


Pure isolated medial talonavicular joint dislocation following low-energy trauma: a case report

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Abstract

Midtarsal dislocations are relatively rare injuries secondary to high-energy trauma and are typically accompanied by disruption of ligamentous structures and fractures of the midfoot. We herein present a case of a pure isolated medial swivel dislocation of the talonavicular joint (TNJ) that was sustained following low-energy trauma without an associated fracture. A 78-year-old woman visited our emergency department with severe pain in the midfoot area of the right foot without neurovascular deficits. She had sustained this injury after severe ankle inversion while going downstairs. Plain radiographs of the right foot showed that the navicular was dislocated medially on the talus; no other malalignments were present. Three-dimensional computed tomography revealed dislocation of the TNJ, but no other tarsal or midtarsal bone fractures or dislocations. A medial dorsal incision was made to expose the TNJ. The dorsal talonavicular ligament was ruptured and interposed between the navicular and talus. The ligament was

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removed and the TNJ was reduced. The clinical outcome at the 1-year follow-up was satisfactory with no limitations in daily activities. In summary, we have reported an extremely rare case of a pure isolated medial TNJ dislocation in which the interposed dorsal talonavicular ligament served as an obstacle to reduction.

Keywords

Talonavicular, dislocation, joint, ligament, foot, reduction, case report

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Introduction

Midtarsal dislocations of the foot are relatively rare injuries secondary to high-energy trauma, and they are typically accompanied by disruption of ligamentous structures and fractures of the midfoot. The prevalence of concomitant injury with dislocation of the talonavicular joint (TNJ) ranges from 75% to 90%.^{1,2} However, pure dislocation of the TNJ without an associated fracture of either the TNJ or calcaneocuboid joint is extremely uncommon; other reports have tended to describe coexisting injuries.^{3–7} We herein present a case of a pure isolated medial swivel dislocation of the TNJ that was sustained following low-energy trauma without an associated fracture.

Case description

A 78-year-old woman with a body mass index of 23.07 kg/m² (height, 153 cm; weight, 54 kg) visited our emergency department with severe pain in the midfoot area of the right foot. She had sustained this injury after severe ankle inversion while going downstairs. The patient had diabetes and hypertension that were well-regulated with medications. She had no history or signs of rheumatoid arthritis and no history of steroid or other injections in the affected foot. Physical examination revealed a marked bony prominence on the medial

aspect of the right foot with severe swelling and tenderness (Figure 1). No tenderness was present at any other site, and no distal neurovascular deficits were found elsewhere on the affected foot. Plain radiographs of the right foot revealed that the navicular was medially dislocated on the talus; no other malalignments were present (Figure 2). Three-dimensional computed tomography (CT) revealed dislocation of only the TNJ with no other tarsal or midtarsal bone fractures or dislocations (Figure 3). No other abnormalities, such as hypoplasia of the middle facet of calcaneus, were found on CT. T2-weighted sagittal magnetic resonance imaging (MRI) showed that the ruptured dorsal talonavicular ligament was sandwiched within the TNJ (Figure 4). The injury was diagnosed as a pure isolated medial swivel dislocation. Our emergency room team unsuccessfully tried to reduce the dislocation without anesthesia. Therefore, emergency surgery was performed to obtain joint reduction and stability. The patient's preoperative visual analog scale pain score was 8 points.

Closed reduction was promptly attempted in the operating room under spinal anesthesia but was unsuccessful. We decided to attempt open reduction under the consideration that some other structures, such as ligaments, may have been interfering with the reduction as observed on the preoperative MRI examination.

