

Post-traumatic Tuberculous Osteomyelitis of Foot and Ankle: Case Series and Literature Review

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ABSTRACT

Osteoarticular tuberculosis involved 1–3 % of all tubercular cases with most common sites as spine, hip, and knee. Less than 10 % of osteoarticular tuberculosis involves foot. Its rare occurrence requires high degree of suspicion for early diagnosis and optimal management. Post-traumatic occurrence, atypical radiological picture, and variable presentation further worsen the prognosis and morbidity. Post-traumatic osteoarticular tuberculosis is a very rare entity with very few cases reported worldwide. We are reporting our case series of five patients with post-traumatic osteoarticular tuberculosis.

Keywords: Atypical, Case series, Foot, Osteoarticular, Post-traumatic, Tuberculosis.

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INTRODUCTION

In developing countries, even after recent advancements and developments in the field of Tuberculosis (TB), it still remains a major concern for health practitioners. Osteoarticular TB occurs in 1–3 % of all tubercular cases and its atypical presentation imposes a major problem to orthopaedic surgeons resulting in delayed diagnosis and suboptimal outcome.¹ Due to its known tendency to mimic other known common diseases, morbidity and prognosis worsened significantly.^{2–4} Less than 10 % of osteoarticular TB involves foot¹ and its rare occurrence requires high index of suspicion for early diagnosis and optimal management. Post-traumatic osteoarticular TB of foot is even rarer occurrence and only a few cases are reported in literature.^{5,6} Diagnostic difficulty worsens in a low incidence sites like foot, if in addition, to atypical radiological picture. TB foot cases do not have a classical presentation.^{4,7} In our case series, we are reporting five cases of post-traumatic osteoarticular TB of foot which is the longest case series till now.

CASE 1

A 35-year/male presented to orthopaedic emergency with twisting injury right ankle while climbing stairs. Patient evaluated thoroughly and diagnosed as a case of anterior inferior tibiofibular ligament sprain left ankle. The patient was advised below-knee POP plaster splint immobilization for 3 weeks with no apparent bony injury on plain radiographs.

On follow up visit at 3 weeks, swelling was persistent around left ankle but pain was reduced hence rehabilitation started after plaster removal. Patient again visited orthopaedics OPD after 10 weeks of injury with increased swelling and tenderness around left ankle and mid-foot region with no other signs of acute inflammation and associated constitutional symptoms. Aspiration of swelling was done from two sites where maximum fluctuation was found and sent for gram/AFB staining and culture sensitivity evaluation to rule out septic arthritis. Patient was started on oral broad-spectrum antibiotics and below knee splint was given. Culture Report came out to be sterile after extended culture. Patient continued on oral broad-spectrum antibiotics for 2 weeks and ankle immobilization. Patient-reported back to Orthopaedic OPD after

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2 weeks with two discharging sinuses developed around previous needle aspiration sites with persistence of swelling dull aching pain and painful restricted left ankle movements.

The patient was advised of plain radiographs and MRI of the left ankle with the foot. Blood investigations showed elevated erythrocyte sedimentation rate and C-reactive protein. Chest X-ray examination was normal. Plain radiographs revealed osteopenia of all cuneiforms, cuboid, navicular, and base of metatarsals (Fig. 1). MRI findings suggestive of abscess collection around ankle joint with confluent areas of marrow edema in talus, all cuneiforms, cuboid, navicular, and base of metatarsal bones due to infective etiology most likely (Fig. 2). Patient planned for open biopsy along both sinus tracts and soft tissue sample collected sent for staining, culture sensitivity (pyogenic and AFB), and histo-pathological examination (HPE). HPE showed well-formed granuloma consisting of epithelioid cells, lymphocytes, and plasma cells along with micro-caseation suggestive of TB (Fig. 3).

Patient started on multidrug Anti-tubercular therapy (ATT) with a diagnosis of osteoarticular TB left ankle with mid-foot involvement (Regime followed 3 months HREZ and 15 months HRE). The patient was non-weightbearing with below-knee removable splint for

6 weeks. Patient condition improved dramatically in terms of swelling, pain, and movements left ankle with well-healed sinus tracts after 6 weeks of starting ATT. Patient resumed his daily routine activities with no deficit after completion of 18 months of ATT (Table 2).

