VER
Vascular & Endovascular Review

Tuberculosis of the Elbow in Teenager: A Rare Case

Rendy Andromeda Anwar[1*], Arda Pratama Putra Chafid[1], Retno Asih Setyoningrum[1], Tri Wahyu Martanto[2]

[1]Department of Pediatrics, Faculty of Medicine, Universitas Airlangga, Dr. Soetomo General Academic Hospital, Surabaya, Indonesia
[2]Department of Orthopedics and Traumatology Universitas Airlangga, Dr. Soetomo General Academic Hospital, Surabaya, Indonesia
Corresponding Author:
Rendy Andromeda Anwar, Department of Pediatrics, Faculty of Medicine, Universitas Airlangga,
Dr. Soetomo General Academic Hospital, Surabaya, Indonesia. Email: andromeda.rendy@gmail.com

ABSTRACT

This paper aimed to report a rare case of elbow tuberculosis in a teenager with nonspecific symptoms and a prolonged diagnostic journey, in order to increase clinical awareness of bone TB in uncommonly affected sites. This is a case report of a 17-year-old female teenager experienced pain and swelling of the left elbow for 13 months. Radiological examination revealed osteolytic lesions consistent with Brodie's abscess. The diagnosis was established through GeneXpert testing that detected rifampicin-sensitive Mycobacterium tuberculosis. The patient had undergone arthroscopy, debridement, abscess curettage, and bone grafting, then initiated intensive-phase anti-tuberculosis therapy with supportive treatment. This case highlights the necessity of an extensive clinical, radiological, and microbiological evaluation in chronic joint pain in order to obtain an early diagnosis of elbow tuberculosis, allowing long-term therapy can be promptly initiated and joint deformity complications prevented.

KEYWORDS: Bone Tuberculosis, Elbow, Teenager.

How to Cite: Rendy Andromeda Anwar, Arda Pratama Putra Chafid, Retno Asih Setyoningrum1, Tri Wahyu Martanto, (2025) Tuberculosis of the Elbow in Teenager: A Rare Case, Vascular and Endovascular Review, Vol.8, No.4s, 94-100.

INTRODUCTION

Bone tuberculosis (TB) accounts for 1-3% of all TB cases, with a predilection for the spine, pelvis, and knees [1,2]. Elbow TB is a very rare form, but early diagnosis is important to prevent joint destruction and maintain function.[3] In 2019, an estimated 10 million people worldwide were infected with TB [1,2]. Tuberculosis can manifest as either pulmonary tuberculosis or extrapulmonary tuberculosis. Skeletal tuberculosis accounts for approximately 1%–3% of all TB cases and represents the third most common form of extrapulmonary TB, following lymph node and renal involvement. Tuberculosis of the elbow constitutes around 1%–5% of skeletal TB cases, with the elbow being the most frequently affected joint in the upper extremities [1,4,5].

The most common early clinical manifestations include pain, swelling, and prolonged movement restriction, while advanced stages may lead to joint deformity and functional loss [6]. The gold standard for diagnosis is the identification of Mycobacterium tuberculosis and/or caseating granulomas from biopsy specimens using Ziehl-Neelsen or auramine fluorescent staining. However, due to the paucibacillary nature of the disease, the diagnostic yield is often low [1,4,7].

Antituberculosis drugs remain the mainstay of treatment for this condition [8]. In pediatric patients, treatment outcomes tend to be highly favorable due to the strong regenerative capacity of the articular cartilage and epiphyseal regions. Surgical debridement is only recommended in advanced cases with permanent joint deformity [1]. This case report aims to describe the clinical course, diagnostic approach, and management of elbow tuberculosis in a 17-year-old teenager patient. By understanding the clinical characteristics and diagnostic challenges of this condition, this report seeks to enhance clinical awareness and optimize the management of skeletal tuberculosis in rarely affected joints.

CASE REPORT

A 17-year-old female teenager suffered from pain and swelling in her left elbow for 13 months. The patient had already undergone arthroscopy and abscess curettage in August 2024, but had not yet begun TB treatment. GeneXpert testing in December 2024 confirmed the diagnosis of rifampicin-sensitive bone TB. The patient is currently receiving intensive-phase anti-tuberculosis medication alongside supportive care.

