

## Extrapulmonary forms of tuberculosis. Clinical case report of a child with tuberculous osteoarthritis

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### Abstract

**Introduction:** Tuberculous osteoarthritis, caused by *Mycobacterium tuberculosis*, is a very rare extrapulmonary manifestation of tuberculosis, especially in children.

**Aim:** This article presents a clinical case of a 21-month-old male patient with tuberculous osteoarthritis affecting the ankle joint. The rarity of this pathology underscores the critical importance of swift diagnosis and a multidisciplinary approach involving specialists from diverse medical fields.

**Results:** Early initiation of specific antituberculous treatment, coupled with timely surgical intervention, ameliorated the patient's immediate suffering. Furthermore, this combined therapeutic strategy holds promise for a favorable long-term prognosis regarding joint function.

**Conclusion:** Tuberculosis in children exhibits markedly diminished incidence, and its extrapulmonary variants are exceedingly rare. However, clinicians should maintain a high index of suspicion, particularly when confronted with recalcitrant diseases that defy conventional therapeutic approaches. A comprehensive understanding of tuberculous osteoarthritis, despite its rarity, is pivotal for effective management.

### Keywords

tuberculosis, osteoarthritis, pediatric disease, pediatric surgery

### Introduction

Tuberculosis (TB), caused by *Mycobacterium tuberculosis*, remains a formidable global health challenge. Despite concerted efforts by medical experts worldwide, TB continues to afflict approximately one-third of the world's population, with 10% of infected individuals progressing to active tuberculosis disease during their lifetimes. Alongside HIV/AIDS and malaria, TB stands as a critical health priority of the 21<sup>st</sup> century [1].

According to Prof. Petko Minchev, Tuberculosis is a monoetiological disease with polymorphological manifestations. The disease can affect various organs and systems within the human body [1]. These diverse presentations can be broadly categorized into two main groups: pulmonary and extrapulmonary forms of tuberculosis (Tab. 1). While pulmonary TB garners significant attention, extrapulmonary forms, such as tuberculous osteoarthritis, remain less common but equally significant [2].

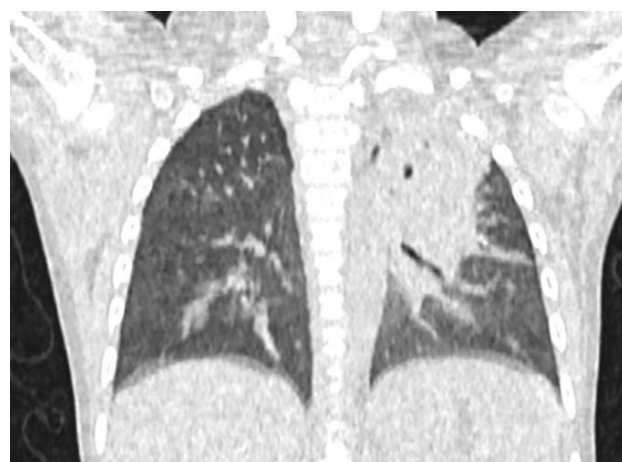
**Table 1.** Different forms of TB disease in childhood.

| Forms of Tuberculous disease in childhood |  |
|---|--|
| Pulmonary forms of TB                     | Extrapulmonary forms of TB                   |
| Primary TB complex                        | TB meningoencephalitis                       |
| Intrathoracic tuberculous lymphadenopathy | Peripheral tuberculous lymphadenopathy       |
| Infiltrative tuberculosis                 | Tuberculous pericarditis and myopericarditis |
| Caseous pneumonia                         | Genitourinary tuberculosis                   |
| TB pleuritis                              | Ocular tuberculosis                          |
| Pulmonary tuberculoma                     | Skin tuberculosis                            |
| Miliary tuberculosis                      | Tuberculosis of bones and joints             |