CASE 2

A 12 years old female child presented to orthopedics OPD with pain, swelling, and a chronically discharging sinus over the dorsum



Fig. 1: Plain radiographs revealed osteopenia of all cuneiforms, cuboid, navicular, and base of metatarsals (Case 1)

of left foot since 3 months. She had a blunt trauma to left foot due to fall of heavy object 3 months back and patient being managed with painkillers by general practitioner but no improvement. Plain radiographs showed a lytic lesion in the base of third metatarsal left foot (Fig. 4). There was no signs of acute inflammation and no associated constitutional symptoms.

FNAC done through the sinus tract and discharge from the sinus sent for staining and culture sensitivity evaluation. Patient was started on oral broad-spectrum antibiotics and below knee splint was given. Mantoux test came out positive with raised ESR and CRP in blood investigations. Culture report came out to be sterile after extended culture. The HPE from FNAC revealed evidence of chronic inflammation consistent with chronic osteomyelitis as seen in TB.

On the basis of clinico-radiological picture, blood investigation and HPE, patient started on a multidrug ATT with a diagnosis of osteoarticular TB third metatarsal left foot (Regime followed 3 months HREZ and 15 months HRE). Patient condition improved dramatically in terms of pain and swelling left foot with well-healed sinus tracts after 8 weeks of starting ATT (Fig. 5). Patient resumed his daily routine activities with no deficit after completion of 18 months of ATT (Table 2).

CASE 3

A 63 years old female from rural region presented to orthopaedics OPD with pain, swelling, and a chronically discharging sinus over the dorsum of left foot since 5 months. Around 7 months back, she sustained an injury to her left foot due to slip and fall from stairs. She was managed conservatively in POP slab for 4 weeks by a general