Laboratory examinations since April 2024 have shown a relatively stable hemoglobin level with slightly increased red blood cells, while MCV and MCH consistently low. There has been a gradual increase in ESR and CRP indicating chronic inflammation. The test results in August 2024 showed leukocytosis and thrombocytosis with an ESR of 28 mm/hour and CRP of 1.12 mg/dL, along with non-reactive hepatitis and HIV screening results. In December 2024, GeneXpert testing successfully detected Mycobacterium tuberculosis sensitive to rifampicin, confirming the diagnosis of bone tuberculosis. The January 2025 examination once again showed an increase in ESR and CRP, with high platelets remaining, and neutrophil dominance consistent with an infection process.

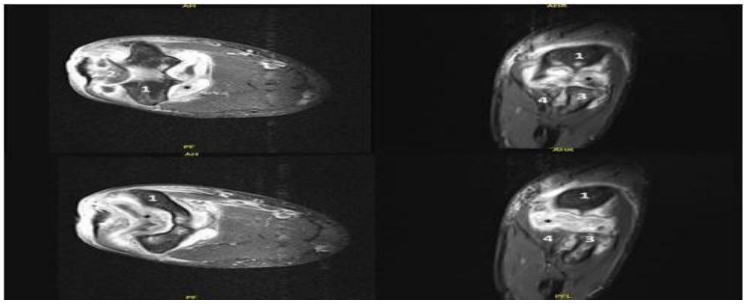

Figure 1: Magnetic resonance imaging scan of the elbow (1, humerus; 2, olecranon; 3, radius; 4, ulnae; *shows synovial inflammation suggestive of osteomyelitis with suspected septic arthritis)

Figure 2: X-ray examination of the left elbow in anteroposterior (AP) and lateral projections on April 16, 2024

The findings were corroborated by the radiologist. An MRI conducted at RS Awal Bros in April 2024 revealed indications of osteomyelitis with suspected septic arthritis in the left elbow joint (Fig 1). X-ray images of the left elbow in April 2024 showed an oval lesion with endosteal scalloping, consistent with Brodie's abscess (Fig 2). Follow-up examinations in August 2024 still showed similar findings, while a PA chest X-ray did not reveal any abnormalities (Fig 3). In January 2025, a chest X-ray showed pneumonia with bilateral hilar lymphadenopathy (Fig 4), while an X-ray of the left elbow demonstrated erosion of the distal humeral cortex with soft tissue swelling around the joint, indicative of advanced bone TB (Fig 5).

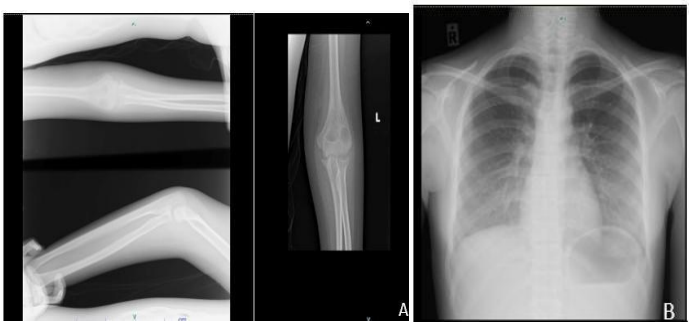

Figure 3: X-ray examination, A) Left elbow (cubiti) in anteroposterior (AP) and lateral projections on August 14, 2024; B) Chest (thorax) in posteroanterior (PA) projection on August 14, 2024