## Case presentation

The Clinic of Child Pulmonary Diseases and Tuberculosis of University Hospital “St. Ivan Rilski” in Sofia, Bulgaria admitted a 21-month-old male patient. Born full-term and without complications in Germany, where BCG vaccination is not mandatory, the child currently resided in Bulgaria with his family. Notably, both his father and brother were treated for tuberculosis prior to the child’s birth. The boy’s presenting complaints, which emerged two weeks earlier, included fever reaching up to 39°C, edema, hyperemia, and pain localized in the area of his left ankle. Seeking medical attention, the parents promptly took him to a nearby healthcare facility, where he was subsequently hospitalized. Laboratory investigations revealed elevated inflammatory markers, while auscultation detected an exudative finding in the left hemithorax. A chest radiography confirmed pneumonic changes in the left apex, prompting initiation of standard antibiotic therapy. Additionally, the left ankle joint was punctured, and material was collected for microbiological examination, although no culture growth was observed. Despite a two-week course of treatment, the child’s fever persisted, and follow-up chest radiography indicated incomplete resorption of the previously described changes. In light of the differential diagnosis, tuberculosis was considered. Consequently, the medical team performed a Mantoux tuberculin skin test (resulting in a 9 mm dense infiltrate at the 72<sup>nd</sup> hour) and conducted a T.SPOT-TB test, which yielded a positive result. As a result, the child was referred for specific treatment to the Clinic of Child Pulmonary Diseases and Tuberculosis of University Hospital “St. Ivan Rilski” in Sofia, Bulgaria.

On admission, the child presented with stable general condition and was afebrile. Notably, no BCG-vaccine scar was discernible on his left shoulder. Respiratory examination revealed bilaterally vesicular breath sounds without wheezing. The left ankle exhibited swelling, characterized by a livid skin color, tenderness upon palpation, and restricted mobility. Laboratory investigations demonstrated elevated inflammatory markers, including a white blood cell count (WBC) of  $14.8 \times 10^9/l$  and an erythrocyte sedimentation rate of 30 mm/h. Furthermore, computed tomography revealed infiltrative changes within the left upper lung lobe and enlarged intrathoracic lymph nodes bilaterally (Fig. 1).



**Figure 1.** Chest CT – infiltrative changes in the left upper lung lobe and bilateral hilar lymphadenomegaly.

The positive immunological test, specifically the T.SPOT-TB assay, coupled with elevated inflammatory activity and the distinctive morphological alterations observed via chest computed tomography (CT) collectively provided compelling grounds to initiate targeted anti-tuberculosis treatment. This therapeutic regimen encompassed the administration of Streptomycin, Rifampicin, and Isoniazid. Notably, despite exhaustive efforts, no etiological agent was successfully isolated from the gastric lavage tests.

However, the persistent arthritis affecting the left ankle joint remained an enigma. In our pursuit of diagnostic clarity, several plausible entities were meticulously considered within the framework of differential diagnosis of left ankle arthritis (Fig.2):

1. Juvenile Arthritis: Although this autoimmune condition is of minimal likelihood given the patient’s age and its tenuous association with tuberculosis, it was conscientiously evaluated.
2. Reactive Arthritis (Poncet’s Disease): This reactive inflammatory process, often triggered by an antecedent infection, was scrutinized as a potential culprit.
3. Septic Arthritis: The possibility of septic arthritis, characterized by joint inflammation secondary to microbial invasion, was meticulously weighed.



**Figure 2.** Current condition of the ankle at the time of the child's admission to the clinic.

4. Tuberculous Osteoarthritis: Given the overarching context of tuberculosis, this form of joint involvement was a pertinent consideration.

To elucidate the child's condition comprehensively, a consultation ensued with a pediatric rheumatologist affiliated with the Rheumatology Clinic of The Pediatric Hospital "Prof. Ivan Mitev" in Sofia, Bulgaria. During the meticulous physical examination and ultrasound assessment, synovitis within the left upper ankle joint was discerned. Subsequently, the child was referred to the Pediatric Surgery Clinic of UMHATEM "N. I. Pirogov" in Sofia, Bulgaria. Employing both echography and radiography, the evaluation of the affected joint unveiled several noteworthy findings – reduced bone density, fluid collections in the area of the fibular malleolus and an osteolytic zone (Fig. 3).

Under general anesthesia a surgical incision in the area of the lateral malleolus was performed and the left talocrural joint was opened. Minimal amounts of purulent exudate and necrotic tissue were evacuated. A proximal penetration of the joint to the overlying bones was assessed. Histological and microbiological examinations were conducted. The operative site underwent rigorous lavage and sanitation using 0,9% saline, 10% hydrogen peroxide, sol. Hibitani and 7,5% povidone iodine, were carried out and the operative wound was closed. Subsequent to a period of vigilant observation, the pediatric patient was re-referred to The Clinic of Child Pulmonary Diseases and Tuberculosis of University Hospital "St. Ivan Rilski" in Sofia, Bulgaria. Unfortunately, the microbiological examination conducted during the surgical intervention failed to identify a definitive etiological agent. However, histology revealed the presence of necrotic tissue, inflammatory infiltrates, epithelioid cells, Langhans-type giant



**Figure 3.** X-ray of left ankle – osteolytic zone.

cells and hemorrhagic manifestations. These histopathological findings most robustly correlated with a diagnosis of tuberculous disease.

