



Tuberculosis of the knee joint: a case report

Diz eklemi tüberkülozu: Olgu sunumu

Umut AKGUN,¹ Bulent EROL,² Cagatay CIMSIT,³ Mustafa KARAHAN²

¹Marmara University School of Physical Education And Sports;
Marmara University School of Medicine, ²Department of Orthopaedics and Traumatology, ³Department of Radiology

Tüberküloz, esas tutulum yeri olan akciğerler dışında iskelet sisteminde de görülmektedir. Yirmi iki yaşında erkek hasta, sol dizde şiddetli ağrı, şişlik ve yürümekte güçlük yakınmalarıyla başvurdu. Yakınmaları 12 yıl önce başlayan hastaya daha önce başka merkezlerde açık cerrahi debridman ve artroskopik debridman yapılmış ve dizden alınan aspirasyon kültürlerinde herhangi bir üreme saptanmamıştı. Fizik muayenesinde sol dizde şişlik, ısı artışı ve efüzyon izlenirken, diz ağrılı ve hareket açıklığı sınırlıydı. Öykü, fizik muayene, radyoloji ve laboratuvar sonuçlarına dayanılarak, hastada geçirilmiş non-spesifik septik artrite bağlı diz osteoartriti düşünüldü ve diz artrodezi uygulandı. Ameliyat sırasında, eklem kıkırdaklarında yaygın destrüksiyon ve sinovyal dokuda belirgin hipertrofi izlendi. Femoral lateral kondilde, eklem uzanım göstermeyen kaviter yapıda, yaklaşık 1x1 cm büyüklükteki lezyondan alınan biyopsi kültüründe üçüncü haftada *Mycobacterium tuberculosis* üremesi üzerine hastaya diz eklemi tüberkülozu tanısı kondu ve antitüberküloz ilaç tedavisine başlandı. Ameliyat sonrası altıncı ay kontrolü sırasında hastanın antitüberküloz tedavisi devam etmekteydi ve ağrı yakınması tamamen düzelmisti.

Anahtar sözcükler: Antitüberküloz ilaç; artrit; tanı, ayırıcı; diz eklemi; tüberküloz, osteoartiküler/radyografi/cerrahi.

Tuberculosis may develop in the skeletal system apart from its primary location, the lungs. A 22-year-old male patient presented with complaints of severe pain and swelling in the left knee and difficulty in walking. The symptoms first appeared 12 years before and he underwent open surgical debridement and arthroscopic debridement at two other centers, at which time aspiration cultures taken from the knee yielded no growth. Physical examination showed a painful left knee with swelling, increased temperature, effusion, and limited range of motion. Based on history, physical examination, radiological studies, and laboratory findings, knee osteoarthritis was considered secondary to nonspecific septic arthritis and knee arthrodesis was performed. At surgery, marked destruction of articular cartilage and synovial hypertrophy were observed. In addition, a cavitory lesion was detected, about 1x1 cm in size, in the lateral femoral condyle without articular involvement. Biopsy cultures taken from the lesion showed growth of *Mycobacterium tuberculosis* in the third week. This enabled a diagnosis of tuberculosis of the knee joint and antituberculous drug therapy was instituted. At six months postoperatively, the patient was on antituberculous treatment and had a painless knee.

Key words: Antitubercular agents; arthritis; diagnosis, differential; knee joint; tuberculosis, osteoarticular/radiography/surgery.

Today, one-third of the world population is infected by tuberculosis.^[1] Tuberculosis bacilli reach the human body by the airway and first infects the lungs, that's why it is rare to see it in the skeletal system. Mostly vertebra is affected in the skeletal

system then the joints come. Hip and knee are the most commons among the joints.^[2,3] Despite the success of anti-tuberculosis treatment modalities, tuberculosis is still an important cause of morbidity and mortality in developing countries.

