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ORIGINAL ARTICLE

# Wrist synovectomy confirmed tuberculous tenosynovitis in 8 cases: A follow-up study



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## KEYWORDS

Synovectomy;  
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**Abstract** *Aim of the work:* Tuberculosis is still one of the important health problems. Because of its insidious evolution, tuberculous (TB) tenosynovitis (TS) is usually misdiagnosed and under-treated. The aim of this study was to investigate clinical and therapeutic outcomes of TB TS.

*Patients and methods:* A retrospective study of 8 patients followed-up for TB TS was conducted. Clinical and therapeutic data were collected.

*Results:* The median age was 45 years (range 33–59 years), they were 5 females and 3 males with a median duration till diagnosis of 15 months. Fever, night sweats, and weight loss were reported by 3 patients. Physical examination showed swelling of the wrist and crepitation of the palmar side with affected fingers movements in 7 cases. A carpal tunnel syndrome was found in another case. The median erythrocyte sedimentation rate was 15 mm/1st hour and the C-reactive protein 5 mg/dl. Plain radiographies of the wrists were normal. Ultrasonography showed flexor TS in all cases. Since tuberculin skin tests were positive in all patients, TB TS was suspected. Surgical synovectomy was conducted and histological examination confirmed TB. In addition to surgical synovectomy, patients were treated with anti-TB drugs for 12 months. No relapse was noted for a mean follow-up duration of 2 years.

*Conclusions:* TB TS can be misdiagnosed because of its insidious evolution. Histological examination confirms the diagnosis. Surgical synovectomy could confirm the diagnosis rapidly by the histological examination and be part of the treatment. Medical treatment should be well-conducted and maintained to avoid relapse and future complications.

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## 1. Introduction

Tuberculosis (TB) still remains an endemic disease in tropical regions and remains one of the world's deadliest communicable diseases. The world health organization (WHO) reported that about 9 million people developed tuberculosis in 2013 [1].

*Mycobacterium tuberculosis* can infect any bone, joint, tendon, or bursa; however, the most common musculoskeletal site for infection includes the spine and weight-bearing joints (hips and knees) [2]. Spinal TB is a common form of musculoskeletal tuberculosis however the involvement of the sacrum [3], sacroiliac joints [4] and dorsal facet joints [5] is very rare. Tubercular involvement of the wrist is also rarely reported [2]. While musculoskeletal involvement represents 10–15% of all extra pulmonary cases, the involvement of tendon sheath is more uncommon [6].

The diagnosis of TB tenosynovitis (TS) may be easily delayed because of insidious presentation and non-specific clinical signs which can lead to complications. There have been few reports on TB TS in literature [7]. It has been reported that TB should be taken into consideration in patients with non-specific chronic wrist arthritis, especially if immunocompromised by HIV infection [2].

Flexor tendons are more commonly involved than extensor ones.

We report herein eight cases of TB TS. The aim of this study was to investigate clinical, histological and therapeutic outcomes of a series of patients followed up for TB TS.

## 2. Patients and methods

A retrospective study of 8 patients followed-up for TB TS at the Rheumatology Department, Mohamed Kassab Orthopedic Institute, University Tunis El Manar II, Kasser Said, La Manouba, Tunisia during the period from 2011 to 2014 was performed. Clinical data were collected from medical records. All patients underwent ultrasound (US) examination of the hands in B mode and Power Doppler mode searching for signs of infectious or rheumatic disease. Confirmation of diagnosis was histological after surgical synovectomy. Treatment prescribed and outcomes were recorded. The study was approved by the local ethics committee and patients gave informed consent during their stay at the hospital.

*Statistical analysis:* Data were presented as median and range. The frequency was expressed as number and percentage.

## 3. Results

Five women and 3 men were included. The median age of patients was 45 years ranging from 33 to 59 years. All patients were immunocompetent with no past medical history of chronic disease. Family history of pulmonary tuberculosis was noted in 2 (25%) patients. One patient reported a cow bite 3 months before the symptom's onset. A local steroid injection was given 6 months before the infectious episode in another patient. The median period before consulting was 15 months (3–23 months). Fever, night sweats, and weight loss were noted in 3 (37.5%) patients.

