

Technical tip: Dorsal transmetatarsal approach to intermetatarsal and deep plantar lesions



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ABSTRACT

Synovial and chondromatous lesions can extend dorsally, intermetatarsally and deep into the vault of the longitudinal and transverse plantar arches of the foot. The lesions may prove difficult to excise even with combined approaches. Two cases where a transmetatarsal approach by excision of the base of the third metatarsal enabled successful complete excision of the lesions are presented.

Level of Evidence: Level V, expert opinion.

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1. Introduction

A surgeon planning an excision of an intermetatarsal and deep plantar lesion of the midfoot can usually consider medial, lateral or direct plantar approaches [1–3]. The medial and lateral approaches may not enable adequate visualisation of lesions at the vault of the longitudinal and transverse arches, particularly when complete excision of a tumour is required. Except for pointing abscesses, direct incisions through the sole are best avoided as they give no comprehensive view, and cicatrise at times with deeply creviced, cornifying scars which can be painful [3]. A lesion of synovial or cartilaginous such as synovial chondromatosis or pigmented villonodular synovitis represent particular difficulties as they usually have dorsal, intermetatarsal and plantar extensions.

Two cases where a dorsal transmetatarsal approach by excision of a segment of the third metatarsal was used to excise intermetatarsal and deep plantar lesions are described. To our knowledge, this approach has not been described before.

2. Surgical technique

This approach is preferred for lesions which extend dorsally, intermetatarsally and into the vault of both the longitudinal and

transverse arches of the foot i.e. in the plantar area of the bases of the second and third tarso-metatarsals. Preoperative planning should include plain radiographs, an MRI and/or a CT scan and a needle biopsy when indicated and possible. The patient should be consented for and draped for bone graft from the iliac crest/tibia/calcaneus as appropriate.

With the patient supine and use of a tourniquet, a longitudinal incision is made over the proximal 2/3 of the third metatarsal extending proximally to the navicula. The branches of the superficial nerves are identified and retracted. The tendon of extensor digitorum brevis is retracted medially and used to protect the dorsalis pedis vessels and the deep peroneal nerve [4–7]. The base of the 3rd metatarsal is identified and an osteotomy is performed about 2 cm distal to the third tarso-metatarsal joint. Sharp dissection is carried out to free the base of the third metatarsal from its ligamentous attachments to the second and fourth metatarsals and the capsule of its articulation with the lateral cuneiform. The articular cartilage is removed from the lateral cuneiform and also from the base of the third metatarsal if the latter is to be used as a bone graft. The base of the third metatarsal graft is then grasped with bone holding forceps and disarticulated from the lateral cuneiform by retraction and sharp dissection. The excised base of the third metatarsal is kept in a warm saline-soaked swab if it is to be used as bone graft. The intermetatarsal/plantar lesion is visualised and removed through the cavity created. In tumour cases, the wound is irrigated with sterile water as the osmotic effect of water is said to be cytotoxic to tumour cells.

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The bony cavity can be replaced by either the previously removed base of third metatarsal or an appropriately sized tricortical iliac crest graft, with the use of additional autologous cancellous graft. The lateral cuneiform, third metatarsal shaft and graft are perforated with a 2 mm drill bit to facilitate bleeding and osseointegration and the surfaces are petalised/shingled [5]. Fixation is carried out with a contoured 2.7 mm locking compression plate (LCP, Synthes) or similar plate, with compression after application of autologous cancellous graft.

The patient is kept nonweightbearing in a cast for 6 weeks, followed by progressive weightbearing in a cast for 6 weeks. Full weightbearing in a pneumatic walker is advised until clinical and radiological union.

3. Case one

A 52-year-old lady presented with a one-year history of a continuous dull throb in her right midfoot. She had undergone an open curettage and bone graft of the defect for synovial chondromatosis 14 years previously and had been asymptomatic for 13 years afterwards. She had a well-healed 8 cm scar over the third and fourth tarso-metatarsal joints and there was a non-tender immobile hard pea-sized lump over the fourth tarso-metatarsal joint.

