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## Review of Literature and Acute Management of a Compound Calcaneal Fracture with Peritalar Dislocation: A Rare Injury Pattern Treated with Closed Reduction and K-Wire Stabilization

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### Abstract

Peritalar dislocations associated with calcaneal fractures represent an exceptionally rare and complex injury pattern, accounting for less than 1% of all dislocations and typically linked to high-energy trauma. Their severity is further amplified when combined with open wounds and midfoot fractures. This report describes the acute management of a 22-year-old female who sustained a contaminated medial plantar open wound with a complex intra-articular calcaneal fracture, varus hindfoot deformity, medial subtalar dislocation, talonavicular dislocation, and axial navicular fracture following a fall from height.

Initial evaluation demonstrated severe deformity without neurovascular compromise, and imaging confirmed the rare constellation of fractures and dislocations. Management focused on urgent debridement, reduction, and stabilization while preserving soft-tissue integrity.

Under fluoroscopic guidance, a staged reduction strategy was employed, beginning with spike-assisted maneuvering to relocate the subtalar joint. Persistent calcaneal varus was corrected using a joystick K-wire technique, after which stabilizing K-wires were inserted across the calcaneus into the talus and sustentaculum. Medial displacement of the navicular was addressed through longitudinal traction and forefoot abduction, enabling talonavicular reduction, followed by retrograde K-wire fixation. Vacuum-assisted closure was applied over the open wound to optimize conditions for subsequent skin grafting.

This case highlights the importance of early recognition, aggressive debridement, and innovative percutaneous reduction techniques in managing severe peritalar injuries, especially when soft-tissue compromise limits extensive open reconstruction. The combination of spike-assisted reduction, correction of hindfoot alignment, and strategic K-wire stabilization provided effective temporary fixation while minimizing additional soft-tissue trauma. Although initial outcomes were favorable with progressive granulation and stable alignment, long-term prognosis remains guarded due to the high risk of subtalar arthritis inherent to such injuries. Continued follow-up is essential to monitor union, hindfoot mechanics, and functional recovery.

**Keywords:** Peritalar dislocation, calcaneal fracture, subtalar dislocation, talonavicular dislocation, navicular fracture, K-wire stabilization

### Introduction

Peritalar dislocation is an uncommon and severe form of foot trauma characterized by simultaneous disruption of the subtalar and talonavicular joints while the tibiotalar joint remains intact. This injury pattern represents less than 1% of all dislocations and is typically the result of high-energy mechanisms such as falls from height or motor-vehicle trauma.<sup>[1]</sup> When accompanied by fractures of the calcaneus or navicular, the condition becomes significantly more complex, with increased risks of soft-tissue compromise, neurovascular injury, and long-term stiffness or arthritis.<sup>[2, 8]</sup>

Subtalar dislocations may occur medially, laterally, anteriorly, or posteriorly, with medial dislocations being the most common.<sup>[3, 6]</sup> Lateral and anterior variants are usually associated with impaction injuries or fractures of the calcaneus and talus.<sup>[4, 5]</sup> Peritalar fracture-dislocations, especially those involving the calcaneus, represent an even rarer subset and are

associated with high complication rates, including wound necrosis, infection, compartment syndrome, and post-traumatic subtalar arthrosis.<sup>[7, 8]</sup>

Open peritalar dislocations are exceedingly rare and demand prompt, aggressive management. The combination of open calcaneal fracture, subtalar dislocation, talonavicular dislocation, and navicular fracture represents an exceptionally severe configuration, with only isolated cases reported in literature.<sup>[3, 7, 9]</sup> The surgical approach must address soft-tissue contamination, reduction of peritalar alignment, restoration of normal hindfoot alignment (particularly varus or valgus deformities), and temporary stabilization while preserving the tibiotalar joint whenever uninvolved.

Various reduction strategies have been described, including manual manipulation, ligamentotaxis, external fixation, percutaneous K-wire stabilization, and open reduction.<sup>[3, 8]</sup> Spike-assisted reduction, joystick maneuvers using K-wires, and spanning external fixation have been successfully employed in complex subtalar injuries to achieve stable alignment when conventional methods fail.<sup>[1, 4]</sup>

We present a rare case of a young female with a compound medial plantar wound, a complex calcaneal fracture with varus deformity, subtalar dislocation, talonavicular dislocation, and axial navicular fracture, managed acutely with closed reduction, K-wire stabilization, thorough debridement and VAC dressing. This report highlights the rarity of the injury pattern, the decision-making involved in acute reconstruction, and the role of innovative reduction techniques in achieving anatomic restoration.

