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Case report

A rare case of floated talar head accompanying medial subtalar dislocation

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ABSTRACT

Introduction and importance: Concomitant medial subtalar dislocation and a rotated displaced talar neck fracture may result in poor outcomes. This study aimed to explain this extremely rare injury and assess the clinical outcomes following surgical treatment.

Case presentation: A 22-year-old Iranian man referred to the emergency department with a gross deformity and pain in his right foot and ankle after a falling from 2 m. Plain radiographs showed a rotated free talar head accompanying medial subtalar dislocation. Closed reduction was performed in the emergency department under sedation. Prompt open reduction and internal fixation of talar fracture was done, after removal of free osseocartilaginous fragments in the subtalar and talonavicular joints. At 25 months postoperatively, the clinical outcomes were assessed using the American Orthopaedic Foot and Ankle Society Ankle-Hindfoot Scale and visual analogue scale for pain which were 73 and 3, respectively. In exam, the patient had a stiffed subtalar joint without talar osteonecrosis or collapse.

Clinical discussion: Several osseous and soft tissue barriers could prevent a successful closed reduction of a subtalar dislocation. Associated cartilage injuries or fractures may result in poor clinical outcomes such as persistent pain, limping, osteoarthritis, and osteonecrosis. Immediate open reduction and rigid fixation of associated fractures and resection of small free osseocartilaginous fragments may prevent further soft tissue damages and preserve clinical functions.

Conclusions: Satisfactory clinical outcome could be expected following proper on-time approach to a subtalar dislocation associated with a rotated displaced talar neck fracture.

1. Introduction

Subtalar dislocation is a bi-articular type of peritalar dislocation in which both the subtalar and talonavicular joints are simultaneously involved. If tibiotalar dislocation also adds, it defines pantalar dislocation (1). Subtalar dislocation accounts for less than 2 % of all traumatic dislocations. Young men are affected more than females, with a ratio of about 3:1. High-energy trauma accounts for 68 % of the subtalar dislocations. The most common mechanism is a traffic accident followed by falling from a height and sports activities (2,3).

Subtalar dislocations are subdivided into medial (about 75 %), lateral (about 25 %), posterior (about 2 %), and anterior (about 1 %) dislocations based on the anatomical direction of the dislocated foot (3,4). Moreover, it could be categorized as purely ligamentous dislocation (30–40 %) or dislocation with an additional osseous injury (60–70 %) (3,5,6). Based on the current literature, the posterior process of the talus, talar head, ankle, cuboid, navicular, calcaneus, and fourth and fifth metatarsal fractures are the most frequent injuries associated with subtalar dislocation (3,4,7,8).

A medial subtalar dislocation occurs by forceful inversion of a plantarflexed foot around the sustentaculum tali in association with a severe externally rotated talus. At first, the talonavicular joint dislocates by rupturing its capsule and surrounding ligaments, followed by dislocation of the subtalar joint by rupturing the interosseous ligament (3,9,10). Compressed cartilages, displaced osteocartilaginous fragments, or avulsion fractures from the talus, calcaneus, or navicular would be seen. Associated osseous lesions are found in 55.3 % of the medial subtalar dislocations and 78.6 % of the lateral subtalar dislocations (3).

To the best of our knowledge, the presented case is the first medial

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subtalar dislocation in the literature showing a rotated displaced talar neck fracture. The rotated floated talar head did not reduce in anatomical position by the closed reduction in the emergency department. This study has been reported in line with the SCARE criteria (11).

2. Presentation of case

A 22-year-old healthy man referred to the emergency department after a falling from 2 m with severe deformity of the right foot and ankle. Physical examination revealed an intact arterial supply of the foot without any neurological deficit or skin laceration. Moreover, the past medical history as well as drug, family, and social histories were insignificant. Radiographs showed a medial subtalar dislocation and a rotated displaced talar neck fracture (Fig. 1). Closed reduction was performed in the emergency room under sedation. We flexed the knee joint to relax the gastrocnemius muscle and applied a gentle medial force to release possible obstacles. The subtalar joint was reduced by applying traction and lateral force on plantarflexed foot. Initial immobilization was done with a below-knee splint (Fig. 2). Computed tomography (CT) scan after closed reduction of subtalar dislocation revealed several associated fractures, including multiple osteocartilaginous fragments in the subtalar joint and below the floated talar head (Fig. 3).

