A Rare New Type of "Divergent" Fracture-Dislocation of the Ankle: A Case Report

AYAK BİLEĞİ "DİVERJAN" KIRIK- ÇIKIĞININ NADİR GÖRÜLEN YENİ BİR TİPİ: OLGU SUNUMU

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Abstract

We present the rare case of an open fracture-dislocation of the ankle that combined medial malleolus fracture, anterior dislocation of the talus and complete rupture of the tibiofibular syndesmosis with subsequent full separation of the distal ends of the tibia and fibula. The exertion of a combined axial and twisting force of relatively high energy through the foot caused this injury. The patient was treated successfully with open reduction and internal fixation. A new classification scheme is proposed in order to best describe this highly uncommon type of injury.

Key Words: Fracture-dislocation, divergent fracture-dislocation, ankle fracture, ankle dislocation

Özet

Ayak bileğinin nadir görülen bir açık kırık – çıkıklı olgusunu sunuyoruz. Bu olguda hem mediyal malleol kırığı, hem talusun anterior çıkığı ve tibiofibular sindezmozun tam yırtılmasıyla birlikte tibia ve fibulanın distal uçlarında tam ayrılma meydana gelmiştir. Ayakta çok yüksek enerjili aksiyel ve döndürücü kuvvetlerin birleşmesi bu yaralanmayı meydana getirmiştir. Bu olgu açık redüksiyon ve interna tespit ile başarılı şekilde tedavi edilmiştir. Bu tip nadir görülen yaralanma için yeni bir sınıflandırma şeması önerilmiştir.

Anahtar Kelimeler: Kırık-çıkık, diverjan kırık-çıkık, ayak bileği kırığı, ayak bileği çıkığı

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Fractures and fractures-dislocations of the ankle are quite common and they are often seen as a result of a high-energy injury. We report the rare case of an open-Gustilo et al.[1] type II- fracture-dislocation of the ankle. According to the best of our knowledge, this type of injury (medial malleolus fracture combined with anterior dislocation of the talus and complete rupture of the tibiofibular syndesmosis with subsequent full separation of the distal ends of the tibia and fibula) has never been previously reported in the literature.

Case Report

A fifty-three-year-old man was transferred to the emergency outpatient department of our hospital after suffering an injury to his right ankle due to an occupational accident. He reported trying to support a falling heavy object (a large and heavy flat piece of wood) with his right ankle. When he realized that the object was too heavy for him to control and hold, he tried to turn his body towards his left side in order to avoid it. Unfortunately his move came a little too late and as a result he sustained a combined axial and twisting load through his foot. Upon first examination, his right ankle was obviously deformed. The skin was ruptured on the medial side of the ankle (around 5-6 cm long) and a part of the tibia was protruding through that rupture (Figure 1). On the lateral malleolus area, the skin was tenting with evident signs of abrasion. No vascular or nerve injuries were noted.

The standard anteroposterior and lateral radiographs (Figure 2) revealed an anterior-superior dislocation of the ankle, combined with a complete rupture of the tibiofibular syndesmosis that lead to the full separation of the tibia and fibula at their distal ends and their plantar-wards displacement. The medial malleolus was also fractured and displaced.

An immediate attempt to reduce the dislocation was unsuccessful. The patient was taken shortly after to the operating room. Under epidural anesthesia, the wound was thoroughly washed-out, and the dislocation was easily reduced. That was followed by the open reduction and

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Figure 1. The patient's limb upon admittance to the emergency outpatient department and after the first thorough washout of the wound. Note the protruding part of the tibia through the skin rupture at the medial malleolus area.

Figure 2. Preoperative standard anteroposterior and lateral radiographs of the fracture-dislocation.

fixation of the medial malleolus with the use of three screws. No flexor tendon (or any other anatomical element) was found entrapped and that certainly must have facilitated the effortless reduction of the dislocation. A tibiofibular syndesmosis screw was then inserted (through a small incision on the lateral part of the ankle) in order to secure the reduction. The stress radiographs that were obtained in the operating room, confirmed the stability of the ankle. After the operation, a plaster splint (below the knee) was applied with the ankle in neutral position, and antibiotics were administered intravenously in order to eliminate the potential hazard of infection.

Two days post-operatively, the ankle was inspected and new x-rays were obtained that showed the maintenance of the reduction (Figure 3). No signs of skin ischemia or infection were apparent. Nevertheless the administration of antibiotics continued for another five days. The patient was then allowed to walk with crutches with no weight-bearing on the affected side. The sutures were removed on the 14th post-operative day. The syndesmosis screw was removed under local anesthesia at the sixth week and the patient was permitted full weight bearing (with the use of two crutches) in a walking cast for another two weeks. At eight weeks post-operatively the cast was removed and full weight bearing was allowed.

