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Clinical case

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Tuberculosis tenosynovitis in the wrist: a case report

Tenosinovitis tuberculosa en la muñeca: presentación de un caso

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ABSTRACT. Articular tuberculosis is a rare condition, with extrapulmonary presentations most commonly appearing in joints such as the hip or knee. It is usually associated with conditions like immunosuppression or a history of pulmonary tuberculosis. Diagnosis involves imaging or pathology, and treatment typically involves surgical intervention along with medication. Here is the case of a 25-year-old male from Barranquilla, Colombia. He lacks classical risk factors for pulmonary tuberculosis but has a history of open reduction of a traumatic fracture in his right distal radius four years ago. He presented with persistent pain, joint swelling, and limited movement, leading to removal of the osteosynthesis material. Despite this, the pain persisted, prompting further investigation with X-ray and MRI of the wrist. These imaging studies revealed findings compatible with tuberculosis. Based on these results, the medical team opted for a surgical procedure. An oncological resection of the synovium was performed, and the material that was removed was used for histological studies to confirm suspicions of extrapulmonary tuberculosis. Following these procedures, the patient underwent physical therapy and began tuberculosis medication, resulting in significant improvement of his symptoms.

Keywords: tuberculosis, extrapulmonary tuberculosis, osteoarticular tenosynovitis, wrist.

RESUMEN. La tuberculosis articular es una condición poco frecuente, incluso entre las formas extrapulmonares, y ocurre especialmente en articulaciones como cadera y rodilla. Suele estar asociada a condiciones como inmunosupresión o antecedente de tuberculosis pulmonar. El diagnóstico se realiza tanto por imagenología como por patología, y el tratamiento generalmente implica intervención quirúrgica adicional al manejo farmacológico. Este es el caso de un hombre de 25 años, procedente de Barranquilla (Colombia), sin factores de riesgo clásicos para tuberculosis extrapulmonar, pero con antecedente de cuatro años atrás de reducción abierta de fractura traumática en radio distal derecho. Consulta por persistencia del dolor y la limitación funcional, motivo por el cual se retira el material de osteosíntesis. Dada la persistencia del dolor se decidió realizar estudios complementarios, dentro de los cuales se realizaron radiografía y resonancia nuclear magnética (RNM) de muñeca, en las cuales se tuvieron hallazgos sugestivos y confirmatorios de tuberculosis articular de muñeca, respectivamente. Como conducta quirúrgica, se realizó sinovectomía con toma de muestra de patología, que posteriormente confirmó el diagnóstico. Posterior al tratamiento quirúrgico, y en conjunto con manejo farmacológico para este tipo de tuberculosis y terapia física, el paciente refiere mejoría del cuadro clínico.

Palabras clave: tuberculosis, tuberculosis extrapulmonar, tenosinovitis osteoarticular, muñeca.

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Introduction

Tuberculosis (TB) continues to be one of the most frequent infections worldwide, with 7.5 million new cases in 2022, it has marked the highest number since 1995 and remains the second leading cause of death from infectious agents. Overall, this pathology is more common in adult men, although the incidence in individuals living with HIV, malnutrition, and those with lower per capita GDP, among others are also relevant.[1] Diagnosis for this pathology continues to be predominantly bacteriological (63% of total diagnoses), while treatment is exclusively pharmacological, with success rates of 88% and 63% in sensitive and resistant cases.[1]

Although tuberculosis primarily affects the lungs, it can also influence other organs such as the intestines, meninges, bones, joints, and lymph nodes. This spread occurs through hematogenous and lymphatic dissemination from primary foci.[2,3] Approximately 50% of cases[4] exhibit a co-infection of both pulmonary and extrapulmonary TB, while isolated extrapulmonary TB represents between 15 and 20% of all TB cases.[5] It has been identified that it is more common in patients with immunosuppression, widely explored with a relationship with type 2 diabetes mellitus (T2D).