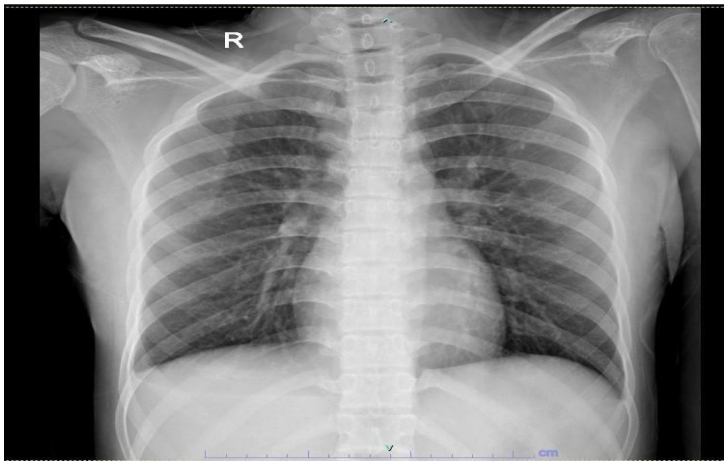

Figure 4: Chest X-ray in anteroposterior (AP) projection on January 20, 2025

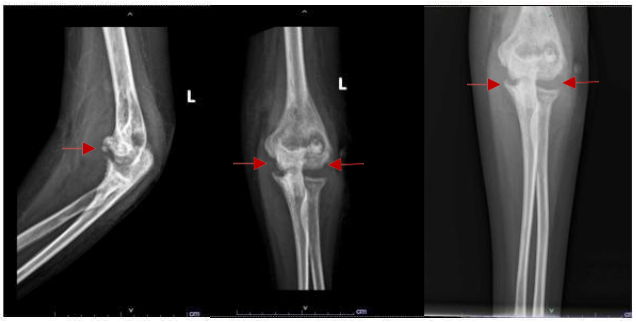

Figure 5: X-ray examination of the left elbow in anteroposterior (AP) and lateral projections on January 20, 2025.

Anteroposterior view (arrows showing erosion of the distal cortex of the humerus, olecranon process of the ulna, and radial bone head with swelling of the soft tissues around the right elbow joint).

Based on the patient's history, physical examination, laboratory tests, and radiological findings, the diagnosis of Brodie's abscess in the distal humerus due to skeletal tuberculosis was established. Currently, the patient is undergoing the intensive phase of antituberculosis therapy (ATT) and receiving additional supportive therapy as needed.

DISCUSSION

A 17-year-old female teenager was referred to the RSUD Dr. Soetomo with complaints of swelling and pain in her left elbow for the past 13 months, initially presenting as limited extension without pain. The diagnostic approach to elbow pain needs to evaluate the nature, duration, and triggering factors of the symptoms, while also distinguishing it from other conditions such as lateral/medial epicondylitis, osteoarthritis, inflammatory arthritis, trauma, or referral pain from the neck or shoulder. A history of trauma, progression of symptoms, limited range of motion, and neurological symptoms are key in determining a differential diagnosis and distinguishing bone TB from other musculoskeletal diseases [9].

In the patient's medical history, she was diagnosed with Brodie's abscess in the distal third of the left humerus, suspected to be bone tuberculosis with the possibility of atypical infection. She also had a history of bone TB surgery in August 2024 and appendectomy in November 2024. The patient has undergone several orthopedic surgical procedures and is scheduled to receive intensive-phase anti- tuberculosis therapy (ATT).

This case highlights important learning points. A high suspicion of tuberculosis should always be considered in patients presenting with masses or lesions of unclear etiology. Tuberculosis in the joints can mimic synovitis, rheumatoid arthritis, degenerative joint disease, neoplasia, hemophilic arthropathy, or abscess formation [10].

Tuberculosis of the bones and joints accounts for 10-35% of extrapulmonary TB cases, with a primary preference for the spine and large joints. Involvement of the elbow joint is uncommon [10,11].

In this patient, there is no family history of similar diseases. Osteoarticular TB can manifest as a primary complex in children, or as the reactivation of latent bacilli in the bones following hematogenous spread from a primary lung infection. TB bacilli tend to target the spine and large joints due to their rich vascular supply, causing granulation (pannus) that damages cartilage and bone leading to joint destruction [12].

At the age of 17 years and 2 months, the patient weighs 49 kg and stands at 157 cm, falling within the 10–25 percentile range, thus still within normal limits albeit approaching the lower end. Nutritional status is deemed normal with an ideal body weight of 106.5%. Adequate nutrition is crucial to support response to antituberculosis therapy and tissue healing, yet the relatively low growth index needs to be monitored to prevent progression to malnutrition that could worsen the course of the disease. Despite advanced countries having better healthcare facilities, cases of atypical osteoarticular infections such as tuberculosis remain a concern due to the increasing number of patients with immunosuppression, for example, due to diabetes, HIV, and autoimmune diseases. Only about 3 out of 10 individuals exposed to Mycobacterium tuberculosis will develop an infection, and 95% of them are able to control the bacteria in a latent state. However, in the first five years after infection, around 5% may experience reactivation, especially in conditions of weakened immunity or malnutrition [13].