Case report

22 years old male patient consulted to our clinic with complaint of severe pain and swelling in his left knee which restricts his daily activities and wakes him up in sleep. He had those complaints since 12 years. When he first consulted another hospital with the complaint of pain and swelling in his left knee without history of trauma, open debridement had been done with the diagnosis of infection. Postoperatively his pain had gradually decreased, but swelling had not been recovered completely. Approximately 1.5 years ago, after having no pain for a long time, he again consulted another hospital with complaint of increasing pain and swelling on his left knee. Aspiration samples were taken from patient's left knee but there was no growth of bacterial culture. Arthroscopic debridement had been performed. Despite the antibiotic treatment postoperatively, his complaints did not diminish, and range of motion (ROM) had gradually decreased.

When he consulted our clinic, he was only able to walk with the help of crutch without loading on his left knee. In his physical examination we found effusion and warming in his left knee but we did not observe any sinus formation around knee skin. ROM of the left knee was between 0-20 degree and painful. In contrast, the healthy one's (right knee) ROM was normal and there was no pain. Bilaterally there was no sensory-motor loss and distal pulses were palpable. Patient did not have any complaint about his other joints except the left knee. At the time he consulted our clinic, he did not have systemic fever and his erythrocyte sedimentation rate (ESR) and C-Reactive Protein levels were in between normal ranges. Leu-

kocyte and hemoglobin counts were also in between normal ranges. From the aspiration sample cultures, neither aerob nor anaerob bacteria grew.

In X-Ray, severe destruction on femoral condyle and tibial plato of the left knee could be seen. Medial and lateral joint intervals became narrow. (Figure 1) On T_1 -weighted Magnetic resonance imaging (MRI), irregularity in the structure of bone cortex and increase in heterogen hypointense signals were detected. (Figure 2) On T_2 -weighted MRI, diffuse, heterogen hyperintense signals were detected on bone. Hyperintense signals showing edema was present in the soft tissue neighbouring the joint. After the injection of Gadolinium, hypertrophied, extra-joint positioned and widespread hyperintense synovial tissue was detected.

At the end of the investigations, our diagnosis was knee osteoarthritis due to a non-specific septic arthritis. Knee arthrodesis was planned and mid-patellar arthrotomy was performed under general anesthesia. Widespread destruction of the cartilage tissue and hypertrophied synovial tissue were seen in the operation. No bacteria was detected on synovial fluid sample and the same sample was then cultured for aerobic, anaerobic and tuberculosis investment. On lateral femoral condyle, an 1x1cm sized cavity was detected. It was not extending to joint. Biopsi was performed from that cavity which was cultured then. Mediolateral dynamic compression plates were used for the arthrodesis as planned before. (Figure 3)

There was a considerable decrease in the pain of the patient postoperatively. There was no bacterial grow in the cultures of the samples taken from the synovial fluid of left knee, but *Mycobacterium tuber-*

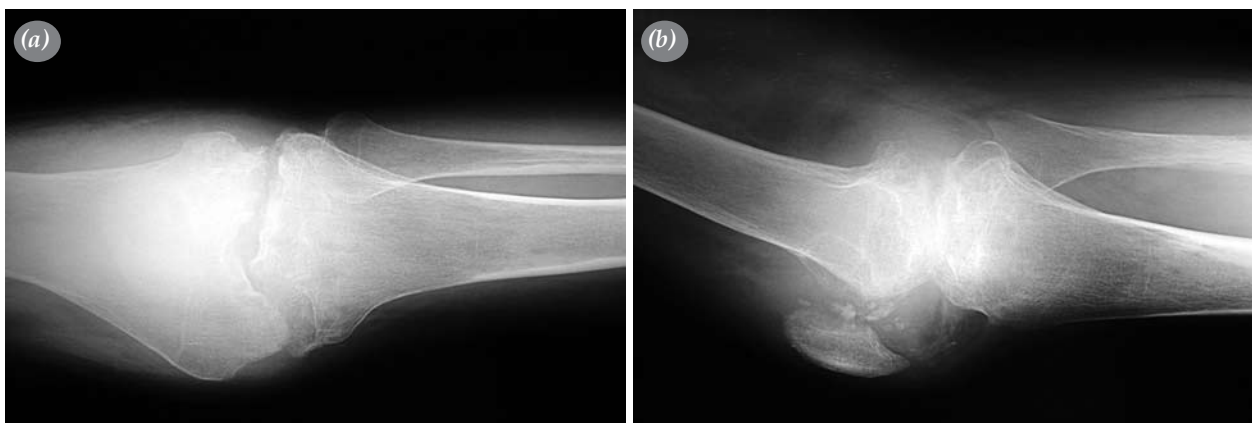


Figure 1. (a) Anteroposterior and (b) Lateral plain radiographs of left knee. High grade degeneration of femoral condyles and tibial plateau is visible, together with joint space narrowing.