Within the extrapulmonary forms, as mentioned earlier, there are osteoarticular forms representing between 2 and 5% of total tuberculosis cases worldwide, a variation largely dependent on population and demographic phenomena rather than clinical factors.[2,6] This form has lower mortality compared to other extrapulmonary TB forms such as miliary or central nervous system TB, which can be related to its localized involvement and lack of vital organ affectation.[7]

Osteoarticular TB was more frequent in men with two age peaks, young adults and older adults, often coinciding with comorbidities such as T2D, HIV, acute respiratory infection, and chronic kidney disease.[6] In Colombia in 2021, extrapulmonary forms accounted for 16.1% of total cases, with the most common being pleural, meningeal, and lymph node involvement; whereas osteoarticular TB ranked fifth at 5.3%, dropping to 0.8% when comorbid with HIV.[8] Among osteoarticular TB cases, the most frequently affected joints are the hip and knee, while in terms of bones,[2,9,10,11] the most affected are the vertebrae.[2,3]

Osteoarticular TB commonly presents as tenosynovitis, particularly in the hand. But it can also manifest as osteomyelitis of the carpal, metacarpal, and phalangeal bones. In its tenosynovitis form, it is more likely to affect flexor and ulnar areas, compared to its extensor and radial counterparts. Another manifestation is palmar ganglion, which can even generate symptoms of carpal tunnel syndrome.[12]

Clinically, osteoarticular TB presents with typical symptoms including pain, deformity, functional limitation, erythema, and conventional abscess formation.[3,10] Additionally, it may present with cold abscesses and tuberculous ulcers; however, general symptoms such as fever, anorexia, and weight loss occur in less than one-third of cases.[2] It is worth noting that in wrist and hand involvement, a «sausage-shaped mass» may develop around the tendons, which limits functionality.[12] Regarding its presentation, the most common form is monoarticular[3] with an initial synovial involvement followed by articular involvement[2,13] described in five phases: synovitis, early arthritis, late arthritis, advanced arthritis with dislocation, and terminal arthritis.[2]

In terms of imaging modalities, radiographs show nonspecific findings.[12] Phemister's triad describes findings in cases of tuberculosis affecting the appendicular skeleton, including osteopenia or osteoporosis, peripheral bone erosion, and joint space narrowing. Magnetic resonance imaging (MRI) is highly sensitive for identifying lesions in bones and surrounding soft tissues. Common findings in the appendicular skeleton include synovitis, tenosynovitis, edema, and bone marrow erosion, as well as periarticular abscesses[2,3] known as the «rice grains» sign, which surround the synovial sheath, especially in cases of wrist tenosynovitis.[12] Although ultrasound is recommended for guiding procedures such as drainage, it is not recommended as a diagnostic method.

Nevertheless, for this type of tuberculosis, culture remains the gold standard, as it not only serves for microbiological identification but also for resistance evaluation, a condition that is currently of great clinical value.[2,3] On the other hand, other types of serological tests, laboratories for the measurement of acute phase reactants as markers of infection or inflammation,[3,12] as well as other indirect methods, are not widely recommended.[2]

Regarding microbiological diagnosis, cultures have achieved a positivity rate of up to 57.97% within a maximum of eight weeks in patients who have not previously received anti-tuberculosis treatment, although this data has ranged from 14.5 to 83.8%. While cultures commonly find *Mycobacterium tuberculosis* as the most prevalent pathogen (60%) in osteoarticular tuberculosis, *M. bovis* and non-tuberculous mycobacteria are also detected. Therefore, it is suggested to use culture, strain identification, and resistance evaluation conventionally.[14]

In general, diagnostic criteria or methodologies have not been defined, and clinical as well as paraclinical tests are usually used as a consideration for the diagnosis. Thus, the following three criteria must be met: clinical manifestations, imaging findings, and microbiological demonstration by culture or response to anti-tuberculosis drugs.[3] It is even considered that diagnosis in the initial phases is rare and is often diagnosed in the severe arthritis phase.[13] However, in countries like India where access to surgical intervention is difficult due to infrastructure and human talent limitations, the diagnosis focuses on clinical suspicion, imaging such as MRI, laboratory results, and cultures obtained through non-surgical procedures.[2]

Treatment, in addition to including the established anti-tuberculous treatment regimens defined by local guidelines,

according to identified resistance profiles, should also include surgical management.[14] Surgical management can range from debridement to arthroplasty[3,12] considering that, for some authors, aggressive debridement is essential not only for treatment but also for preventing recurrence.[9] The effectiveness of surgical intervention has been evaluated in TB of the hip, knee, ankle, and shoulder, but not with wrist or hand joints.[3]

Regarding the recommendation for surgical intervention for the management of wrist tenosynovitis, it is limited to cases where there is no improvement with anti-tuberculous pharmacological treatment, unless there is a presence of complications such as nerve compression, imminent bone collapse, abscess drainage, deformity correction, and removal of foreign bodies, among others.[12]

