BMC Musculoskeletal Disorders

CASE REPORT

Open Access

Wrist joint tuberculosis masquerading as traumatic arthritis sequalae

Han-Zheng Li[1], Jun Zhang[2], Liang Ma[2], Hai-Feng Jia[1], Jia-Cheng Li[1,2] and Gang Li[1,2*]

Abstract

Background Wrist joint tuberculosis(WJ-TB)is a rare manifestation of osteoarticular tuberculosis(OAT).Delayed diagnosis is common and often leads to postponed treatment, resulting in complications such as joint stiffness and persistent pain in the affected limb.

Case presentation A 50-year-old man presented with symptoms in the wrist joint suggestive of WJ-TB.Initially, he was diagnosed with traumatic arthritis.However, following a series of diagnostic tests, the final diagnosis of tuberculous arthritis was confirmed.The patient underwent effective treatment, which led to a marked improvement in his condition.

Conclusions WJ-TB is a treatable condition.Early diagnosis and prompt treatment are essential to prevent joint destruction and maintain function in patients with OAT.

Keywords Wrist joint tuberculosis, Osteoarticular tuberculosis, Wrist joint

Introduction

Tuberculosis (TB) is one of the most prevalent infectious diseases worldwide. Among its extrapulmonary forms, bone tuberculosis is relatively common, primarily affecting long bones, large joints, and the spine [1]. However, WJ-TB is extremely rare, accounting for only 1–2% of osteoarticular tuberculosis (OAT) cases [2]. The clinical manifestations of WJ-TB are nonspecific and often resemble other conditions, such as chronic pyogenic osteomyelitis or rheumatoid arthritis which can lead to delays in diagnosis. This report presents the case of a 50-year-old patient initially diagnosed with traumatic arthritis. Further evaluation confirmed the presence of WJ-TB. TB remains a significant global health concern, and delayed diagnosis often results in postponed treatment, ultimately causing joint destruction and functional impairments.

Case presentation

A 50-year-old man presented with a 6-month history of left wrist pain, deformity, and restricted mobility, accompanied by a subjective sensation of stiffness in the wrist, reduced grip strength, and pain exacerbated by daily activities.

The patient reported sustaining a work-related sprain six months earlier while operating a machine. This injury was suspected to have caused a fracture-dislocation, leading to wrist pain and restricted movement, but he did not seek systematic treatment. The pain progressively worsened over the course of four weeks, and the patient was temporarily immobilized with a brace after visiting several hospitals without a clear diagnosis. Initially diagnosed with tenosynovitis and arthritis, the patient received treatment with topical ointments and a brace, but these measures failed to provide relief. There were no systemic symptoms such as fever, weight loss, or loss of

*Correspondence:
Gang Li
sdszylg@163.com
[1] First College of Clinical Medicine, Shandong University of Traditional Chinese Medicine, Jinan, Shandong 250355, China
[2] Orthopaedic Microsurgery, Affiliated Hospital of Shandong University of Traditional Chinese Medicine, Jinan, Shandong 250014, China

