Case Report

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Flexor Retinaculum Release and Posterior Tibial Tendon Mobilization for Lateral Peritalar Dislocation

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Introduction

Peritalar dislocations are rare injuries and account for approximately 1% to 1.5% of all traumatic foot injuries.[2] Peritalar dislocations are described according to the direction of peritalar foot displacement. Medial peritalar dislocations are often caused by excessive inversion of the hindfoot and are far more common than lateral peritalar dislocations, which are caused by axial load and eversion of the hindfoot.[3] These injuries can involve the tibiotalar, subtalar, and talonavicular[1] joints and often present as open injury with or without talus extrusion.[3,7]

Urgent reduction should be attempted to relieve pressure on the soft tissues and restore anatomic alignment.[4,7] The gold standard for management of open dislocation is debridement followed by open reduction.[8] Other options include open reduction internal fixation, talectomy, and fusion.[1,6,8] High-energy mechanisms preclude these injuries to complication such as avascular necrosis (AVN), posttraumatic arthrosis, and infection.[1,4,7]

These 2 cases describe the successful treatment of 2 complex lateral peritalar dislocations that were not reducible with manual manipulation secondary to dorsal dislocation of the posterior tibialis tendon over the talar head and details the surgical technique used to facilitate reduction.

Case Reports

The first patient is a 26-year-old female who presented to the emergency department as a restrained driver in a head-on motor vehicle crash with obvious hindfoot deformity and open wound with talar head extrusion (Figure 1). Radiographs obtained demonstrated disruption of the tibiotalar, talonavicular, and subtalar joints (Figure 2). Reduction attempted in the emergency department under propofol sedation was unsuccessful. The patient was taken urgently to the operating room for successful open reduction (Figure 3), irrigation and debridement (I&D), primary wound closure, and placement in short leg splint.

Figure 1. Right open pantalar dislocation with medial extrusion of the talar head.

The second patient is a 21-year-old man who presented with a closed deformity of the left ankle and hindfoot more than 10 hours after falling down a cliff while hiking (Figure 4). Radiographs were obtained demonstrating lateral dislocation of the subtalar and talonavicular joints with medial protrusion of the talar head (Figure 5). Of

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Figure 2. (A) Anteroposterior and (B) lateral radiographs demonstrating medial subluxation of the tibiotalar joint and lateral dislocation of the subtalar and talonavicular joints.

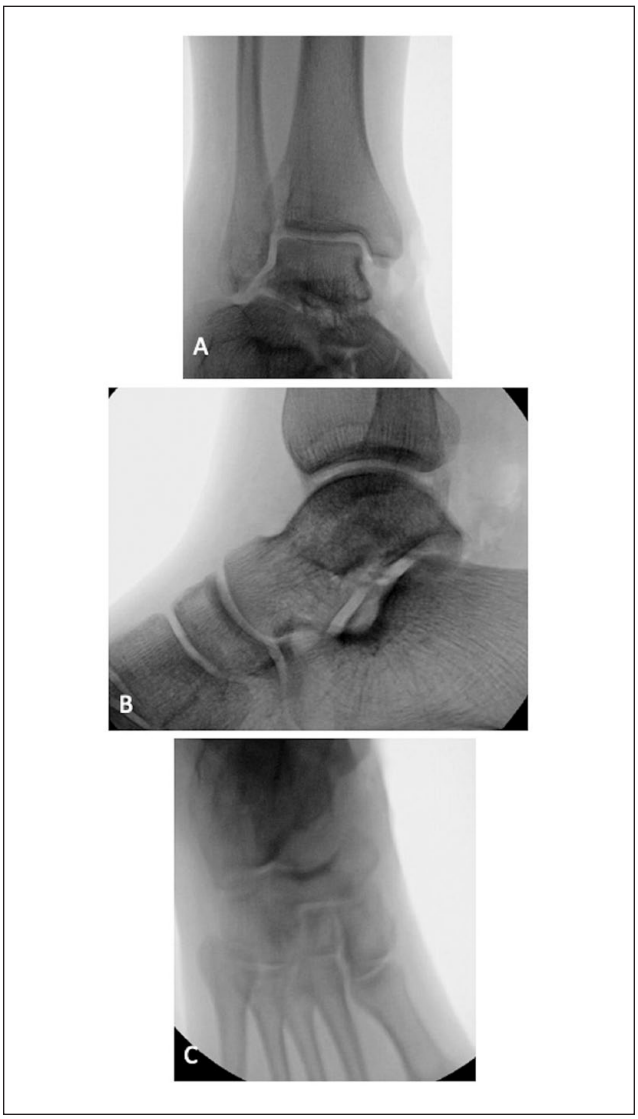

Figure 3. Intraoperative (A) anteroposterior ankle, (B) lateral ankle, and (C) Canale fluoroscopic images demonstrating interval reduction of the pantalar dislocation.

Figure 4. Clinical photograph demonstrating closed lateral peritalar dislocation involving the talonavicular and subtalar joints.