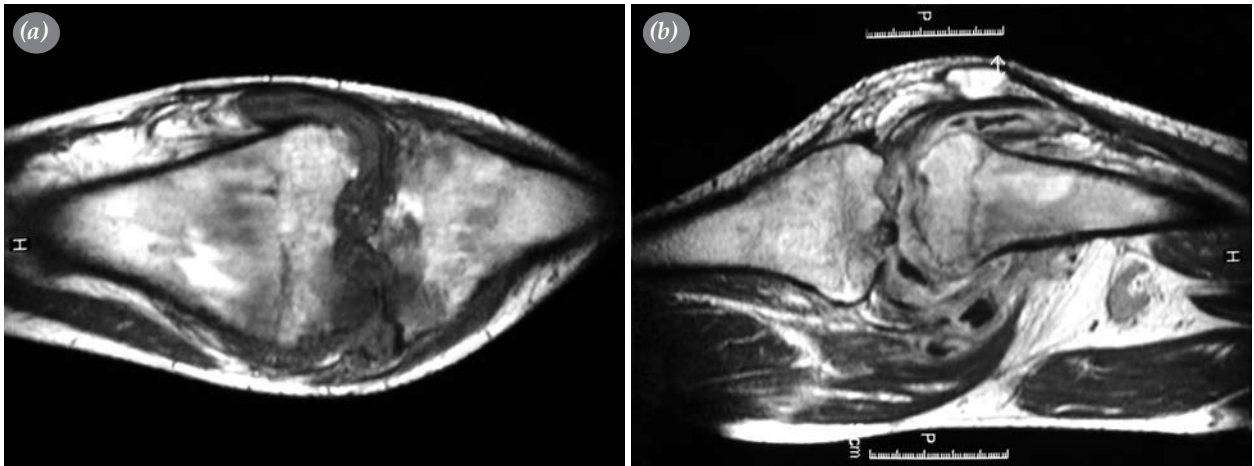


Figure 2.(a) T₁-weighted coronal magnetic resonance image. Cortical irregularity and abnormal hypointense signals on para-articular bony structures. (b) T₁-weighted magnetic resonance image shows hypertrophy, thickening and intense contrast enhancement on synovium which extends extra-articularly.

culosis had grew in its third week of culture which was taken from a cavity lesion. As the evaluation of infectious diseases at the same time with culture result, knee joint tuberculosis has been the diagnosis.

Patient's follow-up was done by infectious diseases after the diagnosis. Patient's last control was done six months after the operation. His anti-tuberculosis treatment kept going and he was pain free. Neither wound problem nor implant infection was observed in that interval.

Discussion

Microorganisms causing tuberculosis disease are *M. tuberculosis*, *M. africanum*, *M. bovis*, *M. kansasii*, *M. marinum*, *M. scrofulaceum* and *M. avium*.^[4] *M. Tuberculosis*, which is an aerob, non spore-forming and immobile bacilli, is the most encountered one.^[5] Lungs are usually the primer focus for the basilli which is infectious by inhalation. At first T-cells kill the infected

macrophages and caseification granulomas forms.^[5] In contrast to intrapulmonary, extrapulmonary localized tuberculosis is very rare. Musculoskeletal system is involved in 1-3% of the cases and vertebra, hip, knee, ankle, elbow, hand, shoulder, bursa and other parts are the most affected localizations according to their frequencies.^[6-8] Generally only one joint is infected but in 10% of cases more than one joint can be infected.^[8-10]

In osteoarticular localizations, the basilli is spread from the primer focus by hematogen way and infection of the joint can occur by arterial (synovial), epiphyseal or metaphyseal neighbourhood.^[10] When articular cartilage is affected, degeneration and erosion of chondral tissue from periphery to central can be observed and early diagnosis and management is very important at that point.^[10] Systemic symptoms of osteoarticular localizations are low grade fever, fatigue, anorexia, weight loss, night sweats, tachycardia and anemia.^[10] Effusion, redness, warmness, soreness (especially at nights), decreased range of motion, muscular atrophy and lymph