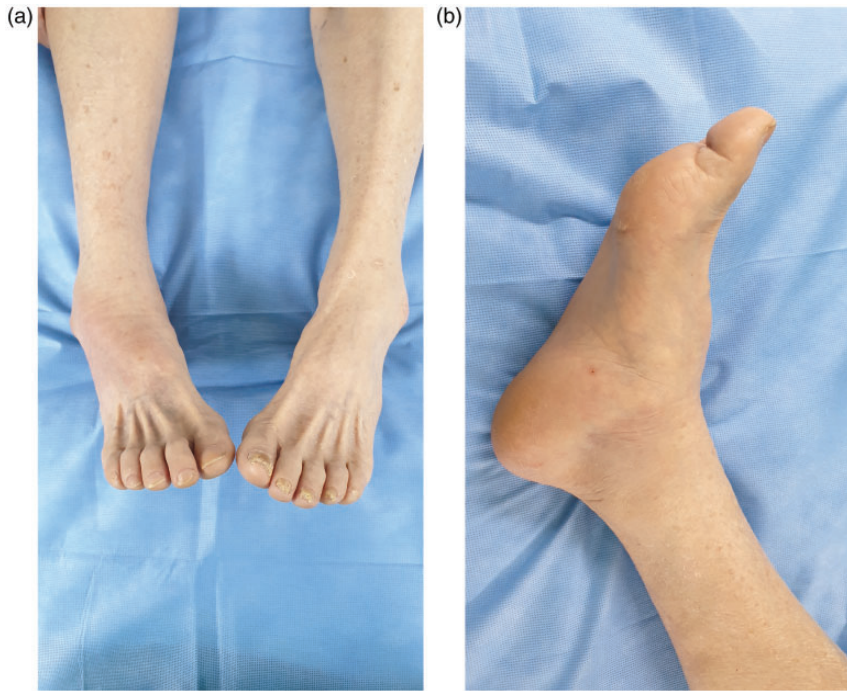


Figure 1. Gross (a) anteroposterior and (b) lateral photographs show a large bony prominence on the medial aspect of the right foot with severe swelling.



Figure 2. Plain (a) anteroposterior and (b) lateral radiographs of the initial injury show the medial talonavicular dislocation.

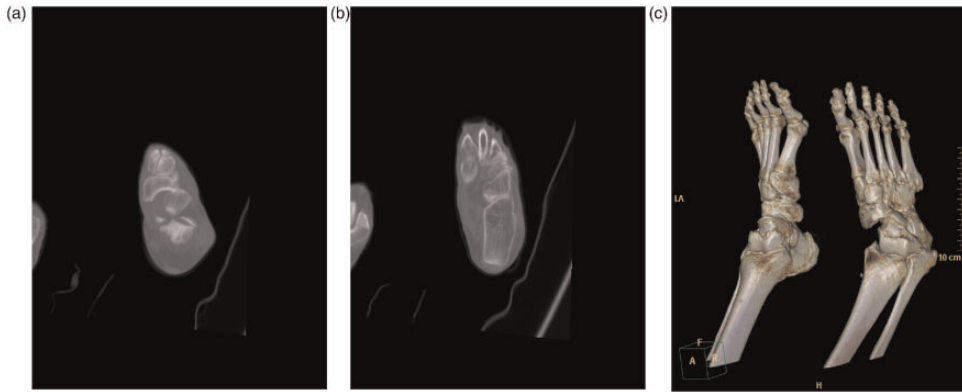


Figure 3. Preoperative three-dimensional computed tomography (CT) images show isolated medial talonavicular dislocation, an intact calcaneocuboid joint, and no other fractures or malalignment. (a, b) An axial CT scan shows the medial talonavicular dislocation and the intact calcaneonavicular. (c) The three-dimensional reconstruction CT image shows no other related fractures or malalignment.



Figure 4. Preoperative T2-weighted sagittal magnetic resonance image shows the ruptured dorsal talonavicular ligament (arrow) sandwiched in the talonavicular joint.

A medial dorsal incision was made to expose the TNJ. The lateral facet of the dislocated navicular was impacted at the medial facet of the talar head, and the dorsal talonavicular ligament was ruptured and interposed between the navicular and the talus (Figure 5). The ligament was

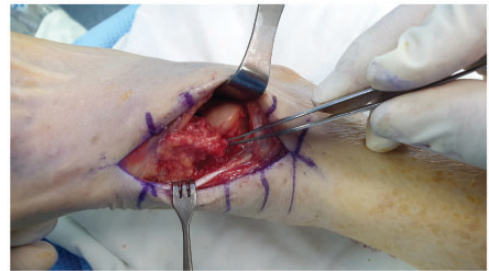


Figure 5. Intraoperative photographs show the ruptured dorsal talonavicular ligament sandwiched in the talonavicular joint, which interfered with reduction.

removed with a Freer elevator, and the navicular was reduced manually. Acceptable joint congruency was achieved under a C-arm image intensifier, and percutaneous pinning was performed using three 1.4-mm K-wires from the navicular to the talus to stabilize the joint (Figure 6). The distal neurovascular status was intact after the operation. The foot was immobilized postoperatively in a non-weight-bearing short leg cast for 6 weeks. The K-wire was removed 6 weeks later, and the joint was shown to be stable by a fluoroscopic stress



Figure 6. Postoperative (a) anteroposterior and (b) lateral radiographs after open reduction and multiple Kirschner wire fixation show anatomic reduction of the dislocation.

test. Partial weight-bearing was allowed in a controlled ankle motion boot for 2 weeks, followed by gradual progression to full weight-bearing. At 12 weeks, the patient experienced no residual tenderness or instability and only mild pain and discomfort when walking on uneven ground. An orthosis such as a University of California Berkeley Laboratory foot orthosis was recommended for prevention of recurrence and additional support of the medial arch, but the patient refused additional treatment because of cost. At the 1-year follow-up, the American Orthopaedic Foot and Ankle Society midfoot score was 85 and the visual analog scale pain score had improved to 2 points. The patient had a satisfactory clinical outcome and reported no limitations during daily activities. The TNJ remained reduced and there were no radiological changes, such as TNJ arthritis or avascular necrosis (Figure 7).