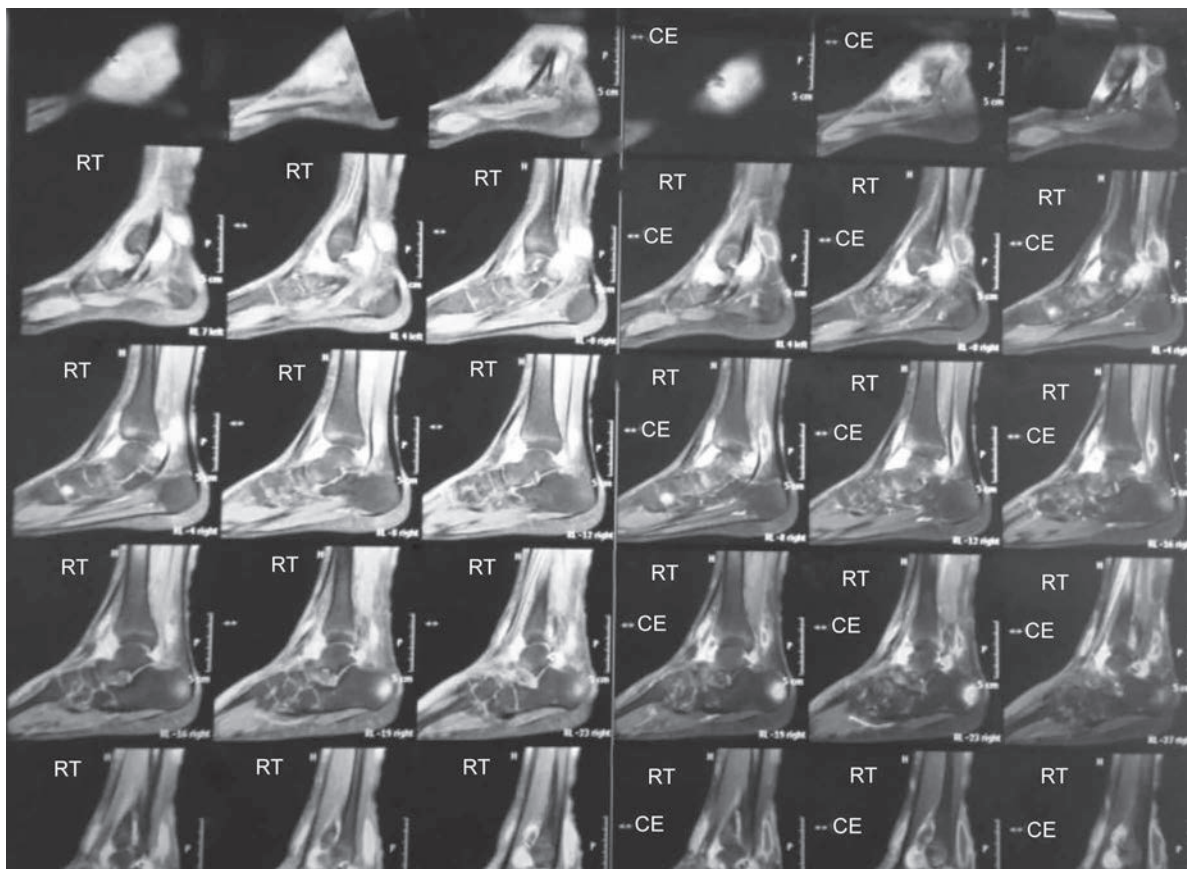


Fig. 2: MRI findings suggestive of abscess collection around ankle joint with confluent areas of marrow edema in talus, all cuneiforms, cuboid, navicular and base of metatarsal bones due to infective etiology most likely (Case 1)

Table 1: Radiographic types, site of lesion and presentation types of all cases

Cases	Age/sex	Site	SIDE	Radiographic types	Site of the lesion start	Presentation types
CASE 1	35/M	MIDFOOT	RIGHT	RHEUMATOID	ARTICULAR	Periarticular granuloma
CASE 2	11/F	3 RD METATARSAL	LEFT	cystic	OSSEOUS	Central granuloma
CASE 3	63/F	4 TH METATARSAL	LEFT	cystic	OSSEOUS	Central granuloma
CASE 4	54/F	3 RD MTP JOINT	RIGHT	KISSING	SYNOVIAL	Primary hematogenous synovitis
CASE 5	6/F	4 TH METATARSAL	LEFT	Spina ventosa	OSSEOUS	Central granuloma

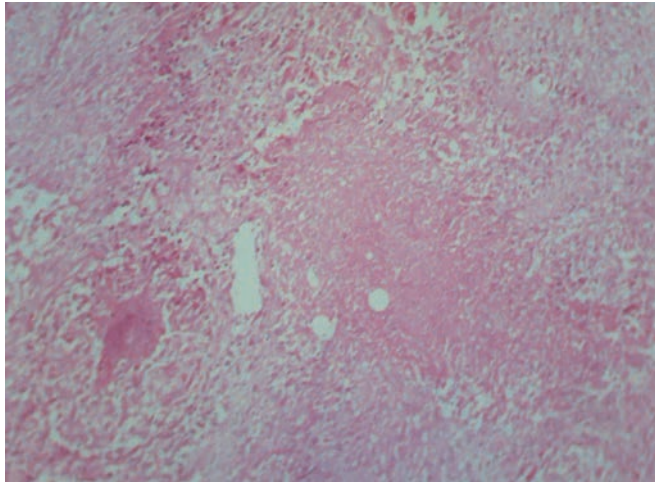

Fig. 3: Photomicrograph 10 x of HPE showed well-formed granuloma consisting of epithelioid cells, lymphocytes, and plasma cells along with micro-caseation suggestive of TB (Case 1)

Fig. 5: Well-healed sinus tracts left foot after 8 weeks of starting ATT (Case 2)

Fig. 4: Plain radiographs showed a lytic lesion in the base of third metatarsal left foot (Case 2)

practitioner. On follow-up after 8 weeks of injury, she developed swelling over dorsum of the left foot for which multiple incision and drainage was done by a general practitioner in the rural region followed by the formation of chronic discharging sinus over the dorsum of the left foot. After 7 months of injury and 5 months of discharging sinus over the dorsum of left foot, she presented to us for further management.

Plain radiographs showed a lytic lesion in the base of fourth metatarsal with permeative destruction along shaft of

Table 2: Diagnostic tests

	POSITIVE	NEGATIVE
MANTOUX TEST	5	–
ZN STAINING	–	5
FNAC	1	3
CULTURE	–	5
OPEN BIOPSY	4	–

fourth metatarsal left foot (Fig. 6). There was no signs of acute inflammation and no associated constitutional symptoms. Patient was advised MRI left foot Mantoux test, blood investigations, FNAC, and discharge from the sinus sent for staining and culture sensitivity evaluation. Patient was started on oral broad-spectrum antibiotics and below knee splint was given.