The plain radiographs (Fig. 1) revealed diffuse speckled calcification between the shaft of the third and fourth metatarsals with increased density in the region in keeping with previous bone grafting. An MRI scan showed a lobular mass lying on the plantar surface deep to the third metatarsal but extending between the third and the fourth metatarsals to form a smaller mass overlying the dorsum of the base of the fourth metatarsal. A CT scan (Fig. 2) demonstrated punctate foci of calcification between the third and fourth metatarsal bases with the largest cluster of mineralisation at the plantar aspect of the third metatarsal base with a small



Fig. 1. Dorsoplantar radiograph of the foot showing speckled calcification compatible with recurrent synovial chondromatosis and evidence of previous bone grafting.

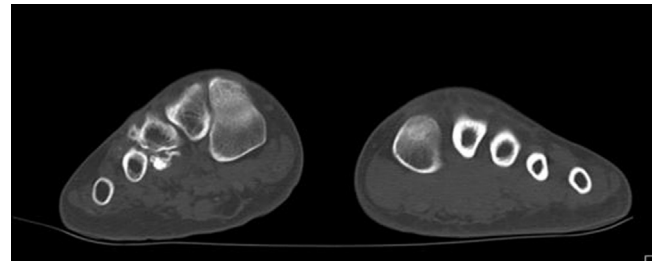


Fig. 2. CT section shows revealed diffuse speckled calcification between the shaft of the third and fourth metatarsals with increased density in the region in keeping with previous bone grafting.

defect in the adjacent bone. Mineralisation also extended onto the dorsal aspect of the fourth metatarsal base. Areas of partial fusion between the tarsal and metatarsal bones were seen due to the previous bone grafting.

A presumed diagnosis of recurrent synovial chondromatosis was made and she was counselled for a dorsal approach to both the plantar and dorsal lesions by excision of the base of the third metatarsal. The old incision was used and the third metatarsal base and tumour fragments were excised as described above. Due to the defect in the third metatarsal base visualised on the CT scan, a sized and drilled tricortical iliac crest graft was preferred to fill the cavity (Fig. 3) and was fixed with a plate.

The histology of the excised multiple bony cartilaginous fragments revealed globules of cartilaginous tissue composed of chondrocytes with enlarged nuclei, vesicular chromatin and small nuclei within a predominantly hyaline stroma. The histology features were deemed to be within the spectrum allowed for synovial chondromatosis with some atypia.

Her leg was placed in a nonweightbearing cast for 6 weeks followed by a weightbearing cast for another 6 weeks and then in a weight bearing pneumatic walker for a further 6 weeks when radiographs showed consolidation of the arthrodesis and she had a quiescent foot. She was then allowed to walk with insoles in her shoes was pain free and able to go on 12 mile walks at her 18 month follow-up. There has been no recurrence at 4 years.

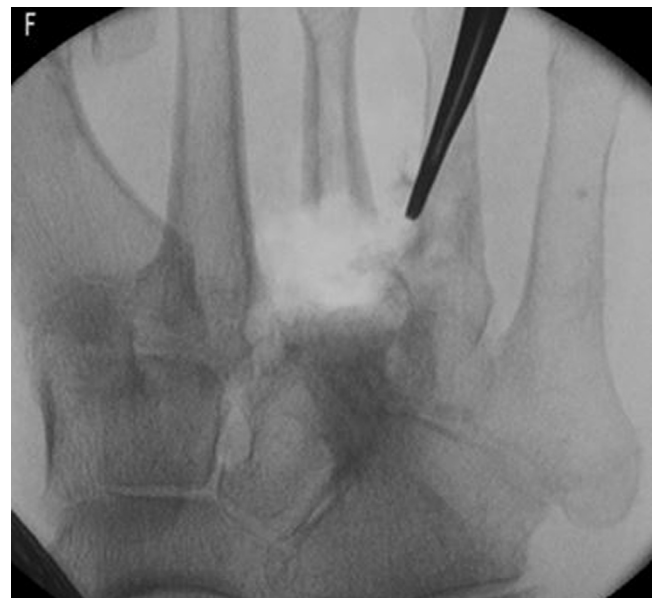


Fig. 3. Intraoperative fluoroscopy to show cavity left after excision of base of third metatarsal.

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