Figure 5. (A) Anteroposterior and (B) lateral radiographs demonstrating subtalar and talonavicular dislocation with medial protrusion of the talar head.

note, the hallux was held in flexed position, suggesting flexor hallucis longus tendon entrapment. Closed reduction was attempted in the emergency department without success. He also was taken to the operating room urgently for successful open reduction (Figure 6).

Surgical Technique

In both cases, intraoperative evaluation demonstrated lateral peritalar dislocation with protrusion of the talar head between the tibialis posterior (TP) and flexor digitorum longus (FDL) tendons. The TP tendon had displaced superiorly and laterally over the talar neck creating a block to talonavicular and subtalar joint reduction (Figure 7A). Reduction with manipulation alone was unattainable secondary to the tension on the TP tendon. The flexor retinaculum was carefully incised behind the medial malleolus and distal tibia to allow for mobilization of the dorsally dislocated TP tendon. The TP and flexor tendon sheaths were further released to allow for increased superior excursion of the TP tendon. A penrose drain was then used to loop around and reduce the TP tendon over the top of the talar head to its anatomic position inferior and medial to

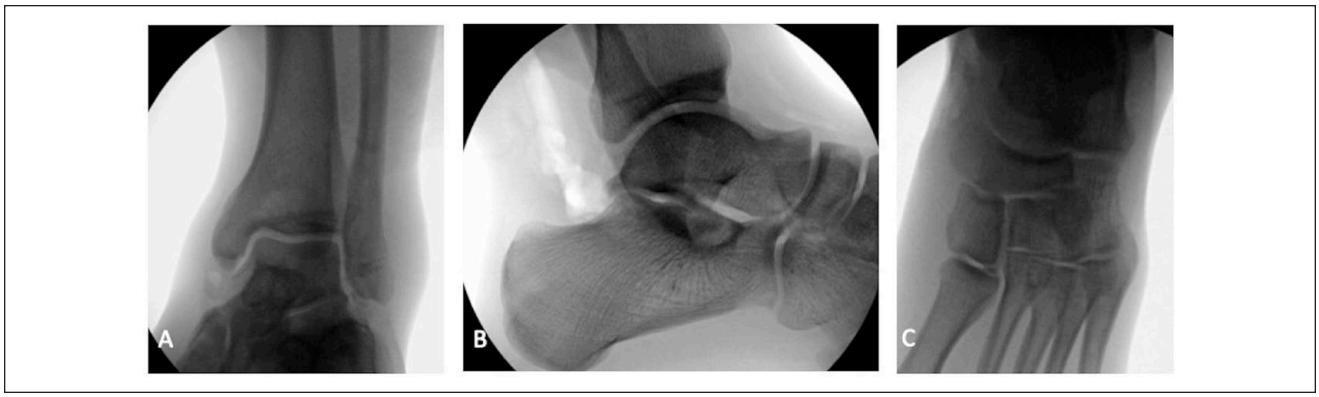

Figure 6. (A) Anteroposterior, (B) lateral, and (C) Canale view fluoroscopic images demonstrating successful open reduction of subtalar and talonavicular dislocations.

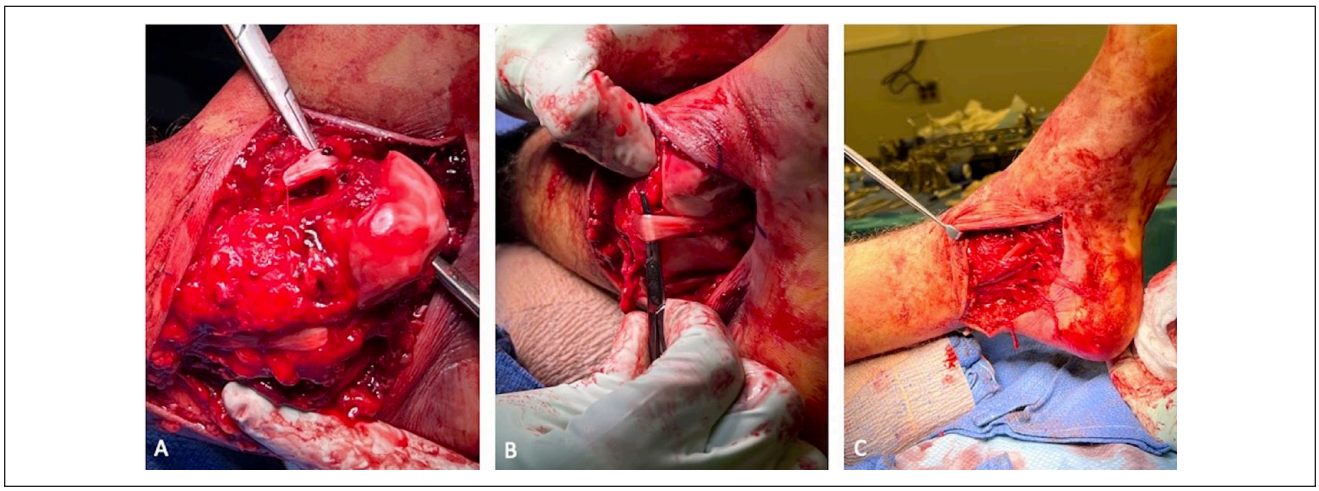

Figure 7. (A) Interposition of the talar head between the tibialis posterior tendon superiorly and the flexor digitorum longus inferiorly; (B) reduction of the tibialis posterior tendon inferior to the talar neck/head after incision of the flexor retinaculum and TP tendon sheath; (C) anatomic reduction of the talonavicular and subtalar joints with gentle traction and adduction of the foot.

