The Journal of Foot & Ankle Surgery xxx (2017) 1–4

Contents lists available at ScienceDirect

The Journal of Foot & Ankle Surgery

journal homepage: www.jfas.org

Case Reports and Series

Low-Energy Hawkins Type III Talar Neck Fracture-Dislocation With Neurovascular and Tendon Entrapment in a Pediatric Patient

Yusuf Onur Kızılay, MD, Onur Aytan, MD

Orthopedics and Traumatology Surgeon/Specialist, Turan & Turan Bone and Joint Surgery Clinic, Osmangazi, Bursa, Turkey

ARTICLE INFO

Level of Clinical Evidence: 4

Keywords:
avascular necrosis
children
neurovascular entrapment
talus fracture
tendon entrapment

ABSTRACT

Several serious complications can occur after talar neck fractures. However, these fractures are extremely rare in children. We present a pediatric low-energy Hawkins type III fracture-dislocation that had excessive displacement accompanied by neurovascular and tendon entrapment. A 9-year-old male patient referred to our hospital 5 hours after jumping off a swing in a children's playground. An excessively displaced talar neck fracture-dislocation was observed at the initial evaluation. The patient underwent urgent surgery. The tibialis posterior flexor digitorum longus tendons, posterior tibial artery, and tibial nerve were entrapped at the fracture site. The talar neck fracture was reduced using open reduction. The neurovascular structures and tendons were removed from the fracture site. The fracture was fixed using two 4.5-mm cannulated screws. The patient was able to bear full weight at 10 weeks postoperatively. At 6 months, the patient was able to walk unassisted with full ankle range of motion. However, at 2 years, his American Orthopaedic Foot and Ankle Society Ankle-Hindfoot scale score had decreased to 72 points, and we observed avascular necrosis in the talar head. In conclusion, talar fractures are rare but can lead to serious complications. In the pediatric population, even low-energy trauma, such as had occurred in our patient, can result in severe displaced fracture-dislocations. After severe displaced fracture-dislocations, important soft tissue structures can become entrapped between fracture fragments, and surgeons should be aware of this situation when considering using closed reduction.

The talus has a unique anatomy and plays a critical role in ankle function. Fracture of this bone was first reported by Fabricious of Hilden, in a man who had fallen from a wall in the opera >400 years earlier in 1608 (1). From that date, several studies have been reported. From these data, it is clear that these fractures can result in high complication rates, depending on fracture displacement and energy of the trauma (2–6). In general, displaced talar neck fractures are considered an orthopedic emergency because of the high risk of avascular necrosis after these fractures. However, talus fractures are rare in children. These fractures were reported with an estimated prevalence of 0.008% of all pediatric fractures (7).

In 1970, Hawkins (8) classified these fractures into 3 groups. Canale and Kelly (9) modified this classification and added a fourth group. Using these classification systems, the complication rates and energy of the trauma increase with the grade of the fracture. Thus, type I fractures occur from low-energy trauma. The other types usually result from high-energy trauma, such as motorcycle accidents or a fall from a height (10–12).

Several soft tissue injuries can accompany talus fractures (13). Open injuries, tendon rupture, and nerve injuries have been reported (13–15). In our study, we present the case of a displaced low-energy Hawkins type III talar neck fracture concomitant with tendon and neurovascular entrapment. We believe this case was unique because high-grade talar neck fractures usually occur after high-energy trauma, and, to the best of our knowledge, this type of neurovascular and tendon entrapment have not been previously reported in the pediatric population.

Case Report

A 9-year-old male patient was referred to our hospital 5 hours after jumping of a swing in a children's park. At the initial evaluation, he had a deformed and swollen ankle (Fig. 1). On physical examination, we palpated a displaced talar body fragment on the posteromedial side of the ankle. The capillary filling time was normal in the digits; however, could not palpate the tibialis posterior pulse. In addition, the plantar sensory examination findings were hypoesthetic. We did not perform closed reduction in the emergency room because we believed the posteromedial displacement of the talar body fragment

Financial Disclosure: None reported.
Conflict of Interest: None reported.
Address correspondence to: Yusuf Onur Kızılay, MD, Turan & Turan Bone and Joint Surgery Clinic, Muradiye mahallesi Bahribaba Vakıf İşhanı Çekirge caddesi No. 1, Osmangazi, Bursa 16050, Turkey.
E-mail address: onurkizilay@yahoo.com (Y.O. Kızılay).

1067-2516/$ - see front matter © 2017 by the American College of Foot and Ankle Surgeons. All rights reserved.
http://dx.doi.org/10.1053/j.jfas.2017.05.007

Fig. 1. Clinical appearance of the patient in the emergency room.

could have damaged the neurovascular structures. The initial radiographs showed a displaced talar neck fracture with subtalar and tibiotalar dislocation. The talar body fragment was displaced posteromedially and had rotated backward (Fig. 2). The fracture was classified as type III using the Hawkins classification (8). Computed tomography images were not taken to protect the young patient from unnecessary radiation and save time before surgery. The patient was taken to the operating room immediately. The surgery was performed using a tourniquet. After skin preparation, a 5-cm curvilinear incision starting 1 cm above the medial malleolus was made. The incision was extended to the navicular bone. After superficial dissection, we observed that the talar body fragment was displaced behind the tibialis posterior and flexor digitorum longus tendons (Fig. 3). The

Fig. 2. Initial radiographs of the patient.

Fig. 3. Intraoperative images demonstrating the talar body fragment displaced beneath Achilles tendon. The tibialis posterior and flexor digitorum longus tendon were entrapped between the fracture site. Also, the tibialis posterior artery and tibial nerve were entrapped between the talar body fragment and the calcaneus.

tibialis posterior artery and tibial nerve were entrapped between the fragment and calcaneus. Also, neurovascular structures were very close to the sharp ends of the talar body fragment (Fig. 3). The medial malleolus was fractured (Salter-Harris type III fracture) that was not visible on the initial radiographs. We used this fracture interval to visualize and reduce the fracture. We did not need to dissect through the deltoid ligament; thus, we did not damage the vascular supply to the talus. The entrapped tendon and neurovascular structures were removed from the fracture site and protected. The talar body fragment was reduced anatomically, and two 4.5-mm partial threaded cannulated screws were introduced in distally to medially and proximally to laterally to the talar body to fix the fracture. The medial malleolar fracture was fixed using two 1.8-mm Kirschner wires (Fig. 4). The wound was closed, and sterile dressings were applied. After surgery, the plantar sensation and capillary filling were normal. A posterior splint was used for 2 weeks. After removal of the sutures, a short leg cast was applied and continued for another 4 weeks. After cast removal, the patient was encouraged to perform active and passive range of motion exercises with physical therapy and to partially bear weight using crutches.

The patient was able to bear full weight and bony union was achieved at 10 weeks. We did not observe the Hawkins sign at this point. At 6 months postoperatively, the patient was able to walk unassisted with full ankle range of motion (Fig. 5). The American Orthopaedic Foot and Ankle Society (AOFAS) Ankle-Hindfoot scale score was 90 at this point, and the patient was nearly pain free (Fig. 6). We offered to remove the Kirschner wires, but patient's parents refused the second surgery. At the 1-year follow-up examination, the AOFAS Ankle-Hindfoot scale score was 80, and the patient complained of some pain around the ankle. Radiographs showed some sclerosis and degenerative changes in the talar head, which were probably the reason for the avascular necrosis of the talar head (Fig. 7). At 18 months after surgery, the Kirschner wires were removed because