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ANKLE

Tibiocalcaneal arthrodesis: a new arthroscopic procedure

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Abstract Tibiocalcaneal arthrodesis is considered an aggressive and technically demanding procedure that can be used to treat severe deformities of the hindfoot, and it is rarely performed. The indications for ankle arthroscopy are increasing, and arthroscopic tibiotalar arthrodesis is a common and successful procedure, but arthroscopic tibiocalcaneal arthrodesis has not been previously reported in the literature. A case of extensive talus necrosis with severe hindfoot deformity treated by means of an arthroscopic tibiocalcaneal arthrodesis is presented.

Keywords Tibiocalcaneal arthrodesis · Arthroscopy · Ankle arthroscopy

Introduction

Tibiocalcaneal arthrodesis is indicated in cases with untreatable ankle pain and severe deformity of the talus such as in extense avascular necrosis of the talus. It could also be an option after failed ankle arthrodesis or failed arthroplasty, or after osteomyelitis of the talus. Talar osteonecrosis commonly occurs after talar neck fractures with damage to the tarsal tunnel artery, after dislocations of the talus and less frequently, spontaneously [1].

The most frequent etiology of nontraumatic osteonecrosis is corticoid treatment, initially described in 1957. Its frequency has been notably reduced by the use of more rational and better adjusted corticoid doses [5].

Currently, the indications for ankle arthroscopy are increasing, and arthroscopic tibiotalar arthrodesis is a common and successful procedure [7], but to our knowledge, arthroscopic tibiocalcaneal arthrodesis has not been previously reported in the literature. The present study introduces the first case of arthroscopic tibiocalcaneal arthrodesis, a new procedure in hindfoot arthroscopy.

Technical note

A 54-year-old female patient with rheumatoid arthritis under cortisone treatment for the last 9 years referred progressive right ankle pain and associated gradual deformity that started 2 years prior to the initial visit to our clinic. The patient walked with two crutches, referred day and night ankle pain and was unable to perform regular daily activities.

The physical examination revealed fixed valgus deformity of the right hindfoot and severe flat foot. Right ankle motion ranged from 10° of dorsiflexion to 40° of plantar flexion, there was no subtalar motion and midtalar motion was extremely painful. The foot and ankle skin was very thin and fragile, and edema was found from the supramalleolar areas to the dorsum of the foot. The radiographs revealed an extensive talar necrosis and collapse with a big lytic defect in the calcaneus body (Fig. 1).

Through standard anteromedial and anterolateral portals, an ankle arthroscopy was performed. Traction was not needed due to the existent wide joint space. The remnants of the talus were easily removed using a motorized burr and curette. After that, the upper surface of the calcaneus and lower surface of the tibial plafond were abraded.

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Fig. 1 Lateral radiograph of the right ankle showing marked collapse of the talus, which is wedged between the calcaneus and the cuboid. The calcaneal body shows osteoporosis and a big lytic lesion

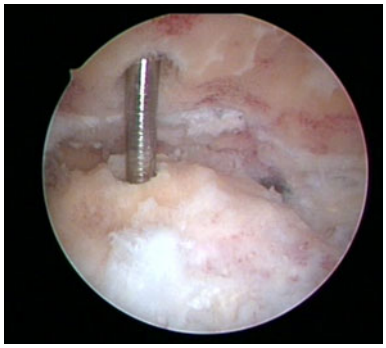

Fig. 2 Insertion of the guide wires for tibiocalcaneal fusion under direct arthroscopic vision after abrading the articular surfaces. Notice the wide space created after talus resection

Through the same portals, the calcaneocuboid joint was also abraded using small chisels and curettes to remove the cartilage remnants and preserve the bone stock. Guide wires were percutaneously inserted under fluoroscopic and arthroscopic control (Fig. 2), and two cannulated 6.5-mm screws were placed compressing the tibia to the calcaneus, and a 4.5-mm cannulated screw was placed across the calcaneo–cuboid joint. The remnant space was filled with cryopreserved cancellous bone graft with platelet-derived growth factors through the arthroscopic portals. The patient was discharged the day after surgery, and the ankle was immobilized in a below the knee cast for 4 months; partial weight bearing was allowed 2 months after surgery.