Physical examination showed swelling of the wrist and crepitation of the palmar side with all finger movements in 4

cases and being localized to one finger in 3 cases: the right 3rd finger in one case, the left 4th finger in one case and the right 5th finger in another case. A carpal tunnel syndrome (CTS) was found in another case.

Plain radiographies were not contributive for the diagnosis. No bone abnormality was seen. However, US examination showed flexor TS in all cases (Fig. 1). TS was localized to one finger in 3 cases. Both flexor and extensor tendons were swollen in one patient. Chest radiography revealed sequel of tuberculosis in one patient. Tuberculin tests were positive in all cases. Sputum test for *M. tuberculosis* was negative on direct examination and culture. The laboratory investigations did not support any inflammation; the median erythrocyte sedimentation rate (ESR) was 15 mm/1st hour and the median C-reactive protein (CRP) was 5 mg/dl.

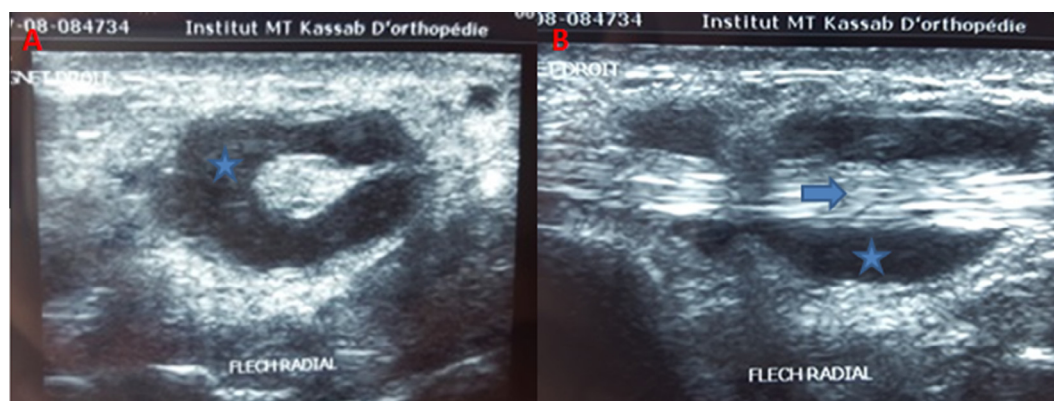
All patients underwent surgical synovectomy. The swollen inflammatory tissues were removed to histological and bacteriological examination. Histological examination confirmed TB TS in all cases by showing epithelioid granuloma and giant cells with peripheral lymphocytic infiltrate and central caseous necrosis (Fig. 2A and B). Rice body formations were detected in one case (Fig. 2C). Bacteriological cultures remained sterile.

The treatment was based on the combination of anti-tuberculosis drugs. Rifampicin (RMP), isoniazid (INH), ethambutol (EMB) and pyrazinamide (PZA) were prescribed daily for 2 months then the first two drugs were continued for 12 months. Treatment was well tolerated for all patients and evolution was good with no relapse after 2 years of follow-up. The characteristics of the studied patients are presented in Table 1.

