



Case Report

Open ankle dislocation without associated malleolar fracture: Review of the literature

Hassan Elsayed*, Ramesh Thalava, Hytham Afifi, Mohammad Khan

Tameside NHS hospital, Ashton-under-Lyne, United Kingdom

ARTICLE INFO

Article history:

Accepted 2 January 2017

Available online 4 January 2017

Keywords:

Ankle dislocation

Ligamentous ankle injury

ABSTRACT

Open ankle dislocation without an associated fracture is an extremely rare injury [1]. We present a case of a 17-years old male who sustained a serious injury of his right ankle during jumping downstairs. He twisted his ankle and sustained an open posteromedial dislocation of his right ankle, without an associated malleolar fracture. The treatment consisted of wound debridement and irrigation open relocation with repair of anterior talo-fibular ligament, and primary closure of the skin post operatively the limb was immobilised in short leg cast for six weeks in a neutral position allowing partial weight bearing. At the 3-month follow-up visit, the patient reported that both ankle and feet had regained full, pain-free range of motion and he returned to full activity.

© 2017 Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Background

Isolated ankle dislocation without fracture is an extremely rare injury due to the strength of the collateral ligaments and the capsular reinforcements of the mortise capsule, which may exceed that of the malleolus and hence in high energy trauma, a bone injury is almost always present [1]. The first reported case was in 1913 by Peraire [2]. A review of the published data indicated that isolated dislocation of the ankle is caused predominately by road accidents (40%), in particular, motorcycle accidents (33%). The second most common cause is sports trauma (35%), particularly sports in which jumping is a fundamental component, such as volleyball (13%) and basketball (8%) [3–5]. Ankle dislocations are described according to the talus displacement in relation to the ankle mortise, and there are five types described according to Fahey and Murphy: anterior, posterior, medial, lateral and combined [6].

Case report

A healthy 18-year-old male injured his right ankle while jumping downstairs. The injury occurred with the following mechanism: after a jump downstairs, the patient landed on the ground with his foot in inversion and plantar flexion. He presented to our emergency department with a deformity of his right ankle. The clinical examination showed that his right ankle was deviated medially. The tip of the lateral malleolus protruded from the skin through a 5 cm laceration on the antero-lateral aspect of the ankle joint. The dorsalis pedis and posterior tibial pulses were felt and the capillary refill time was within normal limit of 2 s. Sensation was intact, but the patient was unable to move his foot and toes because of pain. An X ray that showed posteromedial dislocation of the tibio-talar joint without associated fractures (Figs. 1 and 2). Urgent relocation was performed under sedation in

* Corresponding author at: Tameside NHS Hospital, Fountain Street, Ashton-under-Lyne OL6 9RW, United Kingdom.

E-mail address: hassanfarouk80@hotmail.com (H. Elsayed).



Fig. 1. Lateral view of posteromedial ankle dislocation.

the A&E. Reduction was achieved by longitudinal traction, with the knee flexed, applying anterior force on the foot and the ankle was stabilized in below knee back splint (Figs. 3 and 4). The patient was admitted to continue with antibiotic treatment and for elevation of the extremity. He was prepared for wound washout and debridement under general anaesthesia in the trauma theatre. Under general anaesthesia, wound debridement and extensive saline irrigation of the ankle joint was done followed by exploration of the wound. The wound was clean without contamination and no foreign bodies were found. Mid-substance tear of the anterior talo-fibular ligament was noted and it was repaired with No 2 Ethibond sutures. Intra-operative image intensifier stress testing confirmed the stability of the ankle joint after the ligament repair. Post-operatively the ankle was immobilised in a below knee posterior cast in neutral position for 6 weeks. The patient was followed up in the clinic at 2 weeks for removal of sutures and he continued touch toe weight bearing for another 4 weeks. At 6 weeks of follow-up, he started partial weight bearing. At the end of follow-up, he returned to normal daily activity.

Discussion

The ankle joint is formed by the combined surfaces of the distal tibia and the lateral malleolus that conforms a mortise over the talus acting as a hinge, allowing a dorsal flexion of about 20° and a plantar flexion of 45°. As the talus dome is wider in its anterior aspect than in the posterior part, some associated movement of the talus are possible when the ankle is in plantar flexion as the smaller talar dome engages the tibiofibular /peroneal mortise. The joint is stabilized by the bony configuration of the medial and lateral malleoli and 4 main ligaments: the anterior talofibular ligament, calcaneofibular ligament, posterior talofibular, and talotibial ligament.

Both extrinsic and intrinsic factors contribute to the isolated dislocation of the ankle. The extrinsic factors include the road accident, especially motor vehicle, and sport injuries, especially those involving jumping and landing as basketball and volleyball. The intrinsic factors are medial malleolus hypoplasia, recurrent ankle sprains, ligamentous laxity or neuromuscular weakness and lack of coverage of the talus. Dislocation of the ankle requires considerable force because of the mechanical efficiency of the mortise and strength of the ligaments.