Discussion

In 1975, Main and Jowett² introduced a system for categorizing injuries into five

types (medial displacement, longitudinal impact injuries, lateral displacement, plantar displacement, and crush injuries) according to the direction of the deforming force applied and the resulting displacement of the midtarsal joint. They defined a medial or lateral swivel dislocation as a subtalar dislocation in which the calcaneocuboid joint and subtalar joint remain intact but the navicular is medially or laterally dislocated from the talus.² Regarding the underlying mechanism, the intact talocalcaneal ligament acts as the axis of rotation, rotating the foot medially or laterally without inversion or eversion. This is distinct from a subtalar dislocation, in which the talocalcaneal ligament is disrupted. Based on radiographic, CT, and MRI findings, our case was classified as a pure isolated medial swivel dislocation.

In most studies reported to date, an isolated TNJ dislocation is accompanied by fractures of the navicular, talus, cuboid, calcaneus, and metatarsal bones.^{4,6-13} A pure isolated TNJ dislocation without any associated subtalar joint dislocations or surrounding bone fractures is rare.



Figure 7. Postoperative standing (a) anteroposterior and (b) lateral radiographs at the 1-year follow-up examination show no evidence of incongruity or arthritic changes at the talonavicular joint.

Most reports suggest that disruption in both longitudinal columns is required for TNJ dislocation; such disruption is caused by high-energy trauma such as a traffic accident, fall from a height, or crushing injury.^{2,10,14–16} Several reports have described a medial swivel dislocation of the TNJ with a cuboid fracture caused by low-energy trauma.^{4,6} Pehlivan et al.⁴ reported a case of medial peritalar dislocation with complete dislocation of the TNJ and subluxation of the talocalcaneal joint caused by low-energy trauma. In their case, TNJ dislocation was accompanied by subluxation of the talocalcaneal joint and a talar head fracture. Williams et al.⁶ considered the injury unusual given the absence of major ligament disruption. It was assumed that the TNJ dislocation occurred when the cuboid bone fractured because of tensile force, whereas the lateral columns of the midfoot were subjected to adduction force. However, no concomitant damage was found on CT or MRI in the present case, and no other symptoms were found on physical examination. Therefore, this unusual case shows that even low-energy trauma can cause dislocation of the TNJ.

We assume that the mechanism of injury in this case was similar to that in the case reported by Williams et al.⁶ Additionally, however, in the process of dislocation after damage to the talonavicular ligament, we assumed that there was no bone damage accompanied by traction.

The presence of concomitant injuries is an important factor in the treatment outcome of TNJ.^{4,6,7,11} Therefore, the initial radiograph should be interpreted very carefully, and suspected damage should be evaluated using CT or MRI.

Various methods for treating a dislocated TNJ have been discussed, including closed reduction and open reduction with or without internal or external fixation.^{2,4,17–19} Main and Jowett² were the first to report swivel dislocation, of which there were eight cases in their series (seven patients): seven medial-type dislocations (six patients) and one lateral-type dislocation (one patient). Four of the medial-type dislocations were treated conservatively with strapping, closed reduction, and plaster casts; the outcome was good in one case and poor in three. Open reduction and plaster immobilization were performed in three

cases; the outcome was good in two cases and fair in one. For the one lateral-type dislocation, closed reduction and plaster immobilization were performed with a good outcome.

Richter et al.¹⁸ analyzed 110 pure Chopart joint dislocations, fracture-dislocations, and combined Chopart–Lisfranc joint fracture-dislocations. The dislocations were categorized according to the treatment method as follows: closed reduction, no internal fixation; open reduction with internal fixation; optional additional external fixation; and amputation. Initial anatomical reduction was essential for good results in all groups. The authors concluded that closed reduction can only achieve a good outcome when the anatomical integrity of a pure dislocation is maintained and that an initial open reduction yields significantly better results than closed reduction in all other cases.

Pehlivan et al.⁴ described a case of medial TNJ dislocation requiring open reduction. Closed reduction under general anesthesia was unsuccessful, so the authors treated the deformity with open reduction and percutaneous fixation. Similar to the ruptured dorsal talonavicular ligament presented herein, structures were present in their case that prevented reduction. Their pathological findings included buttonholing of the head of the talus through the extensor retinaculum and fracture of the medial aspect of the talar head. At the last follow-up, there was no radiological arthritis or avascular necrosis of the tarsal bone; additionally, the patient had no pain during activities of daily living, although mild to severe pain was experienced when walking long distances or upon forced inversion of the foot. Similarly, in our case, dorsal talonavicular ligament rupture interfered with the reduction, such that the reduction was performed after the ligament had been removed.