In a case from Indonesia, the patient presented with mild progressive edema, mild pain, and nocturnal fever; which eventually led to the formation of an abscess. Radiographic findings revealed lytic lesions of the carpal bones and the distal part of both the ulna and radius. Laboratory tests only showed elevated PCR and positive Mantoux (tuberculin) test results, while ultrasound showed a multilocular collection with intra-articular extension. Surgically, this case approaches from both the extensor and flexor sides, performing debridement and curettage, followed by immobilization with a thermoplastic splint. The pathology result was negative for *M. tuberculosis* but positive for granulomatous reaction and PCR for tuberculosis, which confirms osteoarticular TB.[15]

Similarly, a 35-year-old woman in Indonesia experienced wrist joint pain for a year. She consulted a healthcare provider and received an initial diagnosis of rheumatoid arthritis, leading to the initiation of pharmacological management. However, after a month of treatment, her pain worsened, accompanied by local edema onset. Alongside clinical observations, the patient exhibited a deformity in the affected wrist and experienced functional limitations. General laboratory tests revealed elevated ESR and PCR levels. Although a synovial fluid sample was obtained, it remained unanalyzed due to contamination concerns. Ultrasound imaging indicated severe joint hyperemia, X-ray findings showed osteoporosis and irregularity in radiometacarpal joint surfaces, while MRI results indicated joint destruction, periarticular tenosynovitis, and suggestive joint edema of infection. Consequently, the patient was managed with intravenous antibiotics.[10]

After one month into her treatment, the patient showed no improvement in symptoms. Eventually, a synovial biopsy was conducted, revealing granulomatous inflammation with caseation, which was a strong indicator of joint tuberculosis. Although acid-fast bacilli (AFB) were not detected, *M. tuberculosis* growth was evident in culture. Initial management involved anti-tuberculous drugs, followed by surgical debridement and synovectomy.[10]

Other clinical cases reported from Malaysia, United States and Colombia involved a 70-year-old woman, 31-year-old man and 42-year-old man, respectively. Of these cases, only the first two had a history that is considered risk factors, while in all cases, the diagnosis was made by imaging tests, especially MRI. The three cases underwent surgical intervention, finding purulent material and other signs of inflammation and joint involvement, confirming diagnosis by pathology and laboratory in the last two cases, respectively. For the first two cases, combined treatment with anti-tuberculosis medications was reported, complementary to surgical conduct.[9,11,13]

Description of the clinical case

A 25-year-old man working as a warehouse assistant in a grocery store who is from Barranquilla, Colombia suffered a fracture of the right distal radius four years ago in a work-related accident. The patient has no notable medical history, including anything related to immunosuppression as intravenous drug use or type 2 DM, which was ruled out by laboratory tests. This fracture was treated with open reduction and internal fixation. However, his recovery was complicated, characterized by slow rehabilitation, persistent pain, and restricted function in his right wrist. Consequently, it was decided to remove the osteosynthesis material.

Despite the expectation of symptom improvement, it was found that even with the appropriate analgesic management, there was no adequate improvement. He continued to experience wrist pain with mild joint swelling, without other related signs, and general symptoms such as malaise, weakness, or sweating, no vital sign alterations such as fever or tachycardia, and no localized signs in other joints.

Given the case's evolution, it was decided to perform complementary studies, starting with a wrist X-ray, which showed no abnormalities of any kind. Similarly, a soft tissue ultrasound was performed, which reported tenosynovitis of the flexor tendons and an increase in the transverse area of the median nerve with an edematous appearance. These findings were considered diffuse and did not allow for a definitive diagnosis.

Thus, additional assessment via MRI revealed the «rice grain» sign *(Figure 1)*, a hallmark of osteoarticular TB. Consequently, it was deemed appropriate to conduct a synovectomy of the right wrist. This surgical procedure aimed to achieve two objectives: firstly, to therapeutically eliminate all encountered granulomatous tissue *(Figure 2)*, and secondly, to send the excised tissue for pathological examination. Following tissue removal, it was noted that the area was devoid of adhesions and any additional biological elements before closure *(Figure 3)*.

Upon receiving the pathology results, it showed to be positive for acid-fast bacilli (AFB) upon Ziehl-Neelsen (ZN) staining, thus confirming the diagnosis of osteoarticular TB. Given that the surgical management had been correctly performed, this was complemented with antibacterial and antituberculous therapy according to current guidelines.