MRI left foot showed permeative destruction of the fourth metatarsal with a lytic lesion in the base and collection around the fourth metatarsal suggestive of infective etiology. Mantoux test came out positive with raised ESR and CRP in blood investigations. FNAC report came out nonsignificant. The culture report came out to be sterile after extended culture. Patient planned for open biopsy and curetted soft tissue/bony sample sent for staining, culture sensitivity (pyogenic and AFB), and HPE. HPE showed a well-formed granuloma consisting of epithelioid cells, lymphocytes, and plasma cells suggestive of TB (Fig. 7).

Patient started on multidrug Anti-tubercular therapy (ATT) with diagnosis of osteoarticular TB fourth metatarsal left foot (Regime followed 3 months HREZ and 15 months HRE).



Fig. 6: Plain radiographs showed a lytic lesion in the base of fourth metatarsal with permeative destruction along shaft of fourth metatarsal left foot (Case 3)

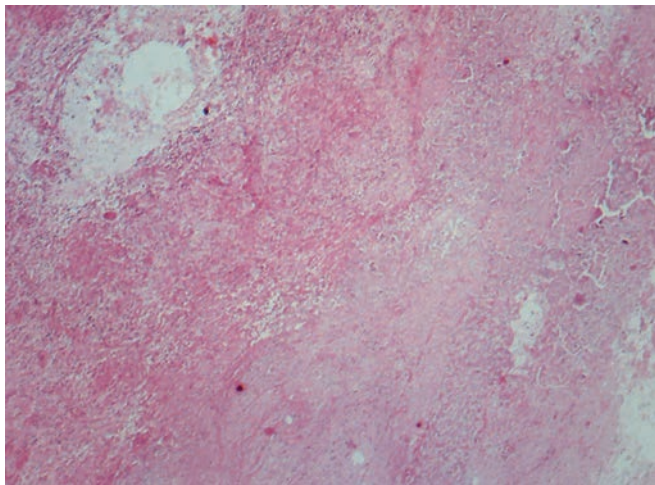


Fig. 7: Photomicrograph 10 x of HPE showed well-formed granuloma consisting of epithelioid cells, lymphocytes, and plasma cells suggestive of TB (Case 3)



Fig. 8: Well healed sinus tracts left foot after 6 weeks of starting ATT (Case 3)

Patient condition improved dramatically in terms of pain and swelling with well-healed sinus tracts after 6 weeks of starting ATT (Fig. 8). Patient resumed her daily routine activities with no deficit after completion of 18 months of ATT (Table 2).

CASE 4

A 54 years old female presented to orthopedics OPD with pain and mild swelling over plantar aspect of 3rd MTP joint right foot since 3 months. She sustained an injury to her 3rd toe right foot 3 months back due to a direct hit with a hard object (stone). She was managed conservatively with buddy strapping for 3 weeks by a general practitioner but not improved. On examination, mild swelling and tenderness were present around the plantar aspect of the 3rd MTP joint with no associated constitutional symptoms and the range of movements of the 3rd MTP joint was terminally painful. Plain radiographs showed no significant abnormality. MRI right foot, Mantoux test, FNAC, and blood investigations to rule out inflammatory aetiology was advised. The patient was started on painkillers but not relieved much with more pain in the night. FNAC showed no significant finding, Mantoux test came positive and elevated ESR/CRP in blood investigations.

MRI right foot showed the collection in 3rd MTP joint with marrow edema of adjoining bones suggestive of infective etiology (Fig. 9). High index suspicion on the basis of clinico-radiological picture and blood investigation, the patient started on multidrug ATT with a diagnosis of osteoarticular TB 3rd MTP joint right foot (Regime followed 3 months HREZ and 15 months HRE). Patient condition improved dramatically in terms of pain and swelling after 4 weeks of starting ATT. Patient resumed her daily routine activities with no deficit after completion of 18 months of ATT (Table 2).

CASE 5

A 6 years old female child presented to orthopedics OPD with pain and swelling over the dorsum of the left foot for 3 months. She had a blunt trauma to left foot 3 months back due to fall from bed and patient being managed with painkillers by general practitioner but no improvement. Plain radiographs showed an expansile lytic lesion in the base of the 4th metatarsal left foot (Fig. 10). There was no signs of acute inflammation and no associated constitutional symptoms.