This case illustrates the reactivation of TB in a teenager with good nutritional status and no clear immunodeficiency, characterized by chronic wounds on the left elbow, persistent pain with movement, swelling, and a history of mild fever. Clinically, diagnosing bone and joint TB can be challenging as symptoms are nonspecific; in the early stages, pain, swelling, and limited range of motion emerge, while in advanced stages deformities and loss of function can occur. A history of TB exposure is not always present, and approximately 50% of cases do not show lung involvement on radiology. Nonetheless, the risk remains high in individuals with a history of contact with active TB patients, and extrapulmonary TB can manifest years after exposure, particularly in individuals with compromised immune systems [14].

Tuberculosis should be suspected in cases of chronic abscesses that progress to ulcers, as the pathophysiology of osteoarticular TB explains the disease's progressive character. The initial infection around the elbow joint may spread through the bloodstream

or lymphatic system, resulting in bone demineralization, local destruction, and osteolytic abscesses as observed on radiological imaging of the distal humerus. Untreated conditions can lead to cartilage loss, persistent ulceration, and irreversible joint abnormalities. As a result, confirmation of the diagnosis through tissue biopsy and acid-fast bacilli testing is critical for initiating long-term anti-tuberculosis therapy (ATT) and prevent further complications [6,15–17].

The patient presented with a complaint of fever the day before, epigastric pain radiating to the left chest and arm, and nausea without vomiting. Upon physical examination, the patient appeared weakened but conscious, with stable vital signs, no shortness of breath, anemia, or lung abnormalities, despite the presence of mild jaundice and tenderness on palpation of the epigastrium without hepatosplenomegaly. The complaints of fever, epigastric pain, and nausea suggest the possibility of gastroenteritis, but constitutional manifestations of tuberculosis or chronic liver disease should also be considered, necessitating further investigation to rule out the cause of chronic infection.

Tuberculous osteoarthritis typically has an insidious onset, presenting with chronic joint pain, progressive swelling, functional decline, and local muscle atrophy. Constitutional symptoms, such as prolonged low-grade fever, weight loss, fatigue, night sweats, anemia, and tachycardia, may be observed in a minority of cases. In approximately 50% of cases, there are no symptoms or radiological evidence of pulmonary TB, making tuberculosis an often-overlooked cause of chronic joint inflammation, particularly in the absence of active pulmonary disease. Therefore, a high index of clinical suspicion is required when evaluating patients with chronic arthritis that does not respond to conventional therapy [17].

The patient underwent several laboratory tests during the diagnostic process, including complete blood count, clinical chemistry, immunology, and microbiology assessments which can be seen in table 1.

Table 1: Patient laboratory examination results

2 April 2024		**13 August 2024**		**30 December 2024**		**20 January 2025**		**21 January 2025**	
Blood Sample		**Blood Sample**		**Pus sample**		**Blood sample**		**Blood sample**	
Hb	13,4	Hb	12,9	Gene Xpert	M. tuberculosis detected, sensitive to rifampin	Hb	12,4	LED	42
RBC	5,72	RBC	5,36			RBC	5,36	CRP	2,36
HCT	43	HCT	41,9			HCT	40,6		
WBC	9,68	WBC	12,17			WBC	9,36		
PLT	401	PLT	488			PLT	495		
LED	25	LED	28						
CRP	0,40	CRP HbsAg	1,12						
		Anti-HCV	NR						
		HIV	NR						
			NR						

Ancillary tests for TB bone involvement reveal elevated ESR and CRP levels indicating chronic inflammation, although both are not specific for TB. Achieving a definitive diagnosis is challenging as there is no single test with high sensitivity and specificity. The optimal approach involves a combination of clinical, radiological, microbiological, and histopathological assessments. The gold standard for diagnosis is the detection of Mycobacterium tuberculosis or caseous granuloma through biopsy, although success rates are often low due to the paucibacillary nature of the disease. Tissue biopsy (synovium or bone) for culture and histopathology remains the definitive method. Meanwhile, non-invasive techniques such as X-ray, CT, PET-CT, USG, and MRI play a role in improving diagnostic accuracy and assessing the extent of joint and surrounding tissue involvement [13].