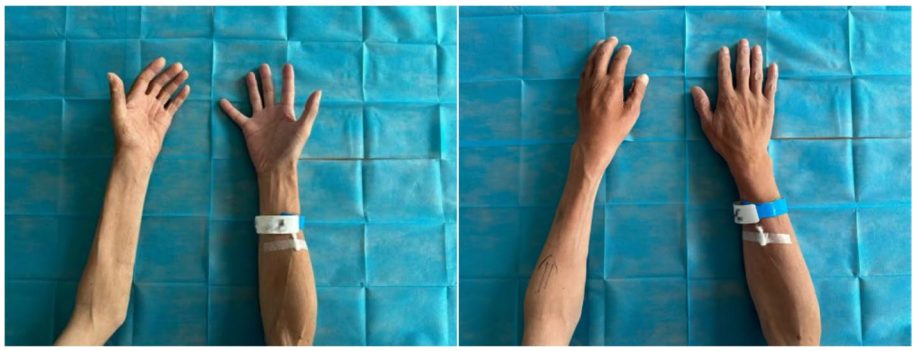

Fig. 1 The patient has limited range of motion in wrist flexion, wrist extension

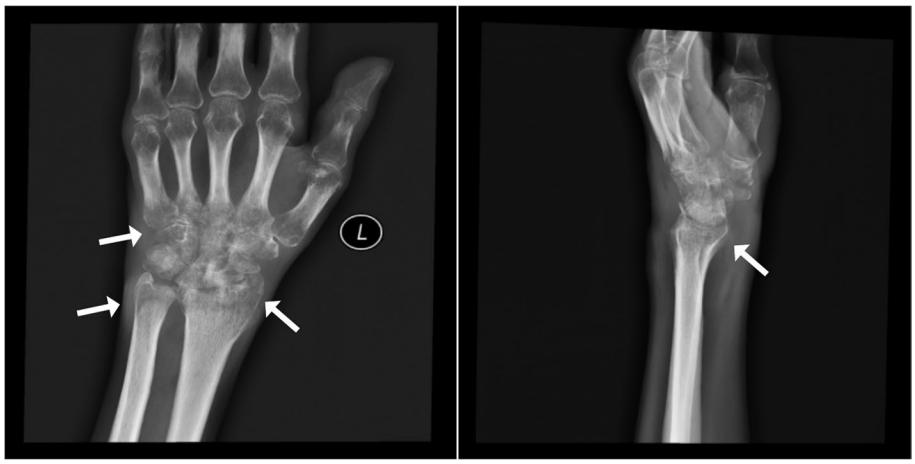

Fig. 2 Anteroposterior and lateral wrist radiographs revealed erosions of the distal radius, distal ulna and carpal bones. (White arrows)

appetite. There was no swelling, numbness, or weakness in the wrist. On palpation, the area was soft with minimal fluctuation. Physical examination revealed an obvious deformity of the left wrist, including a dorsal projection of the distal ulna, tenderness, and pain during passive ulnar deviation. The results of the left wrist range of motion (ROM) examination are shown in Fig. 1: Active motions −10° of flexion, 0° of extension, 0° of pronation, and 5° of supination; Passive motions −15° of flexion, 5° of extension, 10° of pronation, and 40° of supination.

X-ray (Fig. 2) and CT 3D showed uneven narrowing of the joint space between the left wrist, lower ulnar-radial joint, and carpal interphalangeal joint, irregular joint surfaces, decreased bone density, and irregular bone structure. Erosive changes were observed in the articular margins of some carpal bones. MRI examination (Fig. 3) revealed bone marrow edema, diffuse thickening of the synovium, fluid signal intensity in the joint space, and joint surface destruction and erosion.

He was admitted to the hospital with the diagnosis of "traumatic arthritis of the left wrist joint, subluxation of the left lower ulnar-radial joint, traumatic arthritis of the left lower ulnar-radial joint, left ulnar impingement syndrome, and injury to the triangular fibrocartilage of the left wrist joint",and was proposed to undergo surgical treatment. Laboratory examination results after admission showed: leukocytes 19.51×10^9/L, neutrophils 17.94×10^9/L, high-sensitivity C-reactive protein(CRP)141.2 mg/L, calcitoninogen 0.31 ng/ml, plasma D-dimer 2 μg/ml. Upon further questioning, the patient reported no obvious cause for the persistent cough lasting 6 months and mentioned that he had been self-administering cough suppressant drugs, but they were ineffective. In addition, both of the patient's older brothers were diagnosed with pulmonary tuberculosis in early adulthood, which was successfully treated with appropriate medications. No subsequent dissemination of tuberculosis to other parts of the body was observed in either case. Additionally, the patient works as a tire technician, a job requiring frequent joint movement and weight-bearing on the affected limb. Therefore, the treatment approach was adjusted to exclude the