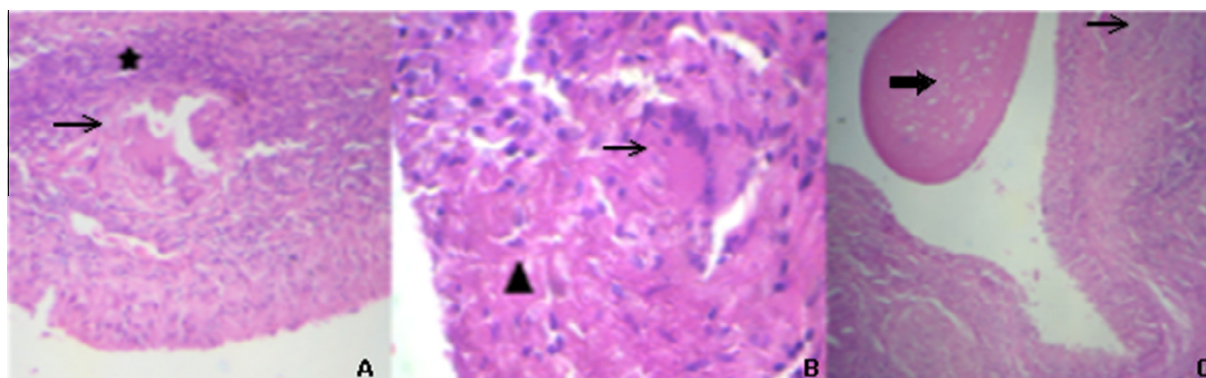
## 4. Discussion

The present study of TB TS highlights the need of increasing the awareness of musculoskeletal TB to physicians. In fact, approximately 10% of extra pulmonary TB involves joints or bone [8]. There are several common presentations of osteoarticular TB: Pott's disease, osteomyelitis, peripheral arthritis, bursitis, tenosynovitis and Poncet's disease [9,10]. TB TS is rare and represents 5% of osteo-articular TB [11]. In a recent study, Weber et al. found 23 cases of TB TS [12]. *M. tuberculosis* is the most common bacteria responsible for tenosynovitis. Other types of the *M. tuberculosis* complex can be a source of tenosynovitis and occur usually in some risky jobs [13]. Wrist and palmar side of the hand are the most affected [14].

Age older than 60 years, previous trauma, corticosteroid injections, low socioeconomic status, alcoholism and immunosuppression are common risk factors for TB [15,16]. In our study, all patients were immunocompetent. In one case, TB TS occurred 6 months after a local corticoid injection. For 2 other patients there was a positive family history of TB. A patient reported a cow bite 3 months before swelling of the hand. Culture of synovectomy was sterile but the presumed pathogen was *Mycobacterium bovis*. Güner et al. found 10 cases of infectious tenosynovitis due to *M. bovis*. They occurred in a veterinarian in one case, in butchers in 4 cases, in health workers in 4 cases and in a milker in another case [13]. The disease's onset is commonly gradual, progressing slowly leading to delay before presentation [16]. Our patients consulted after a median period of 15 months.



**Figure 1** Ultrasound findings in a patient with tuberculous flexor tenosynovitis of the wrist. Transverse (A) and longitudinal (B) scan shows increased fluid content within tendon sheath →, and peritendinous subcutaneous edema (hypoechoic halo sign) ★.



**Figure 2** Histopathological section of tuberculous tenosynovitis (TB TS). Synovial membrane sections show lymphocytic infiltration (★), typical granuloma containing epithelioid cells and Langhans' giant cells (→) and caseous necrosis (▶) associated to rice body formation (⇨) next to the synovial membrane (hematoxylin-eosin A and B  $\times 400$ , C  $\times 100$ ).

Clinical examination may reveal a painful swelling around the affected tendon, CTS or synovitis mimicking De Quervain's disease. Usually patients had an insidious and slow-growing tumefaction around the involved tendon with no or little pain. Tendon rupture is rare but it may occur when treatment is delayed [17]. In our study, clinical examination showed crepitation with flexion of the hand. The swollen tendons were non-tender but limited in extension in 2 cases. Tinel and Phalen's sign tests were positive in one patient. None of the tendons were ruptured.

Laboratory tests are usually negative. ESR may be moderately elevated [11]. In the current patients, the ESR and CRP were normal with no significance of inflammation. Plain radiographies are commonly non contributive for the diagnosis because of slow progression. Similarly, in this patient series, plain radiographies were normal.

US is needful for the diagnosis of swollen tendons [18]. In fact, US is an ideal first-line investigation of TS to confirm the diagnosis and reveal the degree and extent of tendon and tendon sheath involvement [19]. Chaua and Griffith in 2005 described TS as a variable thickening of the tendon and tendon sheath with hyperemia. Tendon sheath thickening is usually hypoechoic and may resemble viscous fluid. Color Doppler is particularly helpful in this instance allowing differentiating synovial sheath thickening from a synovial sheath effusion [20]. In

case of TB TS, rice bodies may be detected as low-level internal echoes, but US may fail to resolve individual rice bodies [19]. In that situation, MRI is recommended for better delineation. The MRI's imaging features are synovial proliferation, abscess formation and destruction of adjacent carpal bones. Tendon sheaths may show irregularities and appear T2 bright due to vascular granulation tissue [21]. Three stages of tenosynovitis have been described by Jaovisidha et al. hygromatous (active phase), serofibrinous (healing phase) and fungoid (disseminated phase) [17]. These different stages depend largely on the duration of the disease before the diagnosis.