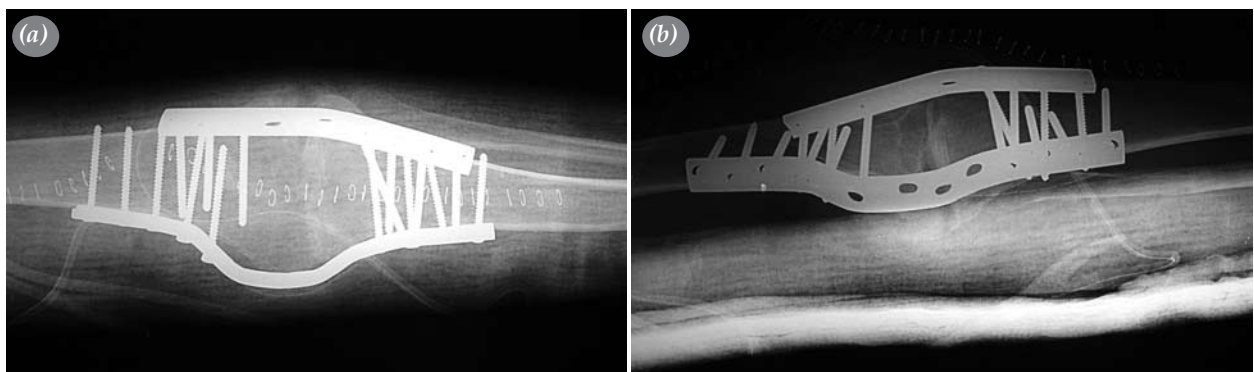


Figure 3. Postoperatively (a) Anteroposterior and (b) Lateral plain radiographs.

node enlargement can be observed on the side of infection.^[10] Effusion might be the only symptom in the early phase of knee joint tuberculosis. In the absence of early management, flexion contractures in knee joint may develop as a result of pain and difficulty in load bearing, which are related to cartilage tissue destruction.^[11]

Anemia and relative lymphocytosis might be seen in complete blood count. Majority of the patients have high erythrocyte sedimentation rate (ESR), but high ESR levels are not diagnostic.^[10] PPD test is positive in patients infected for more than one month but this test might be negative in immunosuppressive patients having the infection. It is possible to see bacilli on direct microscopy with ARB painting and culture the bacilli from aspiration sample. In addition, high leukocyte count and low glucose levels in biochemical investigation of aspiration sample support the diagnosis. Today it is possible to make serologic investigation from aspiration sample. But in some cases, no bacilli on direct microscopy or growth in the cultures in spite of the existing infection can be detected. In such that situation, diagnosis is done by culture and pathological investigation of biopsy material.^[9] In our case, absence of growth in the culture taken from the knee joint aspiration sample, low levels of ESR and leukocyte levels took our diagnosis away from tuberculosis, but biopsy was performed during the surgery and tuberculosis bacilli grew in cultures taken from these biopsy materials. At that point, whatever is the diagnosis preoperatively, superiority of biopsy cultures to aspiration should be kept in mind.

X-ray and MRI are the radiologic investigations. While there is nothing significant on X-ray in early phase of the disease, joint destruction is visible in late phase but it is not specific. On MRI, intraarticular effusion and soft tissue edema can be detected in early phase. Thickening and extra-articular, suprapatellar placement of synovial membrane can be detected with time.^[12,13] In progressive stages, lesions on bone tissue can be detected due to destruction of subchondral cortex. Despite them all, it is impossible to differentiate septic arthritis from joint tuberculosis only by radiologic investigations. Because these radiologic investigations gave us information similar to osteoarthritis due to septic arthritis, they did not help us to suspect from tuberculosis.