Fig. 3 The T2-weighted coronal and sagittal sections indicated bone marrow edema, synovial thickening, fluid accumulation, destruction and erosion of wrist joint. (White arrows)

possibility of tuberculous arthritis and to focus on ruling out tuberculosis infection. Review results showed: interleukin 85.04 pg/ml, erythrocyte sedimentation rate(ESR)46 mm/hr, Mycobacterium tuberculosis complex group positive(+),tuberculosis-specific T-cells 98 SFCs, Mycobacterium tuberculosis complex group nucleic acid test positive(+). (The relevant blood test results can be found in the supplementary materials.) Chest CT (Fig. 4) showed multiple patchy and nodular high-density lung lesions, partly solid and partly with cavitation. To confirm the diagnosis, sputum specimens were collected for smear examination. The samples were first treated with a liquefying agent, followed by centrifugation to concentrate the sediment. The sediment was then stained using the Ziehl-Neelsen method. Under light microscopy, numerous rod-shaped acid-fast bacilli were observed in the field of view.

The diagnosis of tuberculosis was clear, and it was revised to "tuberculosis of the left wrist joint and the lower ulnar-radial joint". The patient was transferred to a specialized tuberculosis treatment hospital, where they received anti-tuberculosis therapy consisting of rifampin, ethambutol, isoniazid, and pyrazinamide. Subsequently, the patient underwent wrist joint lesion debridement and arthrodesis surgery.

Discussion and conclusions

OAT accounts for 11–15%of all cases of extrapulmonary tuberculosis [3]. Bone and joint tuberculosis usually affects weight-bearing joints, especially the spine, whereas tuberculosis of the upper extremities is less common. WJ-TB is a rare form of musculoskeletal tuberculosis (MSK-TB), accounting for less than 1%of all OAT cases [4]. Typically, TB infection starts in the tendon sheath and then spreads to the joints or bones, which may lead to tissue necrosis, tendon adhesions, and wrist dysfunction [5]. Identifying this disease can be particularly challenging due to its non-specific clinical presentation. Pain and swelling are usually the initial symptoms, with no systemic symptoms such as fever, weight loss, or loss of appetite. As the disease progresses, joint dysfunction, muscle spasms, stiffness, and joint damage may become apparent and abscess formation occurs in approximately 20–25%of cases [6–9]. The diagnosis of hand and wrist diseases is often delayed [10], resulting in treatment postponement and subsequent complications, such as stiffness and persistent pain in the affected limb. The patient in our case had visited several hospitals before coming to our hospital but a definitive diagnosis was not reached until 6 months later. The low prevalence of WJ-TB in OAT, combined with limited research and insufficient clinical awareness, has contributed to the lack of detailed descriptions in the literature and difficulties in diagnosis [11]. The history of cough was also ignored, and the patient had no typical clinical manifestations of tuberculosis until the elevated leukocytes, ESR, and CRP, and the history of cough and family history of tuberculosis were traced, leading us to a diagnosis of tuberculosis, later confirmed by chest CT.

It has been reported that 30–50%of WJ-TB cases can be triggered by prior trauma [12]. Therefore, highly suspected OAT should be investigated in detail for a history of trauma.In the present case of WJ-TB, we were unable to determine the sequence of trauma and tuberculosis, but previous fracture trauma is known to be an important cause of exacerbation of OAT. The patient's occupation as a tire technician, which involved repetitive wrist movements and significant weight-bearing activities,