The main difficulty remains on diagnosing the disease because of non-specific clinical signs, indolent presentation and insidious symptoms. Multiple differential diagnoses are possible and include: pyogenic or fungal infections, brucellosis, rheumatoid arthritis, gouty arthritis, foreign body tenosynovitis and sarcoidosis [17,22,23]. The definitive diagnosis of TB in the case series depended on histopathological analysis of the tissue from synovectomy. Microscopic examination shows epithelioid granulomas and giant cells with central caseous necrosis. Kanavel reported three stages in TB TS [24]. Stage 1 is characterized by the presence of a serous exudation with thickening of tendon sheaths. Stage 2, is the proliferative stage with granuloma tissues made of "seed of rice" aspects. Stage 3 is characterized by the presence of massive necrosis.

**Table 1** Characteristics of patients with wrist tuberculous tenosynovitis.

| Characteristics<br>Median (min–max) or n (%)                 | Patients with TB TS<br>(n = 8) |
|--|--------------------------------|
| Age (years)  | 45 (33–59)                     |
| Sex (female:male)  | 5:3                            |
| Family history of tuberculosis                               | 2 (25)                         |
| Past history of steroid injection                            | 1 (12.5)                       |
| Duration till diagnosis (months)                             | 15 (3–23)                      |
| General manifestations<br>(fever, night sweats, weight loss) | 3 (37.5)                       |
| ESR (mm/1st hour)  | 15 (10–26)                     |
| CRP (mg/dl)  | 5 (2–10)                       |
| Normal X-rays hands and wrists                               | 8 (100)                        |
| Histological findings  | 8 (100)                        |
| Tuberculin tests positivity                                  | 8 (100)                        |
| Direct examination and culture                               | Negative                       |
| Synovectomy  | 8 (100)                        |
| Duration of anti-TB treatment (months)                       | 12 (10–14)                     |

TB TS: tuberculous tenosynovitis, ESR: erythrocyte sedimentation rate, CRP: C-reactive protein.

The PCR assay, a molecular biologic technique using nucleic acid amplification, is a highly sensitive method for detecting *M. tuberculosis* [25]. The advantages of this method are the identification of the bacteria and the short delay for confirmation in contrast to conventional methods. In fact, *M. tuberculosis* cultures require a long incubation time (6 weeks or more), and is not useful clinically because of the delay it would cause in treatment. In our study, histological examination showed typical aspect of TB infection in all cases, cultures was sterile and PCR was not performed.

Once TB TS is diagnosed, treatment should be started. So far, there is no consensus on the treatment protocol or the duration of treatment to undertake. The most recent American guidelines for osteo-articular TB treatments indicated that chemotherapy containing RMP for 6–9 months seemed to be as effective as 18 month chemotherapy not containing RMP [26]. In 2011, Donald published a review of recommendation for osteo-articular tuberculosis treatments in children which is also available for adults. He announced that osteo-articular TB should be treated with an intensive phase of 2 months of INH, RMP and PZA, accompanied by EMB if there is any possibility of drug resistance. The continuation phase should consist of INH and RMP for four months [27]. Regnard et al. showed that TB TS has a tendency for recurrence in 50% of cases within a year of treatment [28]. But in this study only a small sample was analyzed.

In some cases, surgery should be performed in addition to medical treatment. The indication of surgery is complications such as abscesses or neurological complications and failure of medical treatment [29]. When indicated, extensive curettage, lavage and synovectomy should be performed. Our patients were treated by surgical synovectomy followed by anti-tuberculosis chemotherapy. After 2 years of follow-up no relapse was notified.

*In conclusion*, the possibility of TB TS should be kept in mind in case of insidious and slow growing swollen flexor or extensor tendons. US examination is helpful in detecting TS. Surgical synovectomy could confirm the diagnosis rapidly by the histological examination and be part of the treatment.

Medical treatment should be well-conducted and maintained for at least 6 months to avoid relapse and future complications.

### Conflict of interest

None.

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