiated. There were no patients with a history of pulmonary tuberculosis in the family except for this patient. Ten patients had been previously vaccinated with bacillus Calmette-Guérin vaccine, and the remaining 3 had not been vaccinated before.

The patients were operated under axillary anesthesia for just taking biopsy specimens for culture and histopathologic examination (Fig. 4). None of them had synovectomy. A small incision was done just over the lesions located clinically or with MRI and 2 or 3 cm³ of synovial tissue including rice bodies (if possible) was taken as biopsy material. In patients with open wounds, the wound itself was used for taking biopsy.

In addition to biopsy and histopathological examination, acid-fast bacilli (AFB) staining and BACTEC tuberculosis culture were performed. All patients were AFB negative. *Mycobacterium tuberculosis* (*M. tuberculosis*) was identified in 9 cases in the BACTEC 460 TB tuberculosis medium. In the histopathological examinations of our patients' biopsy samples, there were prominent synovial proliferation. Also, fibrosis, proliferated vascular structures, fibroblasts, epithelioid histiocytes, granulomas with giant cells in the stroma as well as mononuclear inflammatory cell infiltration, and edema were observed at the periphery of the stroma. Granulomas characterized by caseous necrosis were seen in all histopathological examinations.

Antituberculous chemotherapy with Rifampicin 10 mg/kg per day, Isoniazid 5 mg/kg per day, Pyrazinamide 25 mg/kg per day, Streptomycin 15 mg/kg per day, and Ethambutol 15 mg/kg per day was



FIGURE 1. T2-weighted MR imaging of the wrist in coronal plane shows multiple, small, ellipsoid, hypointense structures called rice bodies in well circumscribed fluid collection near flexor tendons.

initiated in all patients diagnosed with tuberculosis. Streptomycin, Ethambutol, and Pyrazinamide were discontinued after 3 months, and treatment continued with Isoniazid and Rifampicin for 6 more months. This regimen is a standard treatment in our country. Renal and liver function tests were periodically performed during medical treatment. No splinting was applied, and early motion in the extremity was started. Except for 1 patient on the fifth gestation month, all patients continued the chemotherapy regimen until the ninth month. This patient gave up the treatment due to gestation on the fifth month of the treatment.

The patients' findings were reviewed at the first, second, third, sixth, and ninth months of treatment. The authors assessed patient demographics including age, sex, operated hand and wrist, and return to full activity. Each patient completed a QuickDASH questionnaire for subjective outcomes.

RESULTS

The patients did not undergo any further surgery after biopsy procedures. Within 6 to 8 weeks after onset of treatment, partial regression of the lesions was generally observed. The lesions regressed totally in all patients after 3 months of treatment. In patients with CTS, symptoms and signs were recruited at the fifth month of treatment. There was no recurrence, even at the patient who stopped treatment because of pregnancy. Posttreatment mean QuickDASH score was 6.8 (range, 2.22–9.09). Mean return to full activity was 4.8 months.

DISCUSSION

Overall, bone and joint involvement of the tuberculosis account for 11% to 19% of all extrapulmonary tuberculosis.⁷ There are few case reports in the literature regarding hand and wrist tuberculous

tenosynovitis.^{8–17} Kotwal and Khan¹⁸ reported the largest series of the tuberculosis in the hand and wrist with 32 patients.

In some cases, synovial tuberculosis can resemble a soft tissue tumor. Although other systemic symptoms or signs are established in slowly progressive disease, tuberculosis should be considered in the differential diagnosis of painless masses with unusual clinical presentations that continue along the length of the tendons.^{8–10,19–21} Synovial joint involvement of the hand and wrist also decreases joint movements, can cause nerve compressions such as CTS, and may result in tendon ruptures.²² We found CTS symptoms and signs (recurrent or persistent pain, numbness and tingling of the hand, weakness of the thumb, difficulty in gripping, positive Phalen test and Tinel sign) in 4 of our patients and painless swelling, restricted range of motion in the hand and wrist in all of our patients.

