

A Complex midtarsal dislocation of the foot following a supination abduction injury: A case report

by Rajesh Kumar Chopra¹, Narendran Pushpasekaran^{2*}, Sathyamurthy Palanisamy², Balu Ravi²

The Foot and Ankle Online Journal 10 (4): 5

Closed midfoot dislocations are not uncommon injuries. The key to good functional outcomes is stable concentric reduction by understanding the injury pattern and early intervention to maintain the biomechanics of the foot. We report on a 20-year-old male, the presentation of a complex pattern of closed traumatic dislocation of the midfoot, managed by open reduction and internal fixation with Kirschner wires for six weeks. He did not show any evidence of instability or arthritis and had a foot function index of 94% at 14 months. The unique presentation of this midfoot dislocation is the separation of naviculocuneiform and calcaneocuboid joints. An entity that requires reporting in literature as it remains unclassified and to add to the spectrum of injuries caused by the deforming forces of foot.

Keywords: foot injuries, tarsal bones, open reduction, arthritis, foot function index

This is an Open Access article distributed under the terms of the Creative Commons Attribution License. It permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. ©The Foot and Ankle Online Journal (www.faoj.org), 2017. All rights reserved.

Closed traumatic dislocations of the midfoot are common injuries in level 1 and 2 trauma care [1]. Apart from the common Lisfranc, Chopart and talonavicular dislocations, swivel-type dislocations of the medial column involving the talus, navicular and cuneiforms, and lateral columns involving the calcaneus and cuboid bones have rarely been reported [2-4]. The proposed injury mechanisms to cause such injuries are dorsiflexion, plantar flexion, abduction and adduction forces or a combination of them [5]. However, involvement of both columns in the form of complete disruption of the naviculocuneiform and calcaneocuboid joints has been infrequently reported in the literature. We report this complex presentation sustained following a supination-abduction force.

Case report

A 20-year-old male, presented to the emergency department after a motor vehicle collision. He

sustained a supination-abduction injury in a dorsiflexed foot and developed pain, deformity and swelling in the right foot. The forefoot was depressed and supinated in relation to the hindfoot with mild contusion and skin necrosis over the talonavicular prominence. An abnormal prominence was noted dorsally and medially at the naviculocuneiform joint. (Figures 1A and B). Distal pulses, toe movements and neurological examination were normal. There were no associated injuries in the body. The patient had no medical illness or neuropathies. Radiographs of the foot and ankle showed complete dislocation between the naviculo-cuneiform and calcaneocuboid joints with disruption of the calcaneo-navicular articulation. (Figures 2A and B). This pattern of injury has not been included in any classifications available in literature.

1 - M.S.(Ortho), professor, department of orthopaedics, vardhaman mahavir medical college and safdarjang hospital, new delhi, india.

2 - M.S.(Ortho), resident, department of orthopaedics, vardhaman mahavir medical college and safdarjang hospital, new delhi, india.

* - Corresponding author: drnaren247ortho@gmail.com



Figure 1 showing the deformities-step at the naviculocuneiform junction, forefoot supinated in relation to hindfoot. Pressure necrosis is seen over the navicular site.



Figure 2 Anteroposterior and Oblique views of right foot and ankle showing dislocation of the naviculocuneiform and calcaneocuboid joints (white arrow). Chip fracture of the navicular (black arrow), the site of attachment of calcaneonavicular ligament.

Under general anaesthesia, closed reductions were attempted with the knee flexed and the ankle in 15 degree plantar flexion. The deformity was initially exaggerated and reduction attempted by traction and manipulation opposite to the deforming forces. However, incongruent reduction required an open reduction through Ollier's approach. The dorsal midtarsal ligament, lateral and plantar cuboideonavicular ligaments were found to be ruptured. Congruent stable reduction was achieved and secured with two 2mm Kirschner wires (K-wires) stabilizing the calcaneocuboid joint and two k wires fixating the medial two cuneiforms and the navicular under image intensifier control (Figures 3A and B). The ruptured ligaments were meticulously repaired.



Figure 3 AP and oblique views of the foot and ankle. The navicular, the three cuneiforms and calcaneocuboid joints are concentrically reduced and fixed with K-wires.

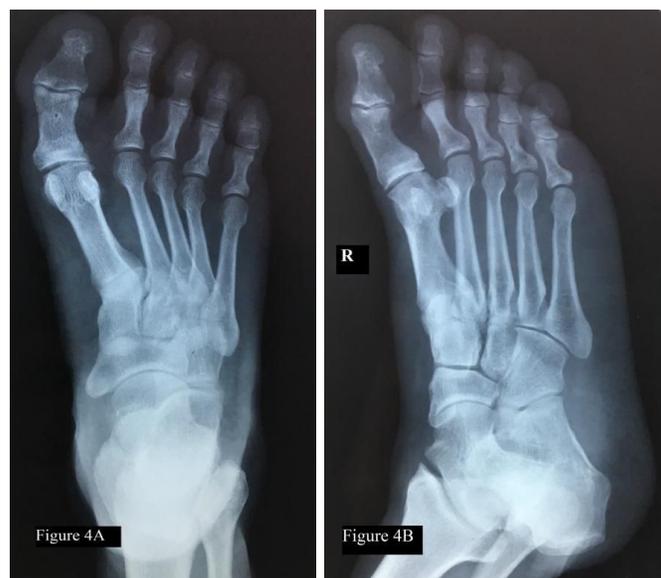


Figure 4 Anteroposterior and oblique views of foot and ankle at 14 months follow-up showing normal alignment of arches and no arthritis.