Twenty months after surgery, the inferior screw was removed. The patient was pain-free and walked without crutches using a 10-mm insert to compensate for the residual 19-mm limb length discrepancy. Radiographs and CT scan showed partial tibiocalcaneal fusion without loosening of the screws and multiple rheumatoid bone defects in the tarsal bones (Fig. 3a, b).

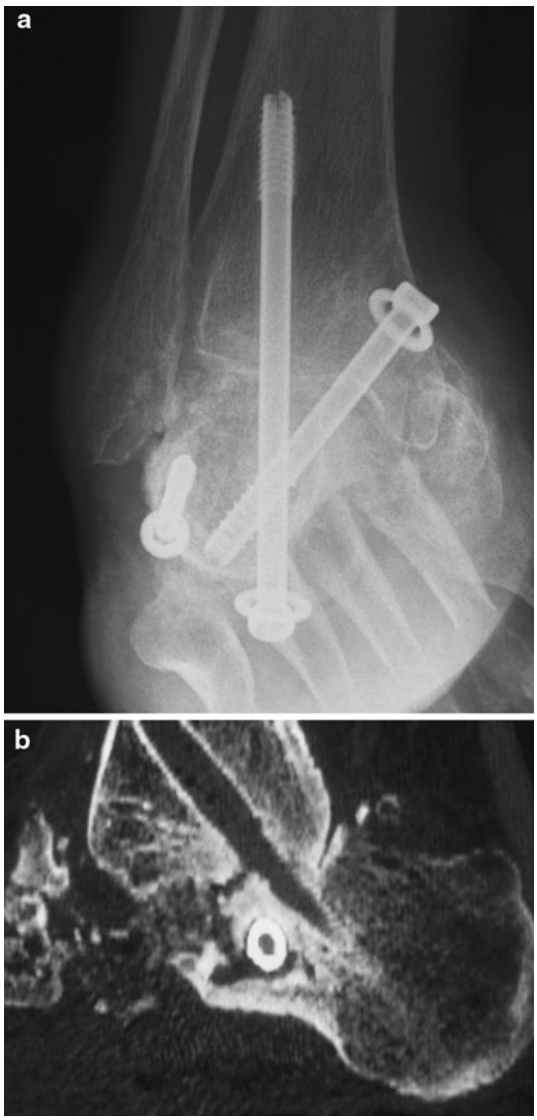

Fig. 3 **a–b** AP radiograph after 12 months and CT scan 20 months after surgery, after removal of the inferior screw. The tibiocalcaneal fusion has been partially achieved. There is incorporation of the graft and no signs of osteolysis around the screws, confirming stability

Discussion

The most important finding of the present study was that tibiocalcaneal arthrodesis can be performed arthroscopically. Tibiocalcaneal arthrodesis is a complex and technically demanding procedure that can be used to treat severe deformities of the hindfoot caused by avascular necrosis of the talus secondary to vascular insults, infection or trauma.

It is usually performed through an extended lateral approach, with or without fibular osteotomy. Different fixation devices have been used including intramedullary nails, plates, external fixators and screws [1]. Regardless of the fixation method, tibiocalcaneal arthrodesis is considered an aggressive and complex procedure, and it is rarely

performed, as shown by the low number of cases reported in the literature [3, 9].

In addition, ankles requiring tibiocalcaneal fusion often present poor-quality soft tissue due to previous injuries or surgeries and even adherent or retracted scars due to previous infection, which could benefit from the least invasive surgical technique.

Despite being considered a salvage procedure after failed surgeries such as ankle arthroplasties, tibiotalar fusions, complex talar fractures with talar necrosis or chronic talar osteomyelitis, most patients report satisfactory subjective results when fusion is achieved in adequate hindfoot alignment [6, 8, 10].

In the literature, reports about tibiocalcaneal arthrodesis usually refer to the type of fixation or to the surgical approach [2–4, 6, 9]. However, there are no reports on the use of arthroscopy to abrade the two surfaces that have to be fused, despite being a commonly used procedure in other foot and ankle arthrodesis. The present case shows that arthroscopy could be used to remove the talus and abrade the tibia and calcaneus, minimizing the damage to the soft tissues and preserving the vascularization of the bony segments to be fused and therefore decreasing the risk of infection and nonunion. In the present case, osteosynthesis was achieved using cannulated screws, due to the calcaneus cystic defect, but arthroscopy can also be useful to select the entry point if it is decided to use an intramedullary nail, decreasing the X-ray exposure time.

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