The patient was advised MRI of right foot, Mantoux test, FNAC, and blood investigations. FNAC showed no significant finding, Mantoux test came positive, and elevated ESR/CRP in blood investigations. MRI right foot showed an expansile lytic lesion of 4th metatarsal, surrounding soft tissue collection and breach in the cortex at the base of 4th metatarsal right foot with a differential of chronic osteomyelitis and Ewing sarcoma.

In view of the diagnostic dilemma, the patient planned for open biopsy and curetted soft tissue/bony sample sent for staining, culture sensitivity (pyogenic and AFB), and HPE. HPE showed well-formed granuloma consisting of epithelioid cells, lymphocytes and plasma cells with micro-caseation suggestive of TB (Fig. 11).

On the basis of clinico-radiological picture, blood investigation and HPE, patient started on a multidrug ATT with diagnosis of osteoarticular TB 4th metatarsal left foot (Regime followed 3 months HREZ and 15 months HRE). Patient condition improved dramatically in terms of pain and swelling left foot after 4 weeks of starting ATT. Patient resumed her daily routine activities with no deficit after completion of 18 months of ATT (Table 2).

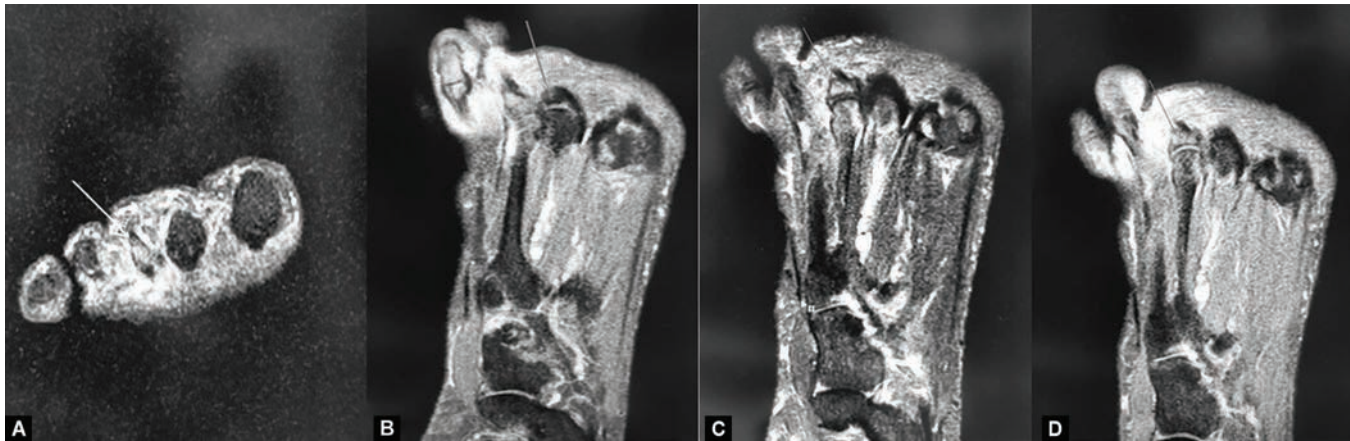


Fig. 9: MRI right foot showed collection in 3rd MTP joint with marrow edema of adjoining bones suggestive of infective aetiology (Case 4)



Fig. 10: Plain radiographs showed an expansile lytic lesion in the base of 4th Metatarsal left foot (Case 5)

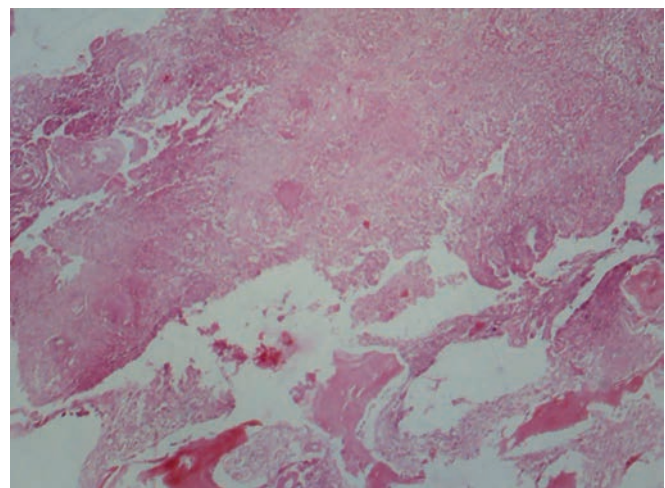


Fig. 11: Photomicrograph 10 x HPE showed well-formed granuloma consisting of epithelioid cells, lymphocytes, and plasma cells with micro-caseation suggestive of TB (Case 5)

