Knee tuberculosis in the context of MALT lymphoma: the diagnostic role of ultrasound and CEUS. A case report.

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Abstract

Tuberculosis (TB) arthritis remains a diagnostic challenge. In addition to clinical presentation, the use of imaging techniques and confirmation of Mycobacterium tuberculosis are essential. We present the case of a 69-year-old female in whom the diagnosis of knee TB arthritis was simultaneously established with the diagnosis of MALT lymphoma. This case report aims to highlight the role of multimodal ultrasound (US) in both diagnosis and its utility in interventional procedures, such as aspiration and synovial biopsy.

Keywords: knee; tuberculosis; ultrasound; CEUS; MALT lymphoma

Introduction

Despite the reduction in the incidence of tuberculosis (TB) worldwide, World Health Organization data estimated that 10.6 million people were newly infected with TB in 2022 [1]. The most common form of TB presentation is pulmonary TB, but extrapulmonary TB is recognized as an important cause of morbidity and mortality. Musculoskeletal system involvement by TB represents 1-3% of all TB cases [2], with the spine and large joints (especially the knees and hips) being the predilect sites [3]. Diagnosis is based on clinical presentation and confirmation of Mycobacterium tuberculosis bacilli in the involved structure. Imaging techniques are essential for characterizing the spread of the pathological process, identifying complications, and monitoring follow-up. Radiography, computed tomography (CT), and magnetic resonance imaging (MRI) are the most frequently used imaging techniques for these purposes [4].

We present the case of knee TB arthritis in a patient with MALT lymphoma, in which multimodal US significantly contributed to the diagnosis. The purpose of this case report is to highlight the high utility of US in this case.

Case report

A 69-year-old female with no significant past medical history was admitted for pain (rated 7 on the visual analogue scale) and limited range of motion in the left knee (both flexion and extension). These symptoms had gradually increased over the previous 8-9 months. She had been diagnosed with knee osteoarthritis, but there was no improvement after treatment. Clinical examination revealed a swollen left knee without any inflammatory signs. Additionally, palpable lymph nodes were found in the axilla, subclavicular, and inguinal regions, measuring between 2-3 cm, elastic, non-tender, and mobile. Laboratory data showed an elevated erythrocyte sedimentation rate (40 mm/h) and C-reactive protein (5 mg/dl), leukopenia (2,730/mm³) with lymphopenia (430/mm³), and hyperglycemia (290 mg/dl).

Given the suspicion of lymphoma, an US was performed (LOGIQ™ E10 Ultrasound/GE Healthcare, United States, 6-15 and 18 MHz linear transducers). In the axilla, subclavicular, and inguinal regions, multiple hypoechoic lymph nodes (measuring between 2-3.5 cm)
In many of these lymph nodes, the hilum was difficult to assess, the vascularization was slightly increased, and strain elastography indicated they were stiff (hard). Contrast-enhanced ultrasound (CEUS) revealed highly vascularized lymph nodes (fig 1, video 1 on the journal site). A biopsy of an axillary lymph node confirmed the diagnosis of MALT lymphoma.

US of the knee confirmed the distension of the joint cavity, which contained predominantly proliferated synovia (moderately hyperechoic, inhomogeneous, with a few hyperechoic foci) and only a small quantity of fluid. This appearance was present in all compartments, including the popliteal fossa, where a medium-sized Baker’s cyst was identified. The synovia exhibited a low degree of vascularization on colour Doppler US. US guided aspiration of the knee and the Baker’s cyst was performed, yielding a viscous, turbid, brownish fluid. The culture was sterile, excluding septic arthritis, and optical microscopy identified a few neutrophils, erythrocytes, and rare lymphocytes. Polarized light microscopy examination excluded the presence of crystals. CEUS showed rapid hyper-enhancement in the joint periphery (starting at second 15). In the centre of the proliferated synovia, microbubbles were detected only in the late phase (after 1 minute 30 seconds) (fig 2, videos 2 and 3 on the journal site). The high level of activity of the proliferated synovia was demonstrated, and in the absence of totally non-enhanced regions, necrosis or extensive fibrosis was excluded. US guided biopsy was performed, and histological examination revealed a granulomatous inflammatory process (multiple granulomas with epithelioid cells, without central necrosis). Although the Ziehl-Neelsen stain was negative, GeneXpert MTB testing was positive, and culture on Lowenstein medium was positive after 6 weeks, confirming knee tuberculosis. Radiography of the knee showed only osteoarthritic changes, with no suspicion of osteomyelitis.

The thoraco-abdominal CT revealed multiple mediastino-hilar adenopathies and small foci of pulmonary consolidation. Bronchoscopy with lavage confirmed the presence of Mycobacterium tuberculosis in the respiratory tract, although the patient was completely asymptomatic. The patient commenced tuberculostatic treatment with the 4-drug regimen and was subsequently referred to the haematology department. The evolution was positive; after 6 months of treatment, the knee became painless, and mobility improved.
Discussion

The occurrence of knee TB in our patient, simultaneous with MALT lymphoma and diabetes mellitus, has not been previously described in the literature. It is well-known that the risk for TB is higher in immunocompromised patients, including those using biologicals and immunosuppressive drugs, and those with chronic liver and kidney diseases, diabetes mellitus, or malignancies [5]. It is possible that our patient had latent tuberculosis that became active and disseminated due to the appearance of lymphoma. MALT lymphoma is a slow-growing [6] type of non-Hodgkin lymphoma, which can explain the evolution of our case.

Gray-scale and Doppler US images of the involved lymph nodes were typical for malignant pathology, and the findings from strain elastography and CEUS reinforced this suspicion. Using US, we were able to select the most representative lymph node for biopsy, thereby avoiding negative sampling.

There are only a few reports on the use of US for articular and extra-articular TB [4], and for this reason, specific US findings for this pathology have not been described. In the presence of a "cold" swollen joint (especially monoarthritis), the US finding of a predominantly parenchymal joint content should raise the suspicion of TB. Of course, a differential diagnosis must be carefully conducted. The presence of small hyperechoic foci in the proliferative synovium may be another important finding. To confirm an active inflammatory process inside the joint, CEUS is an excellent tool, as the microbubbles have dimensions similar to erythrocytes. To our knowledge, this is the first case of knee TB explored using CEUS, and for this reason, we have included videos from the early and late phases of CEUS with this paper.

As TB arthritis is generally paucibacillary, the identification of bacilli becomes a challenge, making molecular diagnosis and histologic examination mandatory [7]. Obtaining joint fluid for laboratory tests using US guidance is recognized as an efficient technique [8].

Previous studies related to histological examination in TB arthritis obtained tissue samples using arthroscopy or open surgery [9-11]. These methods are highly invasive, require special preparation, and involve high costs. US-guided biopsy is a well-tolerated procedure with a high success rate in providing adequate samples [9,12,13]. It can be performed without special preparation [13] and in a shorter time compared to surgical procedures.

In conclusion, the use of multimodal US should be considered in patients with suspected TB arthritis, and US guidance for obtaining synovial fluid or histological samples should be the first line of interventional guidance.

References


Video 1. CEUS of the lymph nodes in left axilla
Video 2 and 3. Knee CEUS