Following extensive deliberation by medical specialists, it was determined that the patient's anti-tuberculous therapy should be continuously administered. Over the subsequent month, notable improvements in the patient's general condition, fever control, and weight gain were observed. However, at the close of December, approximately one month after the initial joint incision, a recurrence of symptoms manifested. Swelling, hyperemia, and pain reemerged in the area surrounding the same ankle. Consequently, the child was promptly referred once more to the Pediatric Surgery Clinic of UMHATEM "N. I. Pirogov", Sofia, Bulgaria. During this subsequent surgical intervention, a meticulous debridement procedure was executed. Approximately 15 milliliters of purulent material were evacuated from within the joint and the vicinity around the fibula. Postoperatively, the local status of the ankle exhibited gradual improvement.

In three months the wound had successfully healed with the emergence of granulation tissue at the site of the surgical intervention (Fig. 4). Subsequently, in 7 months of anti-tuberculosis treatment, only two scars remained visible from the performed manipulations (Fig. 5). Remarkably, in addition to the local healing process, the functionality of the affected joint was fully restored. The child regained the ability to step on the foot without pain, and a full range of motion in the ankle was once again possible.

During the course of specific therapy, the child's laboratory parameters exhibited a return to normalcy, signifying a favorable response to treatment. Furthermore, the follow-up chest radiography revealed a complete resorption of the previously observed infiltrative changes after 5 months of treatment (Fig.6).



**Figure 4.** Wound healing with formation of granulation tissue.



**Figure 5.** Two scars from the conducted manipulations in the area of the left ankle.



**Figure 6.** Chest X-ray from April 2023 – resorption of the infiltrative changes compared to CT from November 2022.

## Discussion

Tuberculosis of bones and joints represents a secondary form of the disease resulting from hematogenous dissemination originating from new or unhealed caseous foci within the lungs [3]. This hematogenous spread usually targets the richly blood-supplied middle part of long bones, subsequently affecting the nearby joint. While its incidence varies among different ethnic groups, with a frequency ranging from 0.2 to 16 cases per 100,000 population in South Asia [1], no specific studies have been conducted to ascertain the disease prevalence in Bulgaria. This form of tuberculosis predominantly afflicts adult patients and is rarely observed in childhood. Clinically, it manifests as slowly progressive monoarthritis of a large joint [4]. General symptoms are non-specific and include weight loss, subfebrile or febrile temperature, and night sweats [5]. The joint involvement progresses slowly, characterized by hyperemia and edema. In more advanced stages, patients experience pain and restricted joint mobility. The most commonly affected joints include those of the spine (known as Pott disease), as well as the hip and knee joints [6]. Historically, in the pre-antibiotic era, the natural course of the disease led to the development of spinal gibbus, severe ankylosis, and permanent functional limitations in the affected joints. However, modern therapeutic approaches have significantly improved outcomes, favorably influencing the disease's course and facilitating joint function restoration [7]. Sometimes surgical intervention is deemed necessary.

## Conclusion

Despite the reduced frequency of tuberculosis in Bulgaria, it remains a significant concern within childhood pathologies. Advances in laboratory and radiological diagnostic methods have undoubtedly improved our understanding, yet the definitive diagnosis of tuberculosis sometimes unfolds during the course of therapy. Treating pediatric tuberculosis is a complex endeavor that demands a multidisciplinary approach and proceeds deliberately over a period of 6 to 12 months, contingent upon the disease's specific form.

The success of this treatment regimen reverberates beyond the individual patient—it profoundly impacts society as a whole. However, amidst the broader landscape of tuberculosis, a rare variants, such as bones and joints tuberculosis, emerges. This form, particularly uncommon in children, warrants special attention. In intricate and challenging cases, early initiation of targeted therapy, and occasionally surgical intervention, significantly influence the disease's ultimate outcome.

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