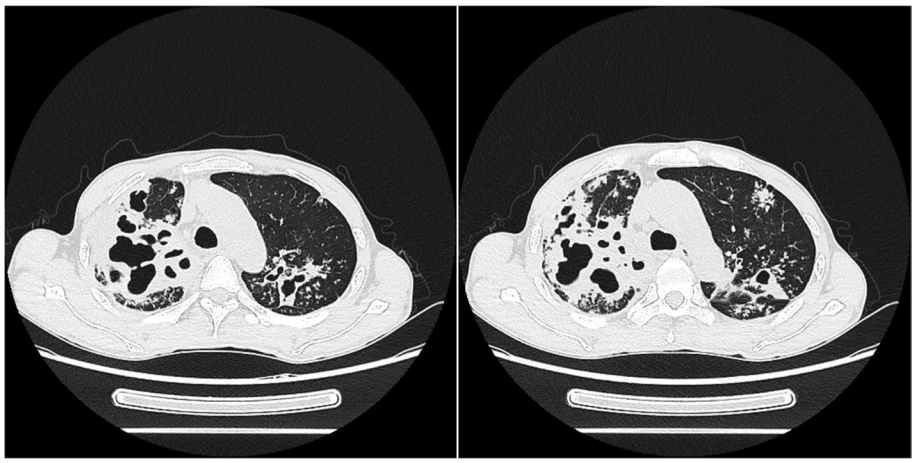

Fig. 4 The chest CT scan reveals areas of patchy consolidation and cavitation

likely increased the susceptibility to WJ-TB. Occupational overuse may exacerbate joint inflammation and predispose individuals to tuberculous infection, particularly in post-traumatic settings. This aligns with previous studies suggesting repetitive trauma as a risk factor for OAT progression [13]. A subluxation of the distal radioulnar or wrist joint may result in limited hand flexion. A distal radius fracture (DRF) often leads to surface disharmony of the radial wrist joint, which further leads to post-traumatic osteoarthritis. This condition manifests as wrist pain, weakness, and stiffness and may lead to tearing or degeneration of the triangular fibrocartilage complex (TFCC) as well as synovitis and arthritis of the inferior radial-ulnar joint [14].

During the initial diagnosis, the lack of detailed imaging and underemphasis on X-ray findings involving small joints other than the radial carpometacarpal joint led to a narrow diagnostic focus on traumatic arthritis, influenced by the patient's history of trauma. This underscores the importance of revisiting diagnostic assumptions, especially in patients with atypical presentations.

The differential diagnosis included chronic pyogenic osteomyelitis, supported by imaging findings such as joint space narrowing, irregular joint surfaces, decreased bone density, and structural bone irregularities. However, the absence of characteristic purulent discharge or sinus tract formation, along with unremarkable laboratory findings, led to its exclusion. Rheumatoid arthritis was considered based on MRI findings of diffuse synovial thickening and joint effusion. Nevertheless, the absence of extra-articular manifestations and symmetric joint involvement ruled out this diagnosis, and further evaluation for rheumatoid factor (RF) and anti-cyclic citrullinated peptide (anti-CCP) antibodies was deemed unnecessary. Psoriatic arthritis (PsA), systemic lupus erythematosus(SLE), and rheumatic arthritis were also assessed due to the observed radiological features. These conditions were excluded owing to the lack of extra-articular manifestations, migratory pain, characteristic autoantibodies, and skin lesions. Gout was ruled out based on the absence of clinical signs of crystal deposition, normal uric acid levels, and imaging findings inconsistent with this diagnosis. Lastly, neoplastic processes were excluded due to the absence of unexplained weight loss, lymphadenopathy, and imaging evidence suggestive of malignancy.

Imaging is generally nonspecific in diagnosing WJ-TB, but it remains essential for early detection and further evaluation [15]. Radiographic findings may reveal an ill-defined wrist mass, bone destruction, joint space narrowing, and involvement of the distal radius and ulna. The classic imaging triad, known as Phemister's triad—decreased articular bone mass, peripheral bone erosion, and progressive joint space narrowing—is suggests of tuberculous arthritis [16]. Rarely, osteolysis of the greater trochanter may involve all carpal bones [17]. According to Martini and colleagues, the imaging features of OAT can be categorized into four stages: stage 1 involves localized bone loss without visible lesions; stage 2 is marked by erosion of one or more bones; stage 3 shows moderate joint involvement; and stage 4 presents with extensive joint destruction [18]. X-rays are more definitive in identifying the disease at its advanced stages, while early diagnosis often requires corroborative evidence from other modalities. CT imaging is particularly valuable in assessing bone damage and surrounding soft tissue involvement [19]. In WJ-TB, CT scans are valuable in identifying bony deformities and patchy changes in bone density [20]. MRI, on the other hand, is highly effective in detecting OAT by revealing synovial thickening, soft tissue

