

## Long-term Follow-up Results of Foot and Ankle Tuberculosis in Turkey



Sarper Gursu, MD<sup>1</sup>, Timur Yildirim, MD<sup>1</sup>, Hanifi Ucpinar, MD<sup>1</sup>, Hakan Sofu, MD<sup>2</sup>,  
Yalkin Camurcu, MD<sup>1</sup>, Vedat Sahin, MD<sup>1</sup>, Nursu Sahin, MD<sup>1</sup>

<sup>1</sup>Baltalimani Bone and Joint Diseases Hospital, Istanbul, Turkey

<sup>2</sup>Suluova State Hospital, Amasya, Turkey

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### ABSTRACT

The incidence of tuberculosis has been increasing, especially in the past 2 decades. Skeletal tuberculosis is very rare compared with the frequency of the pulmonary form. In the present study, we have shared our long-term experience with foot and ankle tuberculosis, providing information about the different aspects of the disease. A total of 70 patients with foot and ankle tuberculosis, treated from 1983 to 2005, were evaluated. The mean patient age was 34.4 (range 7 to 85) years at the diagnosis. The mean interval between the first symptoms and the diagnosis was 26.4 months (range 1 month to 15 years). The mean follow-up period was 21.7 (range 8 to 30) years. The infection affected both the joint and the bones in 29 patients, only the joints in 13, only the bones in 22, and the soft tissues alone in the remaining 6 patients. The most common joint location was the tibiotalar joint. The talus was the most commonly infiltrated bone. All patients underwent biopsy, and 28 patients underwent additional surgical procedures. In 18 patients (25.7%), 1 to 4 recurrences developed during the follow-up period. In the last follow-up visits, either severe destruction of the bones or end-stage arthrosis was evident in 39 patients (55.7%), especially in those with osseous tuberculosis. Foot and ankle tuberculosis is very rare. The diagnosis of the disease will often be late owing to the lack of pathognomonic findings. A histopathologic evaluation should not be omitted in cases with suspicion. The incidence of residual deformity or end-stage arthrosis has been high in the long term; however, the patients will usually be without any symptoms.

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Tuberculosis is one of the major global health problems. Every year, 2 to 3 million people will be reported to have died because of tuberculosis, and an important number of patients will have become crippled from the osteoarticular form of the disease (1). The incidence of tuberculosis has been increasing, especially in the past 2 decades; thus, tuberculosis a common problem for healthcare professionals (2,3). Skeletal tuberculosis accounts for almost less than 3% of all extrapulmonary cases of tuberculosis and is very rare compared with the frequency of the pulmonary form (4,5). The foot and ankle will be affected in 10% of all cases of osteoarticular tuberculosis (6,7). Foot and ankle tuberculosis is rare and not easily diagnosed, because it has the potential to mimic other diseases, causing delays in treatment (4,5). In the present retrospective cohort study, we have shared our long-term experience with foot and ankle tuberculosis, providing information about different aspects of the disease.

### Patients and Methods

An 8-month-long evaluation of the institutional database by 3 of us (S.G., H.U., H.S.) revealed that from February 1983 to April 2005, 78 cases of tuberculosis located to the foot and ankle were treated at our institute. In 2013, 70 of these patients underwent a final evaluation. The other 8 patients either had died of factors unrelated to tuberculosis or were not accessible. Of the 70 remaining patients, 37 (52.8%) were male and 33 (47.2%) were female. The mean patient age was 34.4 (range 7 to 85) years at the diagnosis. The disease was located in the right foot and ankle in 36 patients (50% of the affected feet), the left side in 32 patients (44.4%), and both sides in 2 patients (5.6%). The mean interval between the first symptoms and the diagnosis was 26.4 months (range 1 month to 15 years). The disease in 6 patients (8.5%) had been diagnosed before their admission to our institute. The mean follow-up period was 21.7 (range 8 to 30) years. The institutional review board approved the study.