In order to reduce the fracture of talus and resect free fragments, the patient was transferred to the operating room. Under general anesthesia, through a dorsal longitudinal incision from the ankle joint to the talonavicular joint between the extensor hallucis longus and tibialis anterior tendons, the torn capsule and floated talar head were exposed. The free talar head was completely excluded. Several free osteocartilaginous fragments below the talar head and in the subtalar joint were removed. Anterior talofibular ligament was intact and subtalar interosseous ligament was completely torn. Finally, the talar head was reduced in its anatomical position and fixed using two cannulated partially threaded screws from distal to proximal. Due to the stability of talonavicular and subtalar joints which were checked by stress views under guide of fluoroscopy, they were not stabilized with k-wires. The wound was closed layer by layer on a drain.

Fig. 2. Reduced subtalar joint with floated talar head after closed reduction under sedation in the emergency department.

Postoperatively, a non-weight-bearing below-knee cast was applied for six weeks. Then a below-knee walking cast was applied for another four weeks. After that, physiotherapy and range of motion exercises were started.

At 21 months postoperatively, no noticeable sclerosis or collapse was seen in the talus (Fig. 4). Because of pain in the dorsal of the talonavicular joint, the screws were removed and fibrotic tissues in the talonavicular joint in addition to small osteophytes in dorsal of the joint were resected to increase motion of the joint.

Fig. 1. Anteroposterior (a) and lateral (b) radiographs of the ankle and oblique view of the foot (c) revealed medial subtalar dislocation with dislocated talonavicular joint and floated talar head.

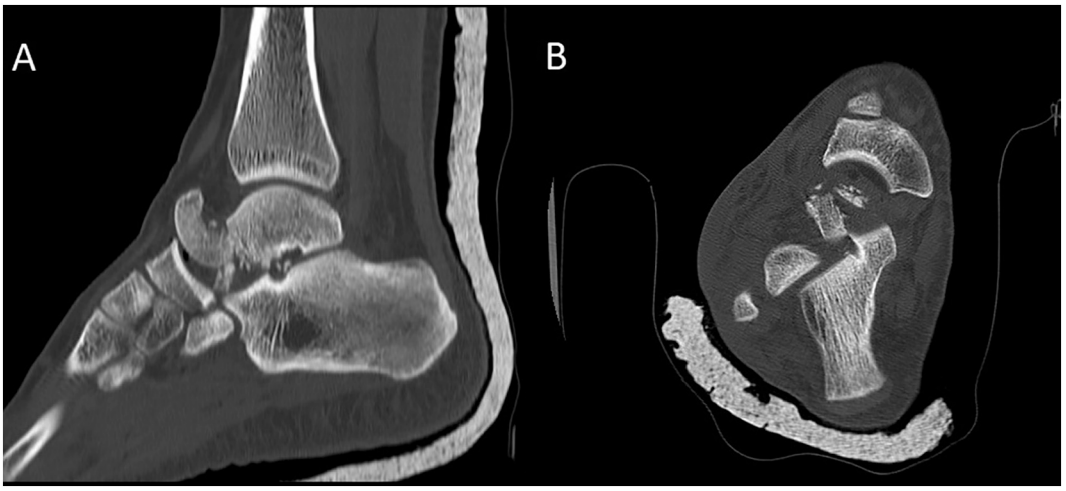

Fig. 3. Post-reduction CT scan showed a displaced talar neck with a dislocated talonavicular joint. Many small osteocartilaginous fragments in the subtalar joint and below the anteriorly-dislocated talar head are seen.

