Performing a Talectomy in Diabetic Ankle Charcot Arthropathy: A Case Series

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Introduction
Charcot neuroarthropathy disrupts the normal osseous structure of the foot potentially leading to limb loss due to the development of bony deformities and the progression to osteomyelitis.1 In its advanced form, Charcot neuroarthropathy causes severe osseous destruction and planter dislocation of the talus on the navicular. Surgical interventions aimed at salvage of the charcot foot include planning, beaming, spanning plates, osteotomies including bidental wedges, external fixation, and various forms of arthrodesis.2 Taleectomy with tibiocalcaneal arthrodesis has been described as a salvage option for cases with a severe deformity due to osteomyelitis or avascular necrosis of the talus.

HC Blair first described the tibiocalcaneal arthrodesis in 1943 excising the body of the talus for a fracture dislocation resulting in talar avascular necrosis.6 Multiple modifications have subsequently been made to the Blair procedure. The purpose of this paper is to report a series of cases with successful implementation of taleectomy with tibiocalcaneal arthrodesis in the salvage of lower extremity charcot arthropathy and talar avascular necrosis.

Methods
A NCBI PubMed Database search for charcotarthropathy taleectomy resulted found only six articles while charcotarthropathy tibiectomy diabulic arthrootomy did not return any published articles. Cases studies were completed by EMR search of CPT codes for taleectomy, ankle arthrodesis and subtalar joint arthrodesis over the past 3 years revealed 35 cases. Cases were picked based on patient history, differing techniques used for fixation. Cases were narrowed down to use of three fixation techniques, use of IM nail or use of femoral graft and use of lateral plate.

Case One
A taleectomy was performed utilizing both lateral and medial incisions secondary to large osteophyte found along lateral ankle and due to severe deformity and varus positioning of talus, removal was best achieved through medial approach. Incisions were carried down to level of sinus tarsi and navicular-cuneiform joints respectively. The talus was then placed in bone mill for use as autograft and mixed with demineralized bone matrix allograft. The articular surfaces were then denuded and an oscillating bone saw was used to obtain optimal position for the tibiocalcaneal arthrodesis along with intraoperative fluoroscopy to confirm alignment. The calcaneus and tibial plafond were then microfractured and fish-scaled with an osteotome and mallet.

Fixation was then achieved via intramedullary nail through plantar incision with reaming performed using 0.5mm increments until cortical contact was made within the tibia. Screw fixation within tibia performed and compression achieved. The milled talus and demineralized bone matrix were then utilized at this time to fill any voids. Next the calcaneal screw fixation within nail was placed. Lastly, since entire talus was removed, stability of forefoot to rearfoot needed to be re-established. Two screws were then placed from the navicular into talus and calcaneus.

Case Two
Patient was a 53 year old male insulin dependent diabetic who developed AVNs of the ankle with severe varus instability within 3 months after an ankle sprain. Conservative bracing measures were performed, however ultimately failed (Fig 2).

A taleectomy with partial fibuloclemy was performed. In order to reduce loss of limb length, a fresh frozen femoral head was utilized. The talib and calcaneal components were prepared for the graft implantation using an acetalic reamer. Femoral graft was also prepared utilizing rotary burr to reduce subchondral plate and fenestrated with drill (Fig 2).

Following implantation, a partially threaded cannulated interpositional screw was inserted through the calcaneus and allograft into the anterior talus, followed by a lateral buttressing blade plate to maintain the corrected position. An internal bone stimulator cathode was applied with the arachnoid inserted subcutaneously in lateral leg.

Patient postoperative course over next three months was uneventful and surgical site healed well. Patient retained a plantigrade foot and was able to return to work and ADLs as he was prior to inciting incident.

Case Three
Patient is a 73 year old male with history of Charcot-Marie-Tooth and partial fifth ray resection secondary to osteomyelitis. Patient was referred following concerns of osteomyelitis infection to right foot and ankle secondary to ulceration and relates concern of being unable to ambulate on right lower extremity. Upon examination, the patient demonstrated a rigid fixed adducted varus deformity of the right ankle.

A taleectomy with partial fibuloclemy was performed. The resected fibula was reinserted of all fibrous and cortical bone and utilized as an autogenic bone graft with bone marrow aspirate obtained from the calcaneous and combined with demineralized bone matrix (DBM). The cartilaginous surfaces of the tibial plafond and calcaneous facets were fully prepared for arthrodesis utilizing the sagittal saw and subchondral drilling. A partially threaded cannulated positional screw was inserted, followed with backfilling of the autogenic bone graft and application of a lateral buttress plate to maintain stability.

Discussion
Charcotarthropathy of the ankle joint is considered a limb-threatening condition where bracing is inadequate and surgical intervention is necessary. Performing a taleectomy with tibiocalcaneal arthrodesis may be used as a limb-salvage option. Use of an interpositional screw assists in maintaining correction of the deformity in conjunction of bone graft implantation and a lateral buttress plate.

An intramedullary nail may also be useful when performing a tibiocalcaneal arthrodesis. However, the surgeon should be cautious of using this method when concern for osteomyelitis is present. In such instances, the interpositional screw with lateral buttress plate fixation has been found to be a reliable and preferable option by the senior author (HIV).

References

Figure 1
Figure 2
Figure 3