On January 20, 2025, the chest X-ray of the patient revealed bilateral perihilar infiltrate with calcification in the right lung, without pleural effusion or cardiomegaly. This finding supports the presence of a tuberculosis process and reinforces the close relationship between bone tuberculosis and primary lung infection [1]. This is crucial in determining therapeutic strategies and monitoring response. Radiological examination of the left elbow reveals lytic lesions on the distal humerus with endosteal scalloping consistent with Brodie's abscess, as well as MRI findings of bone edema, cortical defects, effusion, and joint distension suggestive of osteomyelitis with suspected septic arthritis. Progression in lesion size on further examination strengthens suspicion of bone tuberculosis, although there are no specific radiological features that entirely define tuberculous osteomyelitis in long bones [18]. Divergent opinions exist regarding which bone is most commonly affected by TB in the elbow region, with some literature citing the proximal ulna and others the distal humerus. Radiological features typically include lytic lesions, ossification, and the "ice cream scoop lesion" on the proximal ulna [2]. MRI is quite useful in the early stages as it can detect synovial thickening, bone erosions, intra/extraosseous abscesses, bone marrow changes and joint effusions, even when plain radiographs do not show evident abnormalities [2].

A review of reported cases of tuberculosis of the elbow demonstrates a wide variation in clinical presentation, ranging from chronic infection resembling chronic osteomyelitis to septic arthritis [13,19]. In its early stages, tuberculous arthritis is often difficult to distinguish from trauma, rheumatoid arthritis, or septic arthritis, which can lead to a delayed diagnosis. Therefore, osteoarticular tuberculosis should be suspected in patients from South Asia and Africa, particularly those presenting with bone or soft tissue infections, as the incidence of tuberculosis remains high in these regions [19].

The diagnosis of TB is confirmed through GeneXpert, which detects Mycobacterium tuberculosis sensitive to rifampicin.

Additional tests (culture, PCR, and histopathology) and sampling from multiple sites are necessary to enhance sensitivity in paucibacillary cases and prevent false negative results [13,20].

The patient had a history of bone tuberculosis surgery in August 2024 but did not receive tuberculosis therapy, only antibiotics and regular wound care. Due to the absence of characteristic systemic and pulmonary symptoms, tuberculosis of the elbow joint is often diagnosed late. Various studies have shown that the diagnostic delay from symptom onset to confirmed diagnosis ranges from one week to eight years, with an average delay of approximately 13 weeks. In pediatric cases, diagnostic delays often occur due to low clinical awareness, nonspecific symptoms, and inconclusive imaging. Constitutional symptoms may also be absent in up to 72% of cases, further complicating the diagnostic process [1].

The modified Martini classification categorizes osteoarticular tuberculosis into four stages, with subclasses A (extra-articular) and B (intra-articular). This patient is in stage IIIA, which is defined by the presence of a Brodie abscess in the distal humerus, an extra-articular lesion with the risk of joint involvement but no severe anatomical damage.

The patient was diagnosed with stage III tuberculosis of the elbow using Martini's classification, which was determined by clinical findings (persistent pain, non-healing wound, limited range of motion), radiological evidence (destructive lesions in the elbow joint), and microbiological testing (positive GeneXpert for Mycobacterium tuberculosis sensitive to rifampicin). Elevated ESR and CRP levels indicate the presence of active inflammatory processes. The condition demands long-term anti-tuberculosis drugs (ATD) treatment with continuing monitoring to prevent progression and assess the need for further treatments.

This case has followed the diagnostic algorithm of elbow TB systematically. Based on the patient history and physical examination, suspicion of TB was confirmed and subsequently strengthened by X-rays showing osteolytic lesions consistent with Brodie's abscess. Laboratory tests (leukocyte count, platelet count, ESR, and CRP) supported the presence of active inflammation, while MRI revealed bone edema, lytic lesions with cortical defects, and joint effusion consistent with chronic bone infection. Final confirmation was obtained through GeneXpert testing, which detected Mycobacterium tuberculosis sensitive to rifampicin. Following these findings, the patient was prescribed antituberculosis therapy (ATT) in accordance with protocol. Monitoring of therapy response remains necessary, including reevaluation of diagnosis, drug resistance testing, and consideration of surgical intervention if there is no clinical improvement.