The most frequently described isolated ankle dislocation is the posteromedial dislocation, probably due to the reflex mechanism of placing the ankle and the foot in plantar flexion and inversion when falling down which predisposes to the damage and rupture of the anterior talofibular ligament and calcaneofibular ligament that are tight in this position. Fernandez performed a cadaveric study of this type of injury in which he was able to dislocate the ankle medially or laterally without an associated tibia or fibula fracture. This was achieved by stressing the foot into inversion or eversion in maximum plantar flexion. The ligamentous structures that were torn during his experiment were the anterior talofibular and calcaneofibular ligaments [7].

Kannus and Renstrom reviewed the current data regarding grade III ankle injuries and found no differences between patients with or without ligament repair [8].

Rios-Luna et al. used Kirschner wires to stabilize the ankle in their case report [1].

Lazaretto et al., in their case report, did not repair the anterior talofibular ligament and achieved good results [9].



Fig. 2. Anteroposterior view of isolated posteromedial dislocation of the right ankle.



Fig. 3. Anteroposterior view of the right ankle after reduction.



Fig. 4. Lateral view of the right ankle.

In our study, the anterior talofibular ligament was torn at its mid-substance that required acute repair and only then the ankle was stable clinically as confirmed by the intra-operative stress testing under image intensifier. At the end of follow up, our patient had a pain free stable ankle joint with full range of movement.

Majority of these ankle dislocations are closed and can managed by closed relocation and immobilisation for six weeks followed by gradual return to normal function [10,11]. Non-operative treatment of these closed injuries produces good to excellent results [10,11]. Closed reduction should be done promptly, after a detailed neurovascular examination, under general anaesthesia to achieve complete muscle relaxation. However, in open dislocations of the ankle we feel that acute repair of the torn ligament would help stabilize the joint immediately and enhance the recovery as seen in our case.

In conclusion, our recommendations regarding open ankle dislocation include standard wound care in the theatre that includes wound debridement and irrigation with normal saline and exploration of the joint along with assessment of ligamentous integrity and repair of the torn ligaments. Post-operatively prophylactic antibiotic administration for 48 h is advised along with below knee cast immobilisation for 6 weeks to achieve a stable ankle joint.

Learning points

- Detailed neurovascular examination of ankle dislocation is very important before and after the reduction.
- Acute repair of the torn ligament should be done if the ankle is significantly unstable by examination under general anaesthesia especially in open injuries.
- Standard wound care and prophylactic antibiotic administration to avoid infection of the joint.

Conflict of interest

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

References

- [1] A. Rios-Luna, M. Villanueva-Martinez, H. Fahandezh-Saddi, J. Pereiro, A. Martin-Garcia, Isolated dislocation of the ankle: Two cases and review of the literature, *Eur. J. Orthop. Surg. Traumatol.* 17 (2007) 403–407.
- [2] A. Peraire, Luxation tibio-astragalienne avec issue a l'exterieur du perone non fracture a travers une boutonniere cutanee. Presentation de malade, *Paris Chir.* 5 (1913) 959.
- [3] S. Bahari, I. Hanif, Pure closed medial ankle dislocation without fracture, *Eur. J. Orthop. Surg. Traumatol.* 19 (2009) 433–436.
- [4] N. Gogi, S.A. Khan, R. Anwar, Anterior dislocation of the tibio-talar joint without diastasis or fracture a case report, *Foot Ankle Surg.* 14 (2008) 47–49.
- [5] K. Kaneko, T. Muta, A. Mogami, Y. Uta, Y. Maruyama, Y. Shimamura, H. Iwase, Vertical dislocation of the talus without malleolar fracture, *Eur. J. Orthop. Surg. Traumatol.* 10 (2000) 207–209.
- [6] J.J. Fahey, J.L. Murphy, Talotibial dislocation of the ankle without fracture, *Surg. Clin. N. Am.* 45 (1965) 80–101.
- [7] T.J. Fernandes, The mechanism of talotibial dislocation without fracture, *J. Bone Joint Surg. Br.* 58 (1976) 364–365.

- [8] P. Kannus, P. Renstrom, Treatment for acute tears of the lateral ligaments of the ankle: operation, cast, or early controlled mobilization, *J. Bone Joint Surg. Am.* 73 (1991) 305–312.
- [9] I. Lazaretos, E. Brilakis, N. Efstathopoulos, Open ankle dislocation without associated malleolar fracture, *J. Foot Ankle Surg.* 52 (2013) 508–512.
- [10] K.R. Kiran, T.V. Suresh Babu, K. Deepti, Closed anterolateral ankle dislocation without fractures: case report, *Foot* 22 (2012) 247–251.
- [11] P.K. Karampinas, I.P. Stathopoulos, J. Vlamis, V.D. Polyzois, Pueumatikos SG, *Diabetic Foot Ankle* 3 (2012) 18411.