In differential diagnosis septic arthritis, acut-chronic monoarticular arthritis, chronic abscess and osteomyelitis should be kept in mind. Most important steps in diagnosis of tuberculosis are clinical suspect and a good

history. Following the diagnosis, anti-tuberculosis treatment with at least three different drugs should begin and continue for a long period.^[9]

In treatment, immobilization of the effected joint is necessary in active and painful acute period. Long immobilization period causes joint arthrosis especially in joints having surface destruction.^[10] Early diagnosed patients need for immobilization less frequently. It is very important to hold knee joint in extension when the patient is at rest, because there is high risk of flexion contracture to occur.^[11] In addition, range of motion should be conserved by physical therapy. In joints having risk of bone deformation, like weight loading joint knee, skeletal traction may be applied when necessary.^[10] Only conservative treatment is usually enough for joints early diagnosed and having just synovial infection. For joints having intense effusion, pain, restricted range or chemotherapy resisted lesion, surgical debridement is indicated.^[10] Some authors says that surgical debridement is necessary in every diagnosed knee joint tuberculosis case.^[14] Despite all treatment modalities, correcting osteotomy, arthrodesis or total knee replacement surgeries are carried out in the presence of bone destruction or high grade joint deformation.^[9] High grade degeneration in the joint was radiologically significant and was restricting his daily activities. He had sleep problems because of the pain. Knee arthrodesis was applied according to patient's history and expectations. Although our diagnosis was osteoarthritis due to non-specific septic arthritis, our surgical procedure is one of today's surgical management modalities in joint tuberculosis. In last control of the patient (6th month postoperatively), he was completely pain free and there was no finding detected related to infection.

If early management has not been done in joint tuberculosis cases, irreversible degenerations can occur. That's why morbidity rates are so high. Normal ESR and false negative results in aspiration cultures can be detected despite the existing infection, so the biopsy should absolutely be performed. Because of having high prevalence of Tuberculosis in our country, osteoarticular tuberculosis should be kept in mind as a differential diagnosis of unilateral arthritis cases.

References

1. Babhulkar S. Editorial comment. Osteoarticular tuberculosis. *Clin Orthop Relat Res* 2002;(398):2-3.
2. Hoffman EB, Campbell JA, Lee AS. Tuberculosis of the hip and knee in children. *S Afr Bone Joint Surg* 1995;1:24-8.
3. Silva JF. A review of patients with skeletal tuberculosis

- treated at the University Hospital, Kuala Lumpur. *Int Orthop* 1980;4:79-81.
4. Shembekar A, Babhulkar S. Chemotherapy for osteoarticular tuberculosis. *Clin Orthop Relat Res* 2002;(398):20-6.
 5. Samuelson J, Von Lichtenberg F. Infectious diseases. In: Cotran RS, Robbins SL, Kumar V, Schoen FJ, editors. *Pathologic basis of disease*. 5th ed. Philadelphia: W. B. Saunders; 1994. p. 305-78.
 6. Davies PD, Humphries MJ, Byfield SP, Nunn AJ, Darbyshire JH, Citron KM, et al. Bone and joint tuberculosis. A survey of notifications in England and Wales. *J Bone Joint Surg [Br]* 1984;66:326-30.
 7. Martini M. *Tuberculosis of the bones and joints*. New York: Springer-Verlag; 1988.
 8. Tuli SM. *Tuberculosis of the skeletal system*. 2nd ed. New Delhi: Jaypee Brothers Medical Publishers; 1997.
 9. Watts HG, Lifeso RM. Tuberculosis of bones and joints. *J Bone Joint Surg [Am]* 1996;78:288-98.
 10. Tuli SM. General principles of osteoarticular tuberculosis. *Clin Orthop Relat Res* 2002;(398):11-9.
 11. Hoffman EB, Allin J, Campbell JA, Leisegang FM. Tuberculosis of the knee. *Clin Orthop Relat Res* 2002;(398):100-6.
 12. Soler R, Rodriguez E, Remuinan C, Santos M. MRI of musculoskeletal extraspinal tuberculosis. *J Comput Assist Tomogr* 2001;25:177-83.
 13. Ehara S. Osteoarticular tuberculosis. *Semin Musculoskelet Radiol* 2001;5:107-11.
 14. Wilkinson MC. Tuberculosis of the hip and knee treated by chemotherapy, synovectomy, and debridement. A follow-up study. *J Bone Joint Surg [Am]* 1969;51:1343-59.