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Closed reduction with external fixation and percutaneous screwing in talus neck fractures with severe soft tissue edema: A case report

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Abstract

We herein report a patient with a Hawkins type 3 talus neck fracture because of a traffic accident. A 21-year-old male patient had excessive soft tissue edema in his ankle and suspicious COVID-19 findings in thorax chest computed tomography. Therefore, spinal anesthesia was administered to the patient for the operation, in addition to intravenous midazolam for sedation. Under external fixation, the ankle joint was distracted, and the fracture was reduced. The fracture was fixed percutaneously with two cannulated screws. The operation was completed with two one-centimeter incisions. There was no postoperative edema. The patient was discharged with an external fixator one day later. Percutaneous screwing after closed reduction with external fixation can be a successful method in patients with soft tissue edema.

Keywords: Talus neck fracture, Covid-19, Percutaneous screw

Introduction

Talus plays a key role in a significant part of foot and ankle movements. However, intraosseous blood supply is insufficient in the talus, which is fed by the tibialis posterior and peroneal arteries extraosseously [1, 2]. The blood supply of this bone is significantly affected by the fracture displacement ratio and the dislocation of the subtalar-navicular joint [3, 4].

Talus neck fractures are uncommon and are mostly caused by high-energy trauma. Soft tissue lesions, other bone fractures and life-threatening injuries may accompany this condition [5]. Diagnosis is usually made with AP and lateral x-rays. Computed tomography (CT) can also be used to better understand the presence of other accompanying bone pathologies and fracture morphology.

The treatment of talus neck fracture is one of the orthopedic emergencies. While casting may be sufficient in type 1 fractures that are not displaced, fixation with compression screws after open reduction is required in types 2, 3, and 4.

Due to the presence of severe ankle edema in our case, closed reduction and percutaneous screwing were preferred.

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Informed Consent
The authors stated that the written consent was obtained from the patient presented with images in the study.

Conflict of Interest
No conflict of interest was declared by the authors.

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Case presentation

A 21-year-old male patient was brought into the emergency department after an in-vehicle traffic accident. His left ankle was tender, painful, and edematous. There was pain in the left hip upon examination. Trauma series and chest tomography were obtained. Radiographs showed a left Hawkins type 3 talus neck fracture and a non-displaced fracture posterior to the left acetabulum (Figure 1). The ankle was splinted and elevated after an immediate closed reduction. The patient was admitted to the Covid hospital for surgery after his lung tomography revealed suspicious Covid-19 findings.

Because the patient was suspected of having Covid-19, it was decided to give him spinal anesthesia. Closed reduction and percutaneous pinning were aimed due to excessive edema in the ankle. A triangular system external fixator was placed with two screws, one on the proximal tibia and one on the calcaneus distally. The distal screw was locked. The proximal one was released, and straight traction was performed by holding the distal screws. Meanwhile, intravenous midazolam was administered by the anesthesiologist for muscle relaxation to aid the reduction. After a strong straight traction, the proximal gears were locked so that the ankle remained in distraction. The proximal screws were locked after a strong straight traction to keep the ankle distracted. Following foot dorsiflexion, reduction was completed by pressing from the medial side with plantar flexion. Fluoroscopy control confirmed that the fracture was completely reduced. Following that, two mini-incisions were made from the distal, lateral and medial parts anterior to the talus, and guide k wires were placed under fluoroscopy. The fracture was fixed with two 5.0 headless compression screws (Figure 2, 3, 4). Then the distraction of the external fixator was neutralized, but the fixator was not removed for soft tissue healing (Figure 5). He was discharged on the first postoperative day. There was no additional edema. Informed consent was obtained from the patient's family for scientific presentation.