### Results

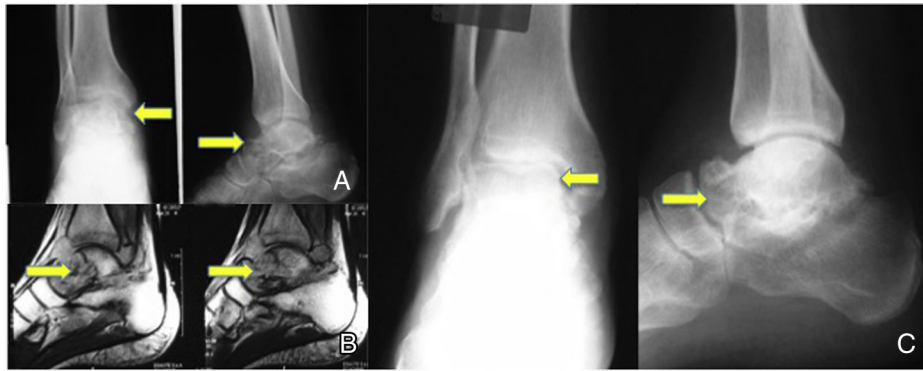
The diagnosis was determined from the clinical, laboratory, radiologic, and histopathologic findings. The mean erythrocyte sedimentation rate was 41.3 (range 22 to 101) mm at 1 hour, and the mean C-reactive protein level was 31.7 (range 12 to 88) mg/L. A tuberculin skin test was performed for all patients and was positive in 66 (95%). Active pulmonary tuberculosis was coexistent in 11 patients (15.7%) at the initial diagnosis. Of the 70 patients, 14 (20%) had presented after acute foot or ankle trauma, and 34 (48.6%) had had a draining fistula at

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Address correspondence to: Sarper Gursu, MD, Baltalimani Bone and Joint Diseases Hospital, Rumelihisari Cad. No. 62, Baltalimani, Sariyer, Istanbul, Turkey.

E-mail address: sarper154@yahoo.com (S. Gursu).



**Fig. 1.** (A–C) Radiographs of a 7-year-old male patient with spina ventosa. Spina ventosa is also known as tuberculous dactylitis and affects the tubular bones of the hands or feet (arrows), especially in the pediatric age group.

presentation. The infection affected both the joint and the bones in 29 patients (41.4%), only the joints in 13 (18.6%), only the bones in 22 (31.4%), and the soft tissues alone in the remaining 6 (8.6%). The bony lesions were classified into 4 different types: focal erosions in 23 patients (32.8%), infiltrative in 18 (25.7%), spina ventosa in 6 (8.6%; Figs. 1 and 2), and cystic lesions in 4 patients (5.7%). The radiologic

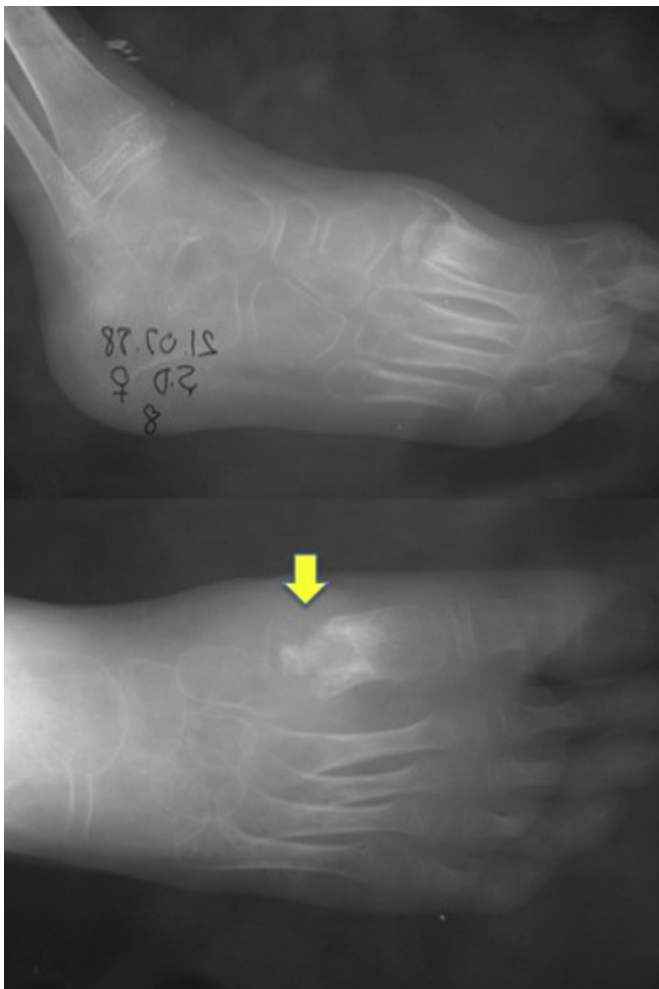
evaluation was performed according to the findings from Martini et al (8):