### Case Presentation

A 22-year-old female presented following a fall from height with severe pain, deformity, and bleeding from the right foot. Examination revealed a contaminated medial plantar open wound measuring approximately  $15 \times 3 \times 3$  cm, exposing soft-tissue structures but without neurovascular compromise. The hindfoot was in varus with visible deformity, and the forefoot appeared adducted. (Fig. 1)

Radiographs and CT imaging demonstrated a complex intra-articular calcaneal fracture with varus collapse, medial subtalar dislocation, talonavicular dislocation, and an axial fracture of the navicular. Importantly, the tibiotalar joint was intact, and no talar body fracture was identified. There were no associated injuries in the lower limb. (Fig. 2, 3)



**Fig 1:** Wound over the medial plantar aspect



**Fig 2:** Plain radiographs at presentation



**Fig 3:** CT scan

Immediate management included IV antibiotics, tetanus prophylaxis, wound irrigation, sterile dressing, and temporary immobilization with a below-knee slab. Given the compound nature and instability, urgent operative intervention was planned.

Under regional anesthesia and fluoroscopic guidance, thorough irrigation and debridement were performed first. The subtalar dislocation was addressed initially using a spike-assisted reduction through a small incision, in which a Hohmann spike was used as a joystick to lever the calcaneus into its anatomical position. Once the subtalar joint was reduced, the varus deformity of the calcaneus persisted, requiring a manipulating K-wire maneuver, which corrected the alignment and was subsequently advanced into the talus to maintain reduction.

Two additional K-wires were placed across the calcaneus into the talus and sustentacular region to augment stability. Intraoperatively, persistent medial displacement of the navicular was noted due to forefoot adduction. Longitudinal traction was applied to the first two toes, while the forefoot was abducted, allowing reduction of the talonavicular joint. Two retrograde K-wires were inserted from the navicular into the talus to stabilize the reduction.

As the tibio-talar joint was intact, no wires were passed across it. Thorough debridement of the wound was done and a vacuum-assisted closure (VAC) dressing was applied over the medial wound. Additionally, the limb was placed in a below knee slab to optimize soft-tissue healing. Post operatively, the patient remained stable. Radiographs were done (Fig. 4) and physiotherapy was started as per pain tolerance. Serial VAC dressing changes showed healthy granulation tissue (Fig. 5) and is soon planned for a skin grafting procedure.



**Fig 4:** Immediate post-operative radiographs



**Fig 5:** Healthy granulation tissue over the wound

### Discussion

Peritalar dislocation combined with calcaneal fracture is an extremely rare injury configuration, with only a few cases described in literature. [1, 7, 8] The complexity is magnified when associated with an open wound and navicular fracture. Because peritalar stability depends on a combination of subtalar and talonavicular alignment, any fracture-dislocation involving both joints poses significant challenges. [2]

Medial subtalar dislocations are more common and often result from forced inversion of a plantarflexed foot. [3, 6] Lateral variants are typically associated with bony impaction or fractures of the calcaneus. [4,5] In our patient, varus deformity and medial displacement of the navicular suggested a strong inversion mechanism.

Open subtalar or peritalar injuries require urgent debridement, reduction, stabilization, and soft-tissue management. [3] Fixation must balance rigidity with soft-tissue preservation. K-wire stabilization remains widely used due to minimal hardware footprint, percutaneous application, and easy removal. [3, 8] Spike-assisted and joystick reduction techniques have been reported in subtalar and calcaneal fracture-dislocations and are especially useful when manipulation is inadequate. [1, 4] The use of the K-wire as a joystick to correct calcaneal varus—as applied here—has been described in complex calcaneal injuries. [8] Navicular fractures with displacement, especially axial ones, require anatomic reduction to restore medial column length. Retrograde K-wire fixation has been reported in isolated and combined midfoot injuries. [2, 3]

Thorough debridement and immobilisation play a crucial role when soft tissues are compromised. Application of VAC dressing further hastens the recovery while being less cumbersome for the patient.

Our patient's surgical strategy mirrored the principles of early debridement, reduction of subtalar and talonavicular joints, correction of calcaneal alignment, minimal internal fixation via K-wires, no tibiotalar transfixion due to preservation of the joint and appropriate wound care. Despite this, long-term prognosis remains guarded due to the high incidence of subtalar arthritis following such injuries. [7, 8] Prolonged follow-up is needed to assess union, hindfoot alignment, and functional recovery.

### Conclusion

This case highlights a rare and severe combination injury involving open calcaneal fracture, subtalar dislocation, talonavicular dislocation, and navicular fracture. Early recognition, spike-assisted reduction, restoration of hindfoot and midfoot alignment, percutaneous stabilization, and meticulous wound care. The described technique offers a practical option in complex peritalar injuries, especially when soft-tissue compromise limits extensive open surgery. Long-term follow-up is essential to evaluate functional outcomes and the risk of subtalar arthrosis.

**Conflict of Interest:** Not available

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