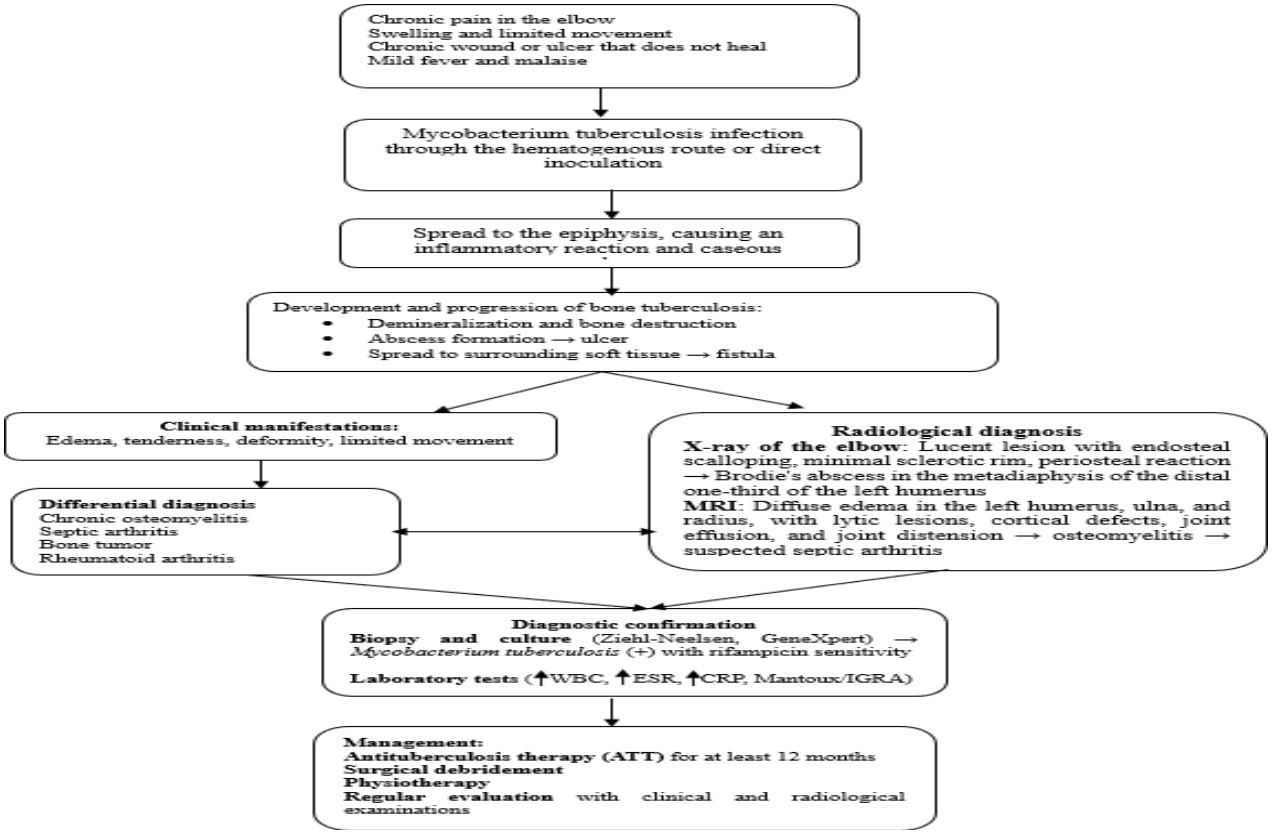

Figure 6: Diagnosis and Management Flow of Elbow Joint Tuberculosis in Patients

The differential diagnosis of tuberculosis (TB) of the elbow in this patient includes various other conditions that can cause pain, swelling, and chronic ulcers in the joint. Pyogenic osteomyelitis should be considered as it can resemble skeletal TB but usually has a more acute onset with systemic symptoms such as high fever and a rapid response to antibiotics. Septic arthritis is also a possibility, especially in patients with systemic infections, but it is usually characterized by more severe pain and more pronounced joint swelling. Additionally, rheumatoid arthritis, an autoimmune disease, can mimic TB of the elbow, particularly in the chronic erosive phase, but it tends to be bilateral and is associated with a positive rheumatoid factor. Metabolic diseases

such as gouty arthritis should also be considered, especially if there is a history of hyperuricemia, although it is less commonly found in the elbow. Bone tumors such as Ewing's sarcoma or osteosarcoma are also important differential diagnoses, particularly in young patients with osteolytic lesions in long bones, but they are typically accompanied by more aggressive soft tissue mass growth [2,6,21].