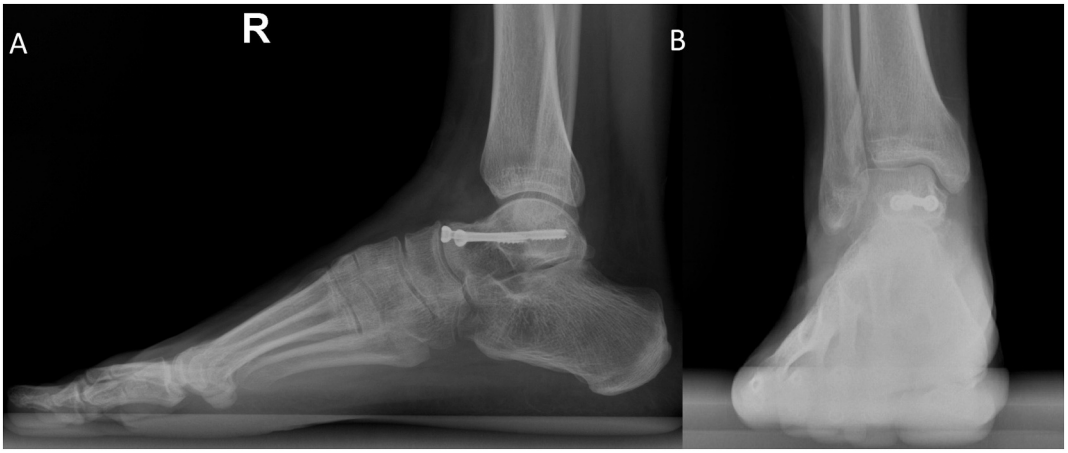

Fig. 4. Perfect reduction and fixation of the talar neck with reduced talonavicular and subtalar joints, 21 months following the surgery, before removal of screws.

At the time of the latest follow-up, 25 months following the surgery, he experienced some difficulty walking on uneven surfaces. In the exam, the foot and ankle were anatomically aligned. The subtalar joint was completely stiff, without any motion. Varus stress test and anterior drawer test indicative of anterolateral ligament instability of the ankle were negative. Ankle range of motion was reduced compared to the

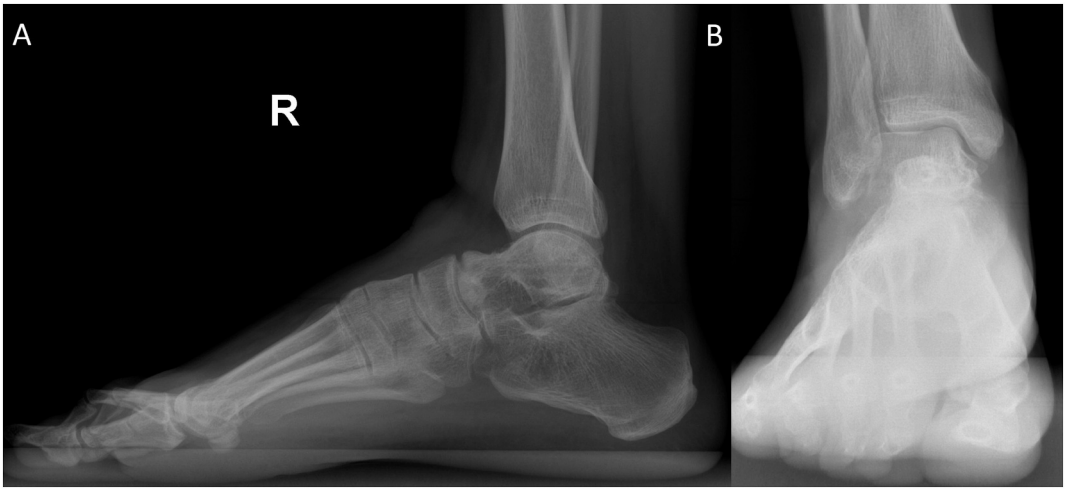

Fig. 5. Ankle radiographs showed no osteonecrosis or collapse but mild degenerative arthritis in talonavicular and subtalar joints after the screw removal, 25 months after the injury.

normal side (from 5° dorsiflexion to 20° plantarflexion). The visual analog scale for pain was 3 out of 10. Furthermore, the American Orthopaedic Foot and Ankle Society (AOFAS) ankle-hindfoot scale (12) was 76. Ankle radiographs revealed healed fracture of the talar neck with proper alignment. Osteophyte formation in the dorsal of the talonavicular joint and decreased joint space indicated the early stage of the degenerative changes. Notably, there was no evidence of osteonecrosis or collapse in the talus (Fig. 5).

The patient was informed and gave written consent for the publication of this case report.

3. Discussion

Association of talar neck fracture and medial subtalar dislocation is a very rare injury; however, the usual mechanism for talar neck fractures accompanying medial subtalar dislocations is following a forceful closed reduction maneuver in the emergency department for a simple subtalar dislocation (3). A comprehensive literature review showed that only a case report illustrated a nondisplaced fracture of talar neck associated with a medial subtalar dislocation (13). They found the talar neck fracture in post-reduction CT scan, contrary to our case for whom the displaced talar neck fracture was presented in initial radiographs. Although diagnosis of subtalar dislocation is easy by taking plain radiographs, determining of associated fractures, especially nondisplaced ones, may need CT scans. Sometimes, MRI is required to find out associated soft tissue injuries such as a tendon entrapment or rupture.

