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Case Report

Open Fracture-Dislocation of the Talar Body Concomitant with the