The management of elbow tuberculosis in this patient follows the TB therapy guidelines with the administration of anti-tuberculosis drugs (ATD) in the form of a fixed-dose combination (FDC) of four tablets once daily since January 21, 2025. The patient also receives supportive therapy, including omeprazole to protect the stomach, paracetamol to relieve pain and fever, and intravenous fluids to maintain hydration and electrolyte balance. This comprehensive approach aims to maintain the patient's general condition, prevent complications, and accelerate the recovery of the joints affected by TB.

The patient has a history of bone TB surgery including arthroscopy, soft tissue release, abscess curettage, and bone grafting in August 2024. The primary treatment for bone tuberculosis is actually anti-tuberculosis chemotherapy (ATT), while surgical intervention is only required in specific cases, such as large abscesses, medical therapy failure, or neurological complications [1,20,22].

Since children have a high ability for epiphyseal regeneration, the combination of osteotomy and tendon transfer frequently results in excellent outcomes; in fact, a number of studies confirm that the majority of pediatric patients can heal without surgery [20]. The common treatment period is one year, with continuous monitoring of clinical responses and pharmacological side effects, as well as an assessment of potential resistance if there is no improvement after 4-5 months [22]. Long-term immobilization is no longer suggested in rehabilitation; instead, modern treatments focus on short-term post-operative immobilization, physiotherapy, and the use of devices such as hinged long arm braces or continuous passive movement (CPM). If joint tuberculosis is identified early and ATT therapy begins promptly complete recovery is possible even without immobilization or surgery [23].

Elbow tuberculosis is a rare condition characterized by nonspecific symptoms that frequently result in a delayed diagnosis. Patients may still be able to move their left elbow with moderate pain (VAS 5-6) and no sensory complaints, but everyday tasks are primarily conducted with the right hand. Long-term tuberculosis treatment is combined with surgical operations. Close monitoring and a multidisciplinary approach are critical for avoiding medication resistance and joint function issues.

CONCLUSION

Elbow tuberculosis is a rare condition. The diagnosis was made based on clinical history, radiology, and positive GeneXpert testing. The patient received intense anti-tuberculosis medication and had previously undergone surgery. A comprehensive approach is required for maintaining joint function while preventing complications.

REFERENCES

1. Yadav, S. (2024). Tuberculosis of the Elbow Joint in an Indian Boy: A Rare Entity With a Diagnostic Challenge. Cureus, 16(4), e58184. https://doi.org/10.7759/cureus.58184
2. Upadhyaya, G. K., Kumar, A., Iyengar, K. P., Agarwal, A., & Jain, V. K. (2021). Current concepts in the diagnosis and management of tuberculosis of the elbow joint. Journal of Clinical Orthopaedics and Trauma, 19. https://doi.org/10.1016/j.jcot.2021.05.014
3. Gautam, D., Jain, V. K., Iyengar, K. P., Vaishya, R., & Malhotra, R. (2021). Total hip arthroplasty in tubercular arthritis of the hip – Surgical challenges and choice of implants. In Journal of Clinical Orthopaedics and Trauma (Vol. 17). https://doi.org/10.1016/j.jcot.2021.03.018
4. Domingo, A., Nomdedeu, M., Tomás, X., & García, S. (2005). Elbow tuberculosis: An unusual location and diagnostic problem. Archives of Orthopaedic and Trauma Surgery, 125(1). https://doi.org/10.1007/s00402-003-0612-y
5. Thimmaiah, V. T., & Deepashree. (2013). Unusual Presentation of Tuberculosis of Elbow Joint : A Case Report. Journal of Medical and Health Sciences, 2(4), 17–20.
6. Ozturk, M., Akatli, A., Sigirci, A., & Akpolat, N. (2018). Tuberculous Arthritis in the Elbow Joint in an Adolescent. European Journal of Therapeutics, 24(3). https://doi.org/10.5152/eurjther.2017.266
7. Liao, Q., Shepherd, J. G., & Hasnie, S. (2017). Mycobacterium tuberculosis of the elbow joint. BMJ Case Reports, 2017. https://doi.org/10.1136/bcr-2017-222735
8. Kala, P. R., & Wati, S. (2024). The Relationship Of The Role Of Drug Swallowing Monitors (PMO) To Compliannce With Drug Drinking In Pulmonary TB Patients In The Kuta Baro Health Center, Aceh Besar District 2023. Pharmacology, Medical Reports, Orthopedic, and Illness Details (COMORBID), 3(1), 26–32. https://doi.org/10.55047/comorbid.v3i1.1107
9. Javed, M., Boyle, S., Mustafa, S., & Scott, F. (2015). Elbow pain: A guide to assessment and management in primary care. In British Journal of General Practice (Vol. 65, Issue 640). https://doi.org/10.3399/bjgp15X687625
10. Rahman, J., Patel, A., & Lam, F. (2016). Primary Tuberculosis of the Elbow joint: A Case Report. Musculoskeletal Care, 14(3). https://doi.org/10.1002/msc.1124
11. Siddiqui, M. S., Javed, S., Razak, A., Zubairy, A., & Khan, S. H. (2014). Brodie'S Abscess With Tuberculous Osteomyelitis Of The Foot. In JBR-BTR (Vol. 97, Issue 3). https://doi.org/10.5334/jbr-btr.66
12. Agarwal, A., Khan, S. A., & Qureshi, N. A. (2011). Multifocal osteoarticular tuberculosis in children. Journal of Orthopaedic Surgery (Hong Kong), 19(3). https://doi.org/10.1177/230949901101900315
13. Palasseril, A. S., Chegu, M., Shahul, M. R., & T, G. M. (2024). "An Atypical Presentation of Tuberculosis Elbow" - A Case Report. Journal of Orthopaedic Case Reports, 14(12), 137–141. https://doi.org/10.13107/jocr.2024.v14.i12.5050