- Stage 1: Local osteoporosis without accompanying bony changes
- Stage 2: The existence of erosions or cavities within the bone
- Stage 3: Involvement of the whole joint without major destruction
- Stage 4: Gross destruction

Thus, in our cohort, 27 patients (38.6%) had stage 1, 13 (18.6%) stage 2, 9 (12.8%) stage 3, and 21 (30%) had stage 4 (Table). Magnetic resonance imaging and computed tomography were used in appropriate cases for additional evaluation of the soft tissues and the bones.

The most common location of the infection was the tibiotalar joint (29 patients [41.4%]). The talus was the most commonly infiltrated bone and was affected in 8 cases (11.4%; Fig. 3). The calcaneus was affected in 7 patients (10%), the metatarsal bones in 7 (10%), the cuneiforms in 6 (8.6%), the synovium in 6 (8.6%), the subtalar joint in 4 (5.7%), and the phalanges in 3 patients (4.3%).

All patients underwent biopsy, and the tissues obtained were evaluated both microbiologically and histologically. Histologically, extensive necrosis, also known as caseification, which is very typical for tuberculosis, was evident in almost all patients, and the necrosis site was completely avascular. The periphery of the affected sites had been infiltrated by lymphocytes, and multinuclear Langhans-type giant cells were visible within the necrotic tissues. The microbiologic evaluation revealed granulomatous infection with epithelioid macrophages and Langhans giant cells around the characteristic caseous necrosis in the center. All specimens were stained with Ehrlich-Ziehl-Neelsen stain, but no bacteria were seen in the primarily stained specimens. Furthermore, the specimens were incubated in Löwenstein-Jensen agar for 3 weeks, and Ehrlich-Ziehl-Neelsen staining revealed the tuberculosis bacillus in the samples obtained from the cultures in all cases (Fig. 4). For 42 patients (60%), no surgery other than the biopsy was used and a 3-, 4-, or 5-drug antituberculous treatment regimen was administered. Debridement of the soft tissues was performed in 28 patients (40%) 1 to 2 times. The bones were debrided in 24 patients (34.3%) 1 to 4 times. Fistulectomy was required 1 to 3 times in 9 patients (12.8%). Arthrodesis of different joints was performed in 5 patients (7.1%). Synovectomy was the treatment choice for 4 patients (5.7%). Finally, sequestrectomy, grafting, and disarticulation or resection were performed in 2 patients each (2.9%). All the patients received a 3- or 4-drug antituberculous treatment regimen for a mean of 8.2 (range 3 to 17) months. In 18 patients (25.7%), 1 to 4 recurrences were seen during the follow-up period. In the last follow-up examinations, either severe destruction of the bones or end-stage arthrosis was evident in 39 patients (55.7%), especially in those with osseous tuberculosis. None of the patients had a fistula or draining sinus, and none had symptomatic tuberculosis.



**Fig. 2.** Radiographs of the patient with spina ventosa at 33 years old. The arrow indicates the lesion and the defective part of the metatarsus.

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