Two years after the injury, the patient has full and painless range of motion of the ankle joint and is able to perform all his usual everyday activities without any restriction (Figure 4). Moreover he refuses to remove the metal-ware from the medial malleolus.

Discussion

This type of injury of the ankle joint that combines both axial loading and rotatory stress seems to be extremely rare. The exertion of a combined axial and twisting force of relatively high energy through the foot would usually result in a pilon type of fracture pattern. Nevertheless, in this case, the rotation of the ankle caused the complete rupture of the tibiofibular syndesmosis and the fracture and avulsion of the medial malleolus. As a result the tibia and the fibula were separated at their distal ends and the tibia was further externally rotated. The axial stress, instead of fracturing the distal parts of the tibia and/or the fibula, caused their plantar-wards displacement. The fractured medial malleolus together with its attached intact deltoid ligament must have acted as a barrier that prevented the flexor tendons from dislocating and entering into the ankle joint. This type of fracture-dislocation is probably bound to happen in patients with 'healthy and strong', non-osteoporotic bones, provided that the force that is exerted is of high (but not of extremely high) velocity and that the time period through which it is exerted is somewhat elon-

Figure 3. Immediate postoperative standard anteroposterior and lateral radiographs of the ankle in a plaster splint.

Figure 4. Standard anteroposterior and lateral radiographs of the patient's ankle, two years post-operatively.

gated. The latter allows the 'protection' of the bone through the absorption of the stress from the adjacent ligaments and their subsequent rupture.

A similar mechanism seems to have lead in the development of a somewhat alike, but not identical, fracture that was described by Adla et al.[2] They reported a superior and central 'divergent' fracture-dislocation of the ankle joint in a 23 year-old man. Our patient had suffered an anterior-superior 'divergent' fracture-dislocation of the ankle. These types of injuries seem similar, but they are actually quite different, when taking into account the actual position of the talus in both cases. In our case the talus was dislocated anteriorly and superiorly, whereas in the patient reported by Adla et al.[2] anteriorly and centrally.

Several classifications have been proposed in order to accurately describe the ankle injuries (fractures and fractures-dislocations). The Lauge-Hansen[3] and the Danis and Weber[3] are the ones most frequently used. However, the type of fracture-dislocation that is hereby presented as well as the one reported by Adla et al.[2] cannot be categorized in any of the pre-mentioned classification schemes. It is our belief that a new classification scheme could be introduced in order to best describe this type of injury that combines: complete rupture of the tibiofibular syndesmosis, plantar-wards displacement of the tibia and fibula and dislocation of the talus. This 'divergent fracture-dislocation of the ankle' could be categorized in three distinct types according to the pattern of displacement of the talus. Type A is a 'divergent' anterior-superior fracture-dislocation similar to the one reported hereby. The talus is displaced anteriorly and superiorly and the split tibiofibular syndesmosis allows the tibia and fibula to move plantar-wards. Type B is a 'divergent' superior-central fracture-dislocation as the one reported by Adla et al.[2] The talus is displaced centrally and superiorly and again the tibia and fibula are displaced plantar-wards. Type C is a 'divergent' superior-posterior fracture-dislocation, where the talus is displaced posteriorly and the tibia and fibula plantarwards. We believe that the main reason for that is that the extensor tendons and mainly anterior tibialis prevent the anterior movement of the tibia. Nevertheless this type of fracture-dislocation is possible to take place and to be reported in the future. The fracture of either malleoli is probably of no importance as far as this new classification scheme is concerned. Nevertheless it is of great significance as far as the treatment modalities are concerned, as a fractured and avulsed malleolus may render the reduction of the dislocation extremely difficult in cases that the flexor tendons are subsequently luxated and entrapped.

Immediate surgical reduction and fixation of this fracture-dislocation is highly recommended[2]. A Computer Tomography scan could be helpful in determining the actual extent of the injury. Magnetic Resonance Imaging could also be useful in order to evaluate and locate the exact position of the flexor tendons. Nevertheless, either or both (especially when they are not performed promptly) are certainly not necessary as plain radiographs provide enough information and any delay in the treatment could influence the end-term result by increasing the infection hazard and by elongating the actual time that the joint remains dislocated.

This type of fracture-dislocation that combines complete rupture of the tibiofibular syndesmosis, plantar-wards displacement of the tibia and fibula and dislocation of the talus, with or without fracture of either malleoli is certainly extremely rare and according to the best of our knowledge has never been reported before.[4-9] Nevertheless, it could be considered as unrealistic to propose to reclassify ankle fractures on the basis of only two rare injuries. Moreover type C fracture-dislocation has not yet been reported in the literature. It is certainly not our intention to reclassify ankle fractures. The hereby proposed classification scheme attempts to best describe these rare injuries only and it is based on two existing cases and a possible third type of fracture-dislocation that will be probably reported in the future.

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