Figure 1: Preoperative lateral ankle x-ray shows a Hawkins type 3 talus fracture (arrow)

Figure 2: Postoperative lateral x-ray shows two cannulated screws

Figure 3: Postoperative antero-posterior X-ray

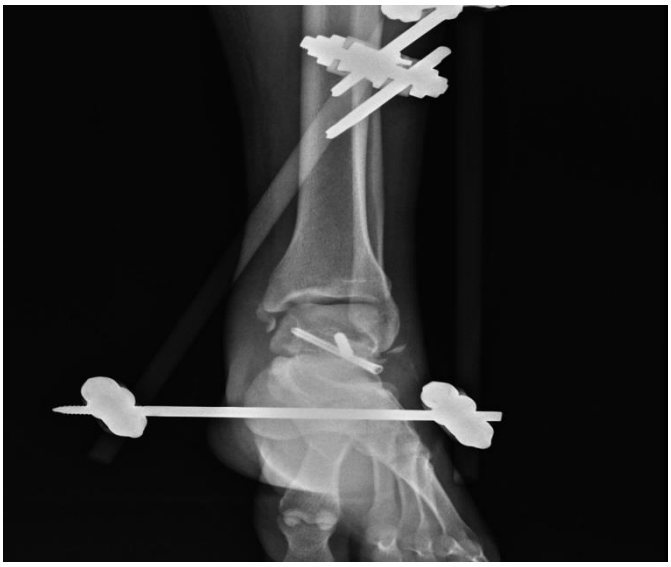

Figure 4: Postoperative CT scan sequence shows the joint

Figure 5: 15th day after the operation. Ankle before the removal of the external fixator

Discussion

Talus neck fractures usually occur as a result of axial loading while the foot is in dorsiflexion [6, 7]. This mechanism was classified by Hawkins according to the degree of displacement of the fractures.

Hawkins [7] published the surgical results of 57 talus fractures in 55 cases in his study in 1970. Avascular necrosis (AVN) did not develop in non-displaced fractures (type 1) and all fractures united without problems. In type 2 fractures with subtalar joint dislocation, nonunion was not observed, but AVN was observed at a rate of 42%. In type 3 fractures accompanied by both subtalar and tibiotalar joint dislocations, the rates of nonunion and AVN were 11% and 91%, respectively. Due to the high rates of nonunion and AVN, the treatment of talus neck fractures should be performed urgently, and anatomic fixation should be aimed to the best.

Canale and Kelly [8] evaluated 71 talus neck fractures clinically and radiologically in 70 patients followed for a mean of 12.7 years. In this study, cases with type 1 fracture with AVN were also reported, but the clinical results of these cases were evaluated as very good. In type 3 fractures, the clinical outcome was closely related to the reduction of the subtalar dislocation and fractured fragments. Based on this, the main goals must be to evaluate all talus neck fractures carefully, avoid leaving subluxated joints after the operation, and ensure that all fracture parts have as much anatomical alignment as possible. It should also be kept in mind that clinical results may be good following fracture union, independent of AVN.

No matter how perfect the fracture fixation is, the accompanying soft tissue lesion can always bring along progressive additional problems. Due to the advanced soft tissue edema in our case, we performed a closed reduction by the percutaneous pinning technique, which is not actually preferred in type 3 fractures. Sherif Mohamed Abdelgaid and Farid Fouad Ezzat [5] reduced 16 talus neck fractures, mostly type 2 and 3, with a t-handle in 2012, then reported an 87% success rate with percutaneous screwing. We performed this reduction with an external fixator, which we believe allows to approach the broken talus fragments and soft tissue more carefully. However, we think that extensive case series are needed to comment on the results.

While general anesthesia is preferred in such cases, in patients with suspected Covid-19 infection, spinal anesthesia and a sedative agent may be sufficient for the surgeon to achieve closed reduction. The fractures of the talus neck may highly likely develop AVN, and urgent intervention is required. Therefore, the recovery of soft tissue edema should not be waited. Closed reduction with an external fixator and percutaneous pinning may be an alternative to open reduction in ankles with soft tissue problems in talus neck fractures. In addition, we think that the external fixator we placed may contribute to soft tissue healing.

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