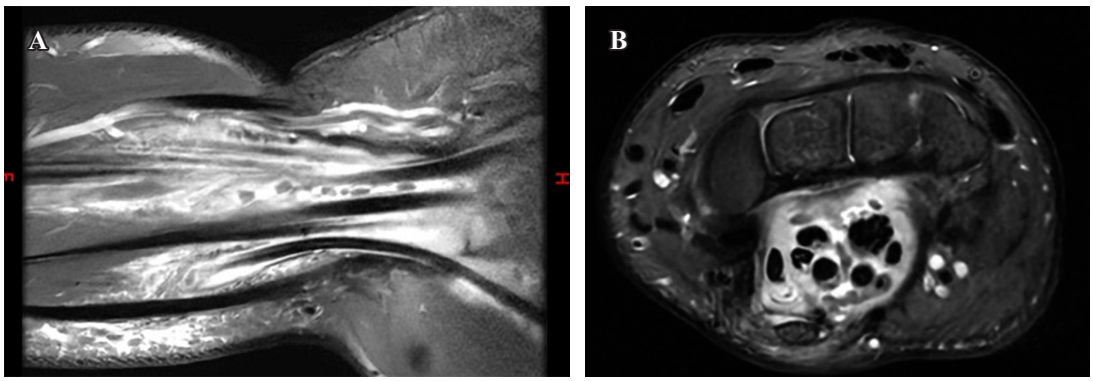

Figure 1: A) Magnetic resonance imaging of the hand, coronal section. Granulomatous synovitis is observed, with «rice grain» figures at the bases of the metacarpals extending to the distal portion of the intermediate column of the radius. **B)** Magnetic resonance imaging of the hand, transverse section. Granulomatous synovitis is observed, with «rice grain» figures at the bases of the metacarpals extending to the distal portion of the intermediate column of the radius.

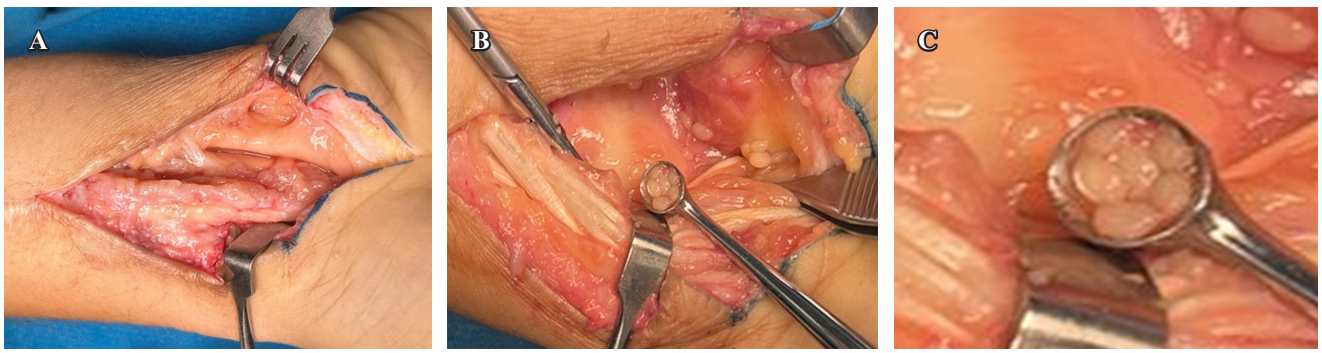

Figure 2: A) Intraoperative image of the volar flexor aspect, Henry's approach. Granulomatous tissue is evident along the flexor tendons in the distal forearm region. **B)** Intraoperative image of the volar flexor aspect, Henry's approach. Granulomatous lesions compatible with «rice grain» lesions are evident (close-up in image 2-3). **C)** Intraoperative image of the volar flexor aspect, Henry's approach. Close-up of «rice grain» lesions.

Figure 3: Intraoperative image of the volar flexor aspect, Henry's approach. The final state of the lesion area after debridement and synovectomy.

As complementary management, a 3-month physiotherapy regimen was prescribed. Subsequently, improvement in symptoms was observed, with mild residual joint pain, no functional limitations, or other related symptoms. Currently, the patient awaits the 12-month orthopedic follow-up for prognosis determination and possible discharge from this specialty. Moreover, a review by the infectious disease specialist is pending to assess the evolution and closure of the extrapulmonary TB aspect in general.