damage, and distinguishing between infected and healthy areas [21]. The combination of MRI and CT provides critical insights into joint integrity and surrounding tissue involvement, making them complementary tools for comprehensive assessment. Despite the utility of imaging, synovial biopsy remains the gold standard for diagnosis, particularly in cases with ambiguous clinical or imaging findings. Histopathological examination plays a pivotal role in confirming tuberculosis, offering definitive evidence through biopsies of bone lesions, synovium, and soft tissues. OAT should be suspected, especially when inflammation extends beyond the bony borders and affects adjacent soft tissues [22, 23]. Molecular methods can detect Mycobacterium tuberculosis and its resistance. GeneXpert is a rapid molecular test that identifies M. tuberculosis DNA within two hours. The newer GeneXpert MTB/RIF Ultra improves sensitivity for TB and rifampicin resistance but has lower specificity than the original GeneXpert [24]. While the clinical presentation and radiological features in this case were highly suggestive of tuberculosis (TB), we acknowledge that a definitive diagnosis of osteoarticular TB requires histopathological identification of caseating granulomas and/or microbiological confirmation through acid-fast bacilli (AFB) staining, mycobacterial culture, or PCR amplification, as mandated by the WHO diagnostic criteria for extrapulmonary TB [25]. However, we know the gold standard in microbiological diagnosis, has imperfect sensitivity as a reference standard [26]. Besides, delaying treatment for confirmatory biopsies could exacerbate joint destruction, whereas empirical anti-tubercular therapy (ATT) provided a favorable risk-benefit ratio, given the high pre-test probability and the urgent need to prevent irreversible joint damage. Currently, the WHO advises that patients who screen negative for TB should receive isoniazid preventive therapy. Empirical TB treatment is recommended for seriously ill patients in peripheral settings with negative initial tests, though the risks of misdiagnosis and drug resistance must be carefully considered [27]. For TB patients, in some cases, the benefits of empirical treatment still far outweigh the risks and costs of potential overtreatment [28].

The mainstay of treatment for WJ-TB includes antituberculosis drugs such as isoniazid, rifampicin, ethambutol, and pyrazinamide [29]. Additionally, orthopedic wrist splinting for 3–4 weeks can help maintain stability. Non-pharmacological treatments, including chemotherapy and rehabilitation, have also been suggested [2, 30]. The surgical treatment of WJ-TB remains controversial.In cases of severe cartilage damage, bone destruction, or poor response to medication, surgical options such as joint fusion may be considered to prevent deformities, correct existing ones, and improve limb function [31, 32]. Furthermore, if anti-tuberculosis treatment is ineffective after 8 weeks, or if there is significant sequestrum accompanied by large abscesses and impaired hand function, surgical intervention is still recommended to enhance functional outcomes, even after effective ATT has been administered [5].

With the development of society, public health conditions are improving, and awareness of tuberculosis is increasing.However, the challenge of resistance to Mycobacterium tuberculosis persists [33]. For individuals with active TB, lack of attention and adherence to treatment increases the risk of treatment failure by 1.5 times compared to those with good adherence, leading to relapse and even death [34].

This risk is further amplified when TB coexists with comorbidities such as HIV and diabetes, which complicate management. TB accelerates disease progression in individuals with HIV, while diabetes increases susceptibility to TB by 2 to 4 times and worsens treatment outcomes [35, 36]. These challenges highlight the need for early diagnosis, synchronized treatment plans, and integrated care approaches.Such strategies are essential not only to prevent complications like joint destruction in OAT but also to maintain patient function and improve overall recovery outcomes.

Abbreviations

WJ-TB	Wrist joint tuberculosis
OAT	Osteoarticular tuberculosis
TB	Tuberculosis
CRP	C-reactive protein
MSK-TB	Musculoskeletal tuberculosis
DRF	Distal radius fracture
TFCC	Triangular fibrocartilage complex
ESR	Erythrocyte sedimentation rate
AFB	Acid-fast Bacilli
ATT	Anti-tuberculosis treatment
ROM	Range of motion
RF	rheumatoid factor
anti-CCP	anti-cyclic citrullinated peptide
PsA	Psoriatic arthritis
SLE	systemic lupus erythematosus

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12891-025-08400-w.

Additional file 1.

Acknowledgements
Not applicable.