Additional immobilization by below knee cast and non weight bearing was maintained for 6 weeks. With the removal of the K-wires, physiotherapy, partial weight bearing, medial arch support and controlled ankle motion boot were instituted. The patient had full weight bearing and a plantigrade foot at his 4 month follow-up. The patient had a mild restriction of subtalar motion and restriction of dorsiflexion by 5 degrees. He had no clinical or radiological signs of instability or arthritis and foot function index of 94% at 14 months (Figures 4A and B)

	Report	Patient details	Mode of injury	Pattern	Treatment	Follow up	Outcomes
1	Choudry et al, 2007 [6]	34/ male	Fall of motorized palate over foot	Naviculo- cuneiform subluxation and calcaneocuboid dislocation	Closed reduction and immobilization for 6 weeks	15 weeks	Good
2	Chen et al, 2012 [7]	64/ male	Run over by car	cuboid, medial and intermediate cuneiform fractures with naviculo-cuneiform and calcaneocuboid dislocation	Open reduction and internal fixation of fractures	6 months	Good
3	Chen et al, 2012 [7]	59/female	Car accident	left navicular, medial cuneiform and calcaneal fractures with calcaneal-cuboid, navicular-cuneiform and first tarsometatarsal joint dislocations	Open reduction and internal fixation	3 months	Chronic pain due to calcaneocuboid instability
4	Present case	20/male	Fall from bike	Isolated calcaneal-cuboid, navicular-cuneiform dislocation	Open reduction and stabilization	14 months	Good

Table 1 Review of reported naviculocuneiform and calcaneocuboid disruptions.

	Deforming forces	Spectrum of midfoot injuries
1	Medial	Fracture-sprains, fracture- subluxations or dislocations, swivel dislocations (talonavicular).
2	Longitudinal	In plantar flexed foot- navicular fractures. In dorsiflexed foot- talus fractures, dorsal navicular dislocations.
3	Lateral	Fracture-sprains, fracture- subluxations or dislocations, swivel dislocations (talonavicular or naviculocuneiform with intact calcaneo-cuboid).
4	Plantar	Fracture-sprains, fracture- subluxations or dislocations (chopart), plantar swivel dislocations.
5	Crush	Fractures of mid tarsals.

Table 2 Mechanism of midfoot injuries [5].

Discussion

Closed midfoot dislocations are not uncommon presentations in level 1 or 2 trauma centers [1]. Apart from the common complex dislocations of Lisfranc and Chopart, isolated and swivel-type fractures and dislocations involving the medial column (talus, navicular and cuneiforms) and lateral column (calcaneus and cuboid) have rarely been reported [2-4]. However, the midfoot dislocations involving the separation of naviculocuneiform and calcaneocuboid joints are rare pattern of injuries infrequently reported in the literature (Table 1).

Main and Jowett had extensively studied the mechanisms of midtarsal injuries and proposed the various deforming forces causing the midtarsal fractures and dislocations [5] (Table 2).

Our case presents an unusual and complex pattern of injury in which plantar-abduction force at the midfoot caused the injury path through naviculocuneiform joint and calcaneocuboid joints causing complete dislocation of the three cuneiforms and cuboid articulations. This extends the spectrum of injury pattern caused by abduction deforming forces.

Obtaining concentric and stable reduction is of paramount importance to restore the biomechanics of the foot and prevent debilitating arthritis [8]. The management and prognosis of such complex midtarsal injuries in the literature have not been elaborated, except for a few case reports favoring open reduction and internal fixation [9]. In our case, the patient had good outcomes treated by open reduction and Kirschner wire fixation.

Conclusion

We report this case of traumatic closed dislocation of naviculocuneiform and calcaneocuboid joints following supination abduction deforming forces. Such injuries require further reporting to understand the spectrum of midfoot injuries. Congruent and stable fixation is of paramount importance to maintain proper biomechanics of foot.

References

1. Hanlon DP. Leg, ankle, and foot injuries: Emerg Med Clin North Am 2010; 28(4):885-905.
2. Davis CA, Lubowitz J, Thordarson DB. Midtarsal Fracture-Subluxation; Case Report and Review of the Literature: Clin Orthop Relat Res 1993; 292: 264-268.
3. Dhillon MS, Nagi ON. Total dislocations of the navicular: are they ever isolated injuries?: J Bone Joint Surg [Br] 1999; 81:881-885.
4. Kollmansberger A, De Boer P. Isolated calcaneocuboid dislocation: a brief report: JBJS [Br] 1970; 71:323-325.
5. Main BJ, Jowett RL. Injuries of the midtarsal joint: JBJS [Br] 1975; 57:89-97.
6. Choudry Q, Akhtar S, Kumar R. Calcaneocuboid and naviculocuneiform dislocation: An unusual pattern of injury: J Foot Ankle Surg 2007;13:48-50.
7. Cheng Y, Yang H, Sun Z, Ni L, Zhang H. A Rare Midfoot Injury Pattern: Navicular-Cuneiform and Calcaneal- Cuboid Fracture-Dislocation: J Int Med Res 2012; 40(2):824-31.
8. Richter M, Wippermann B, Krettek C, Schrott HE, Huefner T, Thermann H: Fractures and fracture dislocations of the midfoot: occurrence, causes and long-term results. Foot Ankle Int 2001; 22:392-8.
9. Richter M, Thermann H, Huefner T, Schmidt U, Goesling T, Krettek C: Chopart joint fracture-dislocation: initial open reduction provides better outcome than closed reduction. Foot Ankle Int 2004; 25:340-8.