14. Tidja, Y. E. A., Mustokoweni, S., & Saleh, T. A. (2020). Bone Tuberculosis: Clinical Profile of 40 Patients in Dr. Soetomo General Hospital Surabaya. JUXTA: Jurnal Ilmiah Mahasiswa Kedokteran Universitas Airlangga, 11(1). https://doi.org/10.20473/juxta.v11i12020.1-5
15. Desdiani, D., Rizal, H., Basuki, A., & Fadilah, F. (2022). Case Report: Delayed treatment of tuberculosis of the elbow joint. F1000Research, 10. https://doi.org/10.12688/f1000research.53488.2
16. Bhattacharjee, S., Chakraborty, S., Baby, S., Jain, V., & Khan, H. (2024). A Rare Presentation - Case Report on Tubercular Cold Abscess. Journal of Drug Delivery and Therapeutics, 14(4), 7–9. https://doi.org/10.22270/jddt.v14i4.6507
17. Khetpal, N., Khalid, S., Kumar, R., Betancourt, M. F., Khetpal, A., Wasyliw, C., & Patel, S. (2018). Tuberculous Arthritis of the Elbow Joint: An Uncommon Location with a Diagnostic Dilemma. Cureus. https://doi.org/10.7759/cureus.2462
18. Wagh, Y., Reddy, R., Gundavda, M., Agarwal, M., Agashe, V. M., & Bajwa, S. (2020). Tuberculosis (T.B.) masquerading as tumor. An 8-year study on 25 cases of long bone tuberculosis presenting as tumors. SICOT-J, 6. https://doi.org/10.1051/sicotj/2020011
19. Thimmaiah, V. T., Shetty, C., & Deepashree, D. (2014). Elbow Tuberculosis - A Case Report. Nepalese Journal of Radiology, 3. https://doi.org/10.3126/njr.v3i2.9618
20. Agarwal, A., & Rastogi, A. (2017). Tuberculosis of the Elbow Region in Pediatric Age Group - Experiences from a Single Centre. The Journal of Hand Surgery Asian-Pacific Volume, 22(4). https://doi.org/10.1142/S0218810417500502
21. Limaiem, F., Gharbi, M. A., Bouhajja, L., & Bouzidi, R. (2025). Tuberculous osteo-arthritis unmasked through unusual elbow swelling: A case report. International Journal of Surgery Case Reports, 126, 110759. https://doi.org/10.1016/j.ijscr.2024.110759
22. Rahangdale, A. (2022). Outcome of Bone Tuberculosis in Children in Rural India - A case series. Pediatric Oncall, 19(2). https://doi.org/10.7199/ped.oncall.2022.21
23. Dahl, C. S. (2001). Physical therapist management of tuberculous arthritis of the elbow. Physical Therapy, 81(6). https://doi.org/10.1093/ptj/81.6.1253