Authors' contributions
HZ L: conception and design of the study. HF J and JC L: collection and analysis of the data. J Z and L M: critical suggestions during the process. G L: final approval of the version to be submitted. All authors read and approved the final manuscript.

Funding
This work was supported by Key Research and Development Program of Shandong Province(No.2021CXGC010501).Natural Science Foundation of Shandong Province of China(No.ZR2022LZY003).

Data availability
All data generated or analyzed during this study are included in this published article and its supplementary information files.

Declarations

Ethics approval and consent to participate
Not applicable.

Consent for publication
Written informed consent was obtained from the patient for publication of their clinical details and/or clinical images.A copy of the consent form is available for review by the Editor of this journal.

Competing interests
The authors declare no competing interests.

Received: 13 September 2024 Accepted: 4 February 2025
Published online: 01 March 2025

References

1. Tuli,Surendra. Mohan,ed.Tuberculosis of the skeletal system. JP Medical Ltd; 2016.
2. Kotwal PP. Khan SA.Tuberculosis of the hand:clinical presentation and functional outcome in 32 patients. J Bone Joint Surg Br. 2009;91(8):1054–7.
3. Lemnouer A, Frikh M, Belfquih B, Jaafar A,Bouya A,Jidal. M,Boussouga M,Elouennass M.Navicular Tuberculosis:a rare localization of bone tuberculosis. IDCases.2015;2(3):80–2.
4. Bayram S. Erşen A,Altan M,Durmaz H.Tuberculosis tenosynovitis with multiple rice bodies of the flexor tendons in the wrist:a case report. Int J Surg Case Rep. 2016;27:129–32.
5. Yushan M, Yalikun A,Hamiti Y, Lu. C,Yusufu A.Clinical features and treatment outcome of wrist tuberculosis in adult-a retrospective study of 84 consecutive cases with minimum of 2years follow up. BMC Musculoskelet Disord. 2022;23(1):618.
6. Leung PC. Tuberculosis of the hand. Hand. 1978;10(3):285–91.
7. Malaviya AN. Kotwal PP.Arthritis associated with tuberculosis. Best Pract Res Clin Rheumatol. 2003;17(2):319–43.
8. Lall H. Nag SK,Jain VK,Khare R,Mittal D.Tuberculous extensor tenosynovitis of the wrist with extensor pollicis longus rupture:a case report. J Med Case Rep. 2009;3:142.
9. Subasi M, Bukte Y. Kapukaya A,Gurkan F.Tuberculosis of the metacarpals and phalanges of the hand. Ann Plast Surg. 2004;53(5):469–72.
10. Prakash J. Mehtani A.Hand and wrist tuberculosis in paediatric patients-our experience in 44 patients. J Pediatr Orthop B. 2017;26(3):250–60.
11. Tsai MS, Liu JW, Chen WS, de Villa. VH. Tuberculous wrist in the era of effective chemotherapy:an eleven-year experience. Int J Tuberc Lung Dis. 2003:7(7):690 -4.12
12. Yao DC, Sartoris DJ. Musculoskelet Tuberculosis Radiol Clin North Am. 1995;33(4):679–89.
13. Hassanpour SE. Gousheh J.Mycobacterium tuberculosis–induced carpal tunnel syndrome:management and follow-up evaluation. J Hand Surg Am. 2006;31(4):575–9.
14. Liebenberg,Cuan MDV, Farhana E. Suleman. Ulnar Impaction syndrome:a case series and imaging approach. SA Orthop Journal15.2 (2016):22–7.
15. Korim M. Patel R,Allen P,Mangwani J.Foot and ankle tuberculosis:case series and literature review. Foot(Edinb). 2014;24(4):176–9.
16. Spiegel DA, Singh GK, Banskota AK. Tuberculosis of the musculoskeletal system. Tech Orthop. 2005;20(2):167–78.
17. Lopes MJ. Furtado I,Brandão M,Farinha F.Tuberculous osteomyelitis of the wrist presenting as a monoarthritis syndrome.BMJ Case Rep. 2018;2018:bcr2017222136.