Notably, closed reduction is the first step in the management of subtalar dislocations. Closed reduction fails in about 14 to 47 % of subtalar dislocations, usually more common in lateral dislocations and also, in cases after a high-energy trauma (9). Cases with associated fractures or soft tissue injuries and irreducible subtalar dislocations need prompt open surgery. Different osseous and non-osseous structures may hamper a successful closed reduction. Soft tissue elements preventing a successful reduction are buttonholing of the talar head in the extensor retinaculum and entrapment of different structures such as talonavicular joint capsule, deep peroneal neurovascular bundle, and extensor digitorum, tibialis posterior, flexor hallucis longus, and flexor digitorum longus tendons (2,3,9). According to our presented case, a talar neck fracture with floated rotated talar head may not be an obstacle to reduce the subtalar joint closely.

Clinical and functional outcomes after subtalar dislocation may vary based on the direction of dislocation, open versus close injury, and associated injuries. Lateral subtalar dislocations have the worse outcome in comparison to medial ones. Furthermore, lateral subtalar dislocations need higher energy trauma to occur with more chance of being open injury. ***Hoexum and Heetveld***, by reviewing 76 articles about subtalar dislocation from 1988 to 2012, concluded the overall functional outcome of subtalar dislocation is good in 52.3 %, fair in 25.2 %, and poor in 22.5 % of cases (3). The mean AOFAS ankle-hindfoot scale was reported to be 71 by evaluating 25 cases in another study by ***Bibbo*** **et al.** (2); nevertheless, for purely ligamentous injuries, the mean of AOFAS ankle-hindfoot scale was reported to be 82.3 (14). Notably, in subtalar dislocations without any associated bony injury, the direction of the dislocation does not affect the midterm clinical or radiographic outcomes (14).

The complications after subtalar dislocation are skin necrosis, neurovascular injury, tendon laceration, recurrent subtalar instability, posttraumatic degenerative arthritis, osteonecrosis of the talus, and peritalar joint stiffness (5). Following talar neck fractures, the maximum time for appearing of osteonecrosis, defined as increased radiographic density of the talar dome, is eight months and collapse of the talus occurs within 11 months of the injury (15). Our case did not develop talar osteonecrosis because we did not see any increased density or collapse on plain radiographs during 25 months following the surgery. It may be the result of early reduction with stable fixation. Degenerative radiographic changes in the subtalar and talonavicular joints would be a common complication after subtalar dislocation, mainly if an associated cartilage injury in the subtalar joint occurred (2). Degenerative arthritis, the most common cause of pain and disability after subtalar dislocation (9), is expected to see in the subtalar joint in about 90 % and the talonavicular joint in about 70 % of patients, whereas all cases are not symptomatic (2). Surgical fusion is more required for symptomatic subtalar joint degenerative arthritis than the talonavicular joint (2). Stiffness with decreased range of motion is the most common complication following subtalar dislocation (9), as seen in our case.

There are some strengths for this case report including prompt diagnosis, reduction and fixation without any associated soft tissue injury. One limitation may be lack of MRI before transferring the patient to the operating room. It could help us to diagnose possible additional soft tissue injuries.

4. Conclusion

In conclusion, floated rotated talar head accompanying subtalar dislocation is an extremely rare entity. Satisfactory clinical outcome could be expected following proper on-time approach to a subtalar dislocation associated with a rotated displaced talar neck fracture.

Consent for publication

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Ethics approval and consent to participate

This study has been reviewed and approved by the institutional review board and research ethic committee of Shiraz University of Medical Sciences with Ethic number: IR.SUMS.REC.1401.027. The patient has signed the written informed consent for reporting his Data anonymously.

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None.

Authors' contributions

SAH and AA designed the primary concept of the study. ARV and RR acquired, analyzed, and interpreted the data. RB supervised the study. MAE and KM wrote the first draft of the manuscript. All authors participated in drafting the manuscript. RB and ARV critically revised the manuscript. All authors read and approved the final manuscript.

Guarantor

Dr. Amir Reza Vosoughi, Associate Professor of Orthopaedic Surgery, Orthopaedic Foot and Ankle Surgeon.

Conflict of interest statement

Authors declare no conflicts of interest.

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Not applicable.

Availability of data and materials

The datasets generated and/or analyzed during the current study are not publicly available due to the perspective of protecting personal

information but are available from the corresponding author on reasonable request.

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