Conclusion

We have herein reported an extremely rare case of a pure isolated medial TNJ dislocation. Closed reduction was impossible, and an interposed dorsal talonavicular ligament served as an obstacle to reduction. The dislocation was caused by low-energy trauma and did not involve another injury. Therefore, the overall anatomical stability of the foot was maintained after surgery, and good results were obtained. In the case of TNJ dislocation, it is advisable to identify the mechanism by which the injury occurred and accurately determine whether any accompanying injuries are present. Reducing the anatomical stability may improve the prognosis in such cases.

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Declaration of conflicting interest

The authors declare that there is no conflict of interest.

Ethics

This case report was approved by the Institutional Review Board of Soonchunhyang University Hospital (IRB No. 2019-05-022). The patient gave written informed consent for publication of this report and the accompanying images.

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References

1. Grantham SA. Medial subtalar dislocation: five cases with a common etiology. *J Trauma* 1964; 4: 845–849.
2. Main BJ and Jowett RL. Injuries of the mid-tarsal joint. *J Bone Joint Surg Br* 1975; 57: 89–97.
3. Miller CM, Winter WG, Bucknell AL, et al. Injuries to the midtarsal joint and lesser tarsal bones. *J Am Acad Orthop Surg* 1998; 6: 249–258.
4. Pehlivan O, Akmaz I, Solakoglu C, et al. Medial peritalar dislocation. *Arch Orthop Trauma Surg* 2002; 122: 541–543.
5. Datt N, Rao AS and Rao DV. Medial swivel dislocation of the talonavicular joint. *Indian J Orthop* 2009; 43: 87–89.
6. Williams DP, Hanoun A, Hakimi M, et al. Talonavicular dislocation with associated cuboid fracture following low-energy trauma. *Foot Ankle Surg* 2009; 15: 155–157.
7. Inal S and Inal C. An unusual variety of simultaneous fracture dislocation pattern: medial swivel dislocation of talonavicular joint with displaced fractures of the fourth and fifth metatarsals. *J Foot Ankle Surg* 2013; 52: 501–504.
8. Ross PM and Mitchell DC. Dislocation of the talonavicular joint: case report. *J Trauma* 1976; 16: 397–401.
9. Hafez MA, Bawarish MA and Guvvala R. Closed talar body fracture with talonavicular dislocation; a case report. *Foot Ankle Int* 2000; 21: 599–601. DOI: 10.1177/107110070002100714.
10. Ricci WM, Bellabarba C and Sanders R. Transcalcaneal talonavicular dislocation. *J Bone Joint Surg Am* 2002; 84: 557–561. DOI: 10.2106/00004623-200204000-00008.
11. Pillai A, Chakrabarti D and Hadidi M. Lateral swivel dislocation of the talo-navicular joint. *Foot Ankle Surg* 2006; 12: 39–41.
12. Powell E and LaBella M. Swivel-type dislocation of the talonavicular joint: a case report. *Foot Ankle Online J* 2011; 4: 3.
13. Bosman WM, Prakken FJ, Pijls BG, et al. Lateral talonavicular dislocation after low-energy trauma. *BMJ Case Rep* 2013; 2013: bcr2013200692.
14. Pathria MN, Rosenstein A, Bjorkengren AG, et al. Isolated dislocation of the tarsal navicular: a case report. *Foot Ankle* 1988; 9: 146–149. DOI: 10.1177/107110078800900311.
15. Dhillon MS, Gupta R, Nagi ON, et al. Inferomedial (subsustentacular) dislocation of the navicular: a case report. *Foot Ankle Int* 1999; 20: 196–200.
16. Dhillon MS and Nagi ON. Total dislocations of the navicular: are they ever isolated injuries? *J Bone Joint Surg Br* 1999; 81: 881–885. DOI: 10.1302/0301-620x.81b5.9873.
17. Richter M, Wippermann B, Krettek C, et al. Fractures and fracture dislocations of the midfoot: occurrence, causes and long-term results. *Foot Ankle Int* 2001; 22: 392–398.
18. Richter M, Thermann H, Huefner T, et al. Chopart joint fracture-dislocation: initial open reduction provides better outcome than closed reduction. *Foot Ankle Int* 2004; 25: 340–348.
19. Van Dorp KB, De Vries MR, Van Der Elst M, et al. Chopart joint injury: a study of outcome and morbidity. *J Foot Ankle Surg* 2010; 49: 541–545. DOI: 10.1053/j.jfas.2010.08.005.