18. Martini M. Benkeddache Y,Medjani Y,Gottesman H.Tuberculosis of the upper limb joints. Int Orthop. 1986;10(1):17–23.
19. De Backer AI, Vanhoenacker FM, Sanghvi DA. Imaging features of extraaxial musculoskeletal tuberculosis. Indian J Radiol Imaging. 2009;19(3):176–86.
20. Zou L, Guo X, Xue H,Huang D, Lv. H,Tan M.Wrist Tuberculosis-experience from eighteen cases:a retrospective study. J Orthop Surg Res. 2021;16(1):37.
21. Parmar H, Shah J, Patkar D,Singrakhia. M,Patankar T,Hutchinson C.Tuberculous arthritis of the appendicular skeleton:MR imaging appearances. Eur J Radiol. 2004;52(3):300–9.
22. Sivasamy P, Bajuri MY, Ghani AW. Tuberculosis of the left wrist joint and spine. Cureus. 2019;11(11):e6203.
23. Mousa,Haider Abdul. Lateef.Bones and joints tuberculosis. Bahrain Med Bulletin. 2007:291:17–21.
24. Dorman SE, Schumacher SG, Alland D, Nabeta P, Armstrong DT, King B, et al. Xpert MTB/RIF Ultra for detection of Mycobacterium tuberculosis and rifampicin resistance: a prospective multicentre diagnostic accuracy study. Lancet Infect Dis. 2018;18(1):76–84.
25. World Health Organization. WHO consolidated guidelines on tuberculosis. Module 3: diagnosis–rapid diagnostics for tuberculosis detection[M]. World Health Organization; 2024.
26. Parker RA. Implications of Tuberculosis Sputum Culture Test Sensitivity on Accuracy of other Diagnostic modalities. Am J Respir Crit Care Med. 2019;199(5):664.
27. Hosseinipour MC, Bisson GP, Miyahara S, Sun X, Moses A, Riviere C, et al. Empirical tuberculosis therapy versus isoniazid in adult outpatients with advanced HIV initiating antiretroviral therapy (REMEMBER): a multicountry open-label randomised controlled trial. Lancet. 2016;387(10024):1198–209.
28. Kendall EA, Kamoga C, Kitonsa PJ, Nalutaaya A, Salvatore PP, Robsky K, et al. Empiric treatment of pulmonary TB in the Xpert era: correspondence of sputum culture, Xpert MTB/RIF, and clinical diagnoses. PLoS ONE. 2019;14(7):e0220251.
29. Procopie I. Anușca DN,OnțicăV,Mureșan R. Diagnosis and Treatment particularities in Osteoarticuar Tuberculosis. Curr Health Sci J. 2017:43(2):153–8.
30. Dlimi F, Bellarbi S, Mahfoud M, Berrada MS, El Bardouni A. El Yaacoubi M.La tuberculose de la main et du poignet:différents aspectsàpropos de 30cas[Tuberculosis of the hand and wrist:different aspects of 30 cases].Chir Main.2011;30(3):198–204.French.
31. Seung OP. Sulaiman W.Osteoarticular Tuberculosis mimicking rheumatoid arthritis. Mod Rheumatol. 2012;22(6):931–3.
32. Tuli SM. General principles of osteoarticular tuberculosis. Clin Orthop Relat Res. 2002;398:11–9.
33. Ocguder A. Tosun O,Akkurt O,Oguz T,Colkoglu T.Tuberculosis of the foot:a rare involvement in osteoarticular tuberculosis. J Clin Rheumatol. 2006;12(6):304–5.
34. Hyvert S, Yailian AL,Haesebaert JVE, Chapurlat R, Dussart C, De Freminville H. Janoly-Dumenil A.Association between health literacy and medication adherence in chronic diseases:a recent systematic review. Int J Clin Pharm. 2023;45(1):38–51.
35. Xu G. Hu,X.,Lian,Y. Diabetes mellitus affects the treatment outcomes of drug-resistant tuberculosis:a systematic review and meta-analysis. BMC infect Dis23,813(2023).
36. Pooranagangadevi N, Padmapriyadarsini C. Treatment of tuberculosis and the drug interactions associated with HIV-TB co-infection treatment. Front Trop Diseases. 2022;3:834013.

Publisher's Note