Nonspecific synovitis or rheumatoid synovitis may be considered in the differential diagnosis of tuberculous tenosynovitis in many patients. Rice bodies can occur in tuberculosis, atypical mycobacterial infections²³, rheumatoid arthritis, systemic lupus erythematosus, rheumatismal diseases, such as seronegative arthritis,^{8,24–26} and fungal infections, such as synovial sporotrichosis.²⁷ Rice bodies seen in other diseases are usually smaller than those of tuberculosis.²⁸ Biopsy and culture should be obtained from these particles. Tuberculosis is diagnosed according to histopathological and microbiological investigations.^{29,30} Histological evaluation of these fibrinous loose bodies may show caseous granulomas, tuberculosis bacillus, and multinucleated Langerhans giant cells.²³

The characteristic feature of the granulomatous tissue in tuberculous tenosynovitis is caseous necrosis.⁵ Atypical *Mycobacterium* infections of the hand (such as *Mycobacterium marinum*) cause granuloma formation but without caseation.⁵ In the histopathological examinations of our patients' biopsy samples, there were prominent synovial

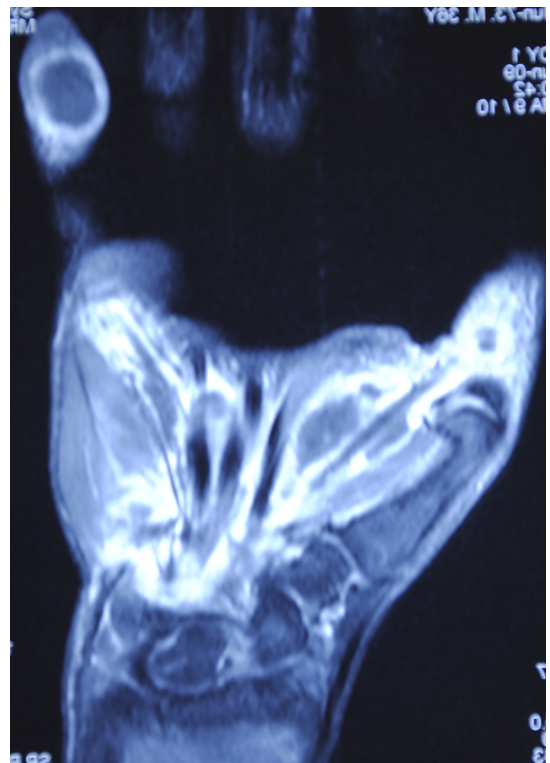


FIGURE 2. The coronal image of the hand and wrist shows hyperintense signal in the pulp of the small finger and in the wrist near the flexor tendons at the carpal region which is consistent with inflammation on T2-weighted image.

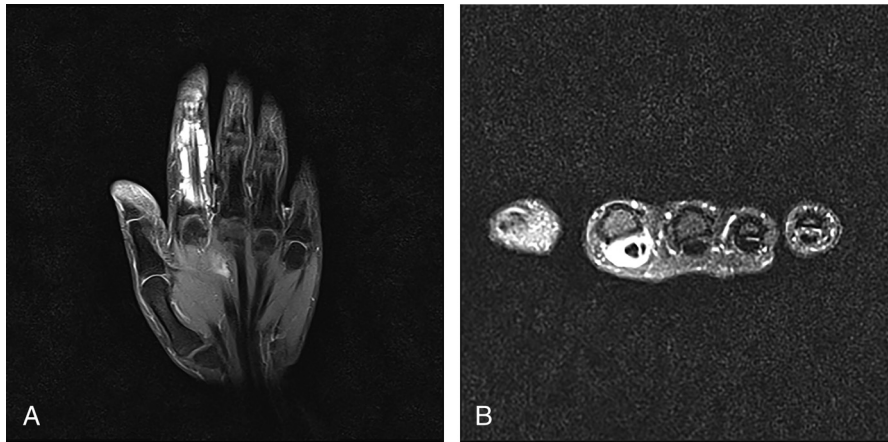


FIGURE 3. A, B, T2-weighted MR images of the hand in coronal and axial planes shows hyperintense areas of fluid collection around the index finger flexor tendons.

proliferation. Also, fibrosis, proliferated vascular structures, fibroblasts, epithelioid histiocytes, granulomas with giant cells in the stroma as well as mononuclear inflammatory cell infiltration, and edema were observed at the periphery of the stroma. Granulomas characterized by caseous necrosis were seen in all histopathological examinations.

Microbiological studies are usually insufficient in the diagnosis of bone and joint tuberculosis.³¹ Hand tuberculosis is a paucibacillary lesion.⁵ Because of this, smears, Ziehl-Nelson stains, and tuberculosis cultures in Lowenstein and BACTEC media are frequently negative in extrapulmonary tuberculosis.⁵ Direct smear examination of the pathological material might reveal AFB 10% in the synovial fluid, 20% in the synovial tissue, and 30% in the regional lymph node of tuberculous tenosynovitis.³² Therefore, negative results in microscopic evaluation should not exclude the diagnosis of tuberculosis in endemic areas with typical clinical, radiological, and histopathological features.^{5,33–35} Lertsrisatit et al³⁶ reported 32% positive results in synovial fluid AFB staining, 80% in culture for tuberculosis, 65% in histology, and 63% in polymerase chain reaction. The AFB staining and BACTEC tuberculosis culture were performed to all of our patients. All patients were AFB negative. *M. tuberculosis* was identified in 9 of our cases in the BACTEC 460 TB tuberculosis medium.

