

A Rare Case of an Isolated Traumatic Cuboid Dislocation

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Purpose

Traumatic cuboid dislocations are exceedingly rare in the foot and ankle literature. These injuries are due to high-energy trauma or crush-type mechanisms. Different fixation methods have been described for surgical treatment, although partial dislocations can be managed conservatively. The purpose of this case was to present successful treatment for a cuboid dislocation without fracture of the cuboid itself, using a mini-open technique, with an external mini-rail device and Kirshner wire fixation.

Literature Review

Cuboid dislocations typically result from high energy trauma or an inversion, plantarflexory injury of the foot with direct trauma¹⁻¹⁰. Even fewer of these dislocations occur without fracture of the cuboid^{1-4, 6,7,9}. The peroneus longus tendon typically acts to prevent reduction of the cuboid when complete dislocations occur⁵. Closed reduction typically cannot be performed due to this tendinous impingement, with success in closed reduction with partial cuboid dislocations only³.

Multiple methods of treatment have been described including internal fixation, Kirshner wire fixation or closed reduction casting¹⁻¹⁰. No studies have described the use of a mini-rail external fixator for an extended period for stabilization of the lateral column secondary to severe cuboid instability. Usage of advanced imaging like computed tomography (CT) scans have been advocated to evaluate for pedal polytrauma including Lisfranc fracture dislocations^{9,10}. Overall, patients in this limited cohort have short term follow up, with positive outcomes, and return to normal activity around three months postoperatively⁶⁻⁹.



Figure 1. (Left)
Initial AP view of the complete cuboid dislocation



Figure 2. (Right)
A. Axial view of a CT scan with complete cuboid dislocation
B. Sagittal CT with anterior process calcaneal fracture and cuboid dislocation



Case Study

A healthy 42-year-old male was riding his motorcycle at a low speed when the motorcycle tilted and landed on his foot while plantarflexed and slightly inverted. He was unable to bear weight and had an abrasion to his dorsal right foot. Physical examination in the emergency room revealed tenderness to palpation of the lateral midfoot and rearfoot at the calcaneal cuboid joint. He had limited eversion secondary to pain and a small superficial abrasion to the dorsum of his right foot. Plain film radiographs were taken (Figure 1) and subsequently a computed tomography (CT) scan was also obtained (Figure 2A, 2B). Results were consistent with a complete cuboid dislocation and anterior process chip fracture, with concern for possible 3rd and 4th metatarsal base fractures and Lisfranc fracture dislocation.

The patient was splinted and referred to a foot and ankle specialist. Due to failed closed reduction, the patient was consented for surgery and subsequently underwent a cuboid pinning and mini-rail external fixation placement. Intra-operatively, it was noted, there was complete dislocation and rupture of the lateral fourth and fifth tarsometatarsal-cuboid ligament and calcaneal cuboid ligamentous complexes, with no Lisfranc fracture dislocation. The peroneus longus tendon inhibited our relocation initially with mobilization and usage of a threaded pin, we were able to relocate the cuboid into its lateral column articulation with the midtarsal and tarsometatarsal joints. Stabilization of the dislocation was achieved through distraction of the lateral column complex with external fixation into the fourth metatarsal and the calcaneus and Kirschner wire fixation (Figure 3 and 4).

The patient was followed for fourteen months. His incision healed uneventfully at three weeks. The external fixator was removed at four weeks and the Kirschner wires at six weeks (Figure 3). The patient was transitioned to a controlled ankle motion walker at six weeks and then into shoe gear at nine weeks. He began physical therapy at the nine weeks postoperatively. Radiographs at six months did not show any arthritic changes (Figure 5). The patient was happy and back to normal activity without pain at 3 months. At 14 months, the patient had continued function without limitations.



Figure 3.
Postoperative clinical image of the fixation construct and surgical wound



Figure 4. (Left)
Immediate postoperative AP radiograph



Figure 5. (Right)
Six months postoperative AP radiograph

Analysis and Discussion

Complete cuboid dislocations are exceedingly scarce in the literature and long-term follow up is even more rare. Early studies, like Fagel et al. and Gough et al. described closed reduction cast immobilization with satisfactory patient outcomes^{3,4}. Kirschner wires have also been described for percutaneous or open reduction with stabilization of the cuboid, as it can continually dislocate due to its ligamentous rupture. Drummond and Hastings utilized Kirschner wires in a crossing fashion, with cast immobilization and removal of pins at six weeks¹. Smith et al., utilized a more longitudinal placement of wires from the fourth and fifth metatarsals into the cuboid, with return to full sporting activity at a professional level.

Multiple studies also utilized internal fixation with screws or plates depending on the personality of the trauma. Some of these injuries have associated Lisfranc fracture dislocations, necessitating fixation along with treatment of a cuboid fracture. Kolker et al. used screw fixation to stabilize the tarsometatarsal joint as well as the peri-cuboid joints, with removal of hardware at seven months. This patient had mild arthrosis at this time, which further progressed. They advocated for protective weight bearing until 12 weeks postoperatively⁶.

No study has shown utilization of an external fixator device to allow in reduction and maintenance of joint spaces in the lateral column in conjunction with K-wire fixation for a complete cuboid dislocation. In conclusion, we demonstrated a positive patient outcome with a novel fixation construct for this unique trauma. We hope this adds to the body of literature and to the fixation options for these very rare injuries.

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