Discussion

In this case, it is striking to see how a young patient, despite having no notable medical history, is diagnosed with extrapulmonary osteomuscular TB in the right wrist. This is interesting because medical literature commonly associates these extrapulmonary forms with conditions like T2D, HIV, CKD, and others,[4,6,12] all of which were ruled out for this particular patient.

One important consideration in this case is that Barranquilla, the patient's hometown, is categorized by the Colombian National Institute of Health (INS) as having a TB burden, surpassing the 75th percentile nationally. This suggests that it is an area where TB has a significant impact, with a mortality rate exceeding 16.3%, aligning with the idea that the risk of developing an extrapulmonary

form of TB is influenced by epidemiological factors, such as residing in an endemic TB area. This observation is consistent with reported cases from Indonesia, Malaysia, and Medellín, Colombia.[9,10,13,15]

Furthermore, the only significant history reported for this patient was the osteosynthesis procedure in the same forearm four years prior to the presentation of the described pathology, which is not commonly associated with this type of TB. Recent literature review reveals more cases of infection by various mycobacteria in post-hip and knee replacements, differing from the prior procedures in this patient.

Clinically, the presentation included symptoms of slowly evolving pain and functional limitation, consistent with literature descriptions,[3,10] and no other general symptoms such as fever, weakness, or sweating, which may be present in less than one-third of cases.[9] It is worth noting that the presentation in this case was a flexor region tenosynovitis, aligning with the expected pathology.[12]

Regarding diagnostic aspects, clinical ambiguity was notable as symptoms were mild pain and functional limitation, which, in the absence of risk factors for extrapulmonary TB, did not provide clinical clues for an accurate diagnostic suspicion. Additionally, radiographic studies did not show clinically significant findings, while ultrasound, although nonspecific, allowed for structuring the diagnostic suspicion, consistent with its diagnostic use in previous cases, rather than as a guide for procedures as suggested in the literature.[12]

On the other hand, the MRI showed the typical «rice grain» signs,[12] allowing for a focused diagnosis and leading to the decision to perform open exploration for management and tissue sampling. Additionally, this test was decisive in four out of the five cases analyzed in the background,[9,10,11,13] confirming its relevance for diagnosis.

Finally, while granulomatous lesions typical of such cases were discovered through direct visual inspection,[1,12,13] the diagnosis was officially established through pathology, which confirmed the presence of acid-fast bacilli (AFB) in the tissue. This discovery aligns with findings reported in up to 57.97% of cases.[14] It is crucial to note that in all cases reviewed for this report, the surgical procedure involved debridement,[9,10,11,13,15] as recommended by the literature[9,14] and consistent with the approach taken in the case presented here.

Regarding the treatment of the presented case, several aspects must be considered:

Surgical intervention was contemplated from the beginning as both diagnostic for tissue sampling and therapeutic with the performance of debridement and synovectomy, given that the latter should be performed regardless of confirmation or origin of the lesions.

Although the literature does not specifically address combined management with physical therapy, considering the patient's background and the intervention performed, this management is essential for successful joint recovery.

Antibiotic management followed clinic protocol schemes. This aims to avoid infectious complications given the nature of the lesion suspicion at the time of surgical approach.

While antituberculous management was indicated according to current guidelines, evaluation and follow-up by infectious disease specialists are necessary due to the atypical nature of this case, as it lacks the typically related risk factors for extrapulmonary tuberculosis forms.

Conclusion

Extrapulmonary osteoarticular tuberculosis cannot be ruled out solely based on clinical presentation, radiography, or the absence of typical associated risk factors such as immunosuppression. In this case, it was evident that the diagnosis required magnetic resonance imaging to focus the diagnostic suspicion on this condition, followed by final confirmation through pathology. In cases of suspected tuberculous tenosynovitis, immediate surgical and pharmacological management is essential for timely intervention and achieving clinical and functional improvement as observed in this case.

It is noteworthy that although the patient did not present typical risk factors, such as immunosuppression, the history of previous forearm fracture management played a relevant role and should be considered in the analysis and future review of similar cases.

Ethical considerations

The manuscript presented below is classified as risk-free research in accordance with resolution 8,430 of 1993 issued by the Health Ministry of Colombia, in addition to that in compliance with law 1581 of 2012 issued by the Congress of Colombia, it is defined that if sensitive information is handled anonymously, it may be used with research purposes. Given these conditions, for the purpose of the case report with research purposes all ethical and legal conditions were fulfilled.

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