Antituberculous drug therapy is the mainstay treatment in tuberculous tenosynovitis as well as all types of tuberculosis.⁵ The treatment should be started as soon as possible after histopathological diagnosis. The specimens for histopathological diagnosis can be obtained by fine needle aspiration biopsy, open, or arthroscopic synovial biopsy. Open biopsies were performed in all our patients. Synovial thickening and numerous rice bodies were detected during macroscopic view of the synovium in open biopsy (Fig. 4). The prognosis is excellent in synovial, bone and joint tuberculosis when antituberculous treatment is given for 6 to 9 months. Because of the difficulty in determining the success of the treatment, some investigators recommend 9 months of antituberculous drug therapy.³⁷ Patient compliance to treatment should be ensured to reduce the risk of developing multidrug-resistant tuberculosis.

Many authors recommend a combination of surgical treatment (debridement and tenosynovectomy) and antituberculous chemotherapy for treatment and for reducing the incidence of recurrence of synovial tuberculosis of the hand and wrist.²⁸ However, surgical debridement is controversial.^{5,8,19} Some authors recommend surgical debridement with complete excision of the tendon sheath, whereas some others recommend decompression of the tendon sheath without excision and debridement of the surrounding tissue.⁶ Tuli¹⁶ advocate that surgical treatment (synovectomy, debridement) should be used in patients who fail to respond to 4 to 5 months chemotherapy. Chemotherapy is an

effective treatment, and surgical intervention is an adjunct treatment for specific indications.³⁸ According to Al-Qattan et al,⁵ indications for the surgery is uncertain with the diagnosis, lack of response to chemotherapy, serious or progressive neurologic deficit, mechanical instability, or progression of deformity. The prognosis in patients with extraarticular synovial tuberculosis is excellent with antituberculous chemotherapy.^{1,39,40} Surgical intervention may result in miliary tuberculosis, increasing the risk of morbidity and mortality. In addition to Al-Qattan's surgical indications, we think that surgical procedures should be applied when the antituberculous therapy is insufficient and when the infection causes limited range of motion and deformity in the hand or wrist. Ozcelik et al¹⁴ described a treatment algorithm in synovial tuberculosis of the hand and wrist. They diagnosed 3 patients with histologic verification and treated successfully with only antituberculous chemotherapy without any other surgical intervention. Kotwal and Khan¹⁸ reported 75% successful results with antituberculous chemotherapy of the tuberculosis in the hand and wrist with 32 patients. They treated only 8 patients surgically who did not respond to chemotherapy.¹⁸ Lee et al⁴¹ reported a case with tuberculous tenosynovitis with paresthesia at the ulnar side and motor weakness of the fifth finger. They had treated their patient with only antituberculous chemotherapy



FIGURE 4. The macroscopic appearance of rice bodies which were extracted from a small incision.

and after 2 weeks paresthesia, and after 3 months, motor weakness had improved.⁴¹ We treated all of our patients successfully only by antituberculous chemotherapy after synovial tuberculosis is diagnosed with minimal biopsy or by culture of drainage material, without surgical debridement or synovectomy. We think that functional results are better in patients treated with only antituberculous chemotherapy than patients treated with a combination of surgery and antituberculous chemotherapy. The CTS is another presentation of hand and wrist tuberculosis.^{25,42–45} Many surgeons recommend carpal tunnel release, remove all rice bodies, and do synovectomy when CTS is present.⁵ In our patients, after the biopsy and antituberculous chemotherapy, we observed that CTS is regressed in 4 patients in 5 months. The CTS is mostly associated with rice bodies, thick synovium, and exudation in synovial tuberculosis of the wrist.^{5,44} The median nerve is not infiltrated but the thickening of the epineurium may be associated with CTS.⁵ Antituberculous chemotherapy decreases the exudation and thickness of the synovium, and by this mechanism, none of our patients with CTS necessitated additional surgical intervention.

In patients presenting with symptoms of painless swelling and limitation of motion at the hand and wrist, MR imaging is an important diagnostic tool. The expansive involvement of flexor synovium (synovitis image) and the observation of rice bodies on MR images suggest the possibility of tuberculosis. In these cases, caseous granulomas, fibrous loose bodies, and the presence of multinucleated Langerhans giant cells confirm the diagnosis of tuberculosis. In patients with flexor tuberculosis tenosynovitis, it is possible to achieve good results by applying only medical therapy after a biopsy, and without the need for further surgery.

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