DISCUSSION

Osteo-articular TB constitutes 1–3% of extrapulmonary cases with the spine, hip, and knee being the most commonly affected.¹ The foot and ankle involvement is rare and commonly detected at an advanced stage.⁵ TB of the foot by itself is rare and post-traumatic TB is rarer as only a few cases are reported worldwide.^{5,6} Variable presentation of post-traumatic TB foot making it difficult to diagnose, and labeled as “the great masquerader.”⁸

History of trauma followed by silent progressive inflammation around the trauma site after several weeks is pathognomonic of post-traumatic TB. Lack of constitutional symptoms and inflammation signs, normal chest radiographs, lack of specificity of ESR/CRP/Mantoux test, and atypical radiographic presentation further complicate the issue and leading to diagnostic dilemma in post-traumatic TB foot cases.^{9–11}

TB of the foot may be synovial (rare), osseous (frequent), or articular (indicative of late-stage). In our case series we had three osseous type, one synovial type and one articular type (Table 1). Once intertarsal joint is involved, TB spreads rapidly to adjacent areas in lieu of intercommunicating synovial channels¹² as seen in our articular type case. TB foot has four basic presentations which include periarticular granuloma (most common), central granuloma, hematogenous synovitis, tenosynovitis, or bursal TB.^{2,3,13} In our case

series, three cases of central granuloma, one case of periarticular granuloma, and one case of hematogenous synovitis were found (Table 1). Mittal et al.¹⁴ described five radiographic types of TB foot which include cystic variety being most common, rheumatoid, subperiosteal, kissing, and spina ventosa. In our case series, we had two cases of cystic variety with rheumatoid, kissing, and spina ventosa one case each (Table 1).

As per literature, most common bone involved in osteoarticular TB foot is calcaneum while in our case series we found metatarsal involvement in 60 % cases (3/5). This suggests, in post-traumatic osteoarticular TB foot, the metatarsal bone is most commonly involved due to its highest incidence in foot trauma.¹⁵

In osteoarticular TB, the factors like lack of constitutional symptoms, atypical radiographic presentation, lack of confirmatory laboratory findings including culture and histopathology in osteoarticular TB lead to diagnostic dilemma as well as delays.^{2–4,7} Before diagnosing a case as osteoarticular TB, all diagnostic tests should be done, as not a single test has high sensitivity and specificity in diagnostic value for osteoarticular TB. Hence high degree of suspicion to be kept and a full battery of diagnostic tests to be done in endemic areas like India to prevent diagnostic delay and advanced stage destruction by TB. Based on this principle, we diagnosed all our cases at early stage with excellent functional outcome.

Due to the paucibacillary nature with many organisms in dormant state,¹⁶ osteoarticular TB requires prolonged period of multidrug ATT which is still a matter of debate worldwide.¹⁷ Recent WHO guidelines and Index-TB guidelines for extrapulmonary tuberculosis in India suggests extension of multidrug ATT in osteoarticular TB up to 12–18 months (2HREZ/10–16 HRE). We have followed the same regime for all the patients in our case series with no recurrence in 5 year follow up.

As per literature, radiographic improvement does occur after multi-drug ATT but small residual cavities may persist and of not much significance,⁴ we have noticed the same finding in our case series. AOFAS ankle and hindfoot score and AOFAS and MTP-IP score improved significantly in case 1 and case 4, respectively.^{18,19} Foot function index²⁰ score improved significantly in case 2, case 3, and case 5 after completion of treatment (Table 2).

Role of surgical intervention is very limited in osteoarticular TB, except for a few cases of potts spine and TB sequelae, in view of the miraculous role of multidrug ATT.¹⁶ Conservative treatment with below-knee plaster cast or a below knee orthosis with fixed ankle combined with anti-tubercular drugs is, as a rule, effective in the majority of patients with TB foot. In our case series, all the cases responded very well with multidrug ATT with no residual deficit after course completion.

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