the talar head (Figure 7B). Direct manipulation with gentle traction and adduction of the foot was then used to reduce the talonavicular and subtalar joints (Figure 7C). Once concentric reduction was obtained with the tendons in appropriate position, the peritalar joints remained stable to varus and valgus stress and the distal flexor retinaculum was loosely reapproximated to prevent late subluxation of the TP tendon. The TP tendon remained well reduced behind the medial malleolus once restored into its anatomic location. Given the stability of the joints as well as the TP tendon, a spring ligament repair was not performed.

Clinical Course

Both patients were placed in short leg splints and made non-weightbearing postoperatively. Postreduction computed tomographic scans demonstrated small osseous fragments from the lateral process of the talus, likely caused by impact from the lateral dislocation of the calcaneus. The first patient was placed into a cast at the 2-week follow-up visit whereas the second patient was transitioned to a fixed-ankle walker at outside institution at 1 week. Sutures were removed at the 2- and 2.5-week visits, respectively. Transition to weightbearing as tolerated in a fixed ankle walker was made between 6 and 8 weeks. Range of motion exercises were initiated at 6 weeks postoperation, with full dorsiflexion and plantarflexion and gentle inversion and eversion permitted. Radiographs obtained at the 12- and 16-week follow-up visits, respectively, have showed maintained alignment and patients have been allowed to transition to weightbearing without fixed-ankle walker.

Discussion

Peritalar dislocations with disruption of the hindfoot comprises a small subset of all talar injuries.[2,3] Management

principles previously described focus on urgent reduction and subsequent urgent open reduction with debridement in the setting of open injury.[4,7] Early and successful reduction are important to limit the damage to soft tissues and restore perfusion to the talus, as common complications include avascular necrosis, posttraumatic arthrosis, and infection. Closed reduction techniques for medial and lateral subtalar dislocations have been well-described using a combination of plantar flexion and inversion of the heel, axial traction, and specific forefoot maneuvers.[5] However, closed reduction of subtalar dislocations may be unsuccessful in up to 14% of all cases[5] and are often secondary to interposition of soft tissue structures.[1,4,6,8] When open reduction is necessary, it is imperative to identify and address interposed structures. This report describes a reproducible intraoperative technique for releasing interposed structures necessary to achieve successful reduction of a lateral peritalar dislocation.

A variety of techniques have been described to successfully open and reduce complex subtalar or pantalar dislocations not reducible with closed techniques alone. Vosoughi and Vallier[7] described techniques using a calcaneal pin, distracting external fixator, and supramalleolar osteotomy to achieve reduction. Ritsema[4] reported 2 open dislocations that were reducible in the operating room only after tenotomy of either the tibialis anterior or peroneal tendons. To date, no studies have described flexor retinaculum and tibialis posterior tendon sheath release to facilitate reduction.

These 2 cases document an unsuccessful closed reduction attempt followed by a successful open treatment with the use of adjunctive TP tendon mobilization technique. Intraoperative exploration revealed protrusion of the talus between a dislocated TP superiorly and the FDL inferiorly. Reduction was obtained using a posterior medial approach to the TP tendon sheath and its retinaculum to facilitate tendon mobilization. Through this approach, the TP tendon was mobilized and reduced inferior to the talar neck, allowing for successful reduction of the peritalar joints. Although both patients were progressing well at their early follow-up appointments, they were advised that posttraumatic stiffness and arthritis were possible after these high-energy dislocations.

Conclusion

Peritalar dislocations are rare, but complex, injuries. Disruption of the soft tissues places the limb at risk for complications including infection, poor wound healing, and infection. Urgent reduction and subsequent open irrigation are indicated for open injuries and those with potentially compromised skin. Not all dislocations are equal, and intimate understanding of the complex ankle and hindfoot anatomy is required to help facilitate reduction when manual manipulation alone is not enough. Thus, it is important to recognize when open reduction and exploration is necessary as multiple anatomic structures may prevent reduction. For lateral peritalar dislocations, the tibialis posterior tendon may be dislocated dorsally and laterally over the talar neck, thus preventing reduction. If this occurs, the TP tendon must be mobilized and reduced inferior and medial to the talar neck and head. This case report demonstrates the release of the flexor retinaculum and TP tendon sheath to facilitate reduction of 2 irreducible complex lateral peritalar dislocations.

Ethical Approval

Institutional review board (IRB) approval: exempt. The case report was discussed with the UVA compliance department—given no patient-identifiable factors, the report is exempt from IRB approval and authorized to proceed without written consent.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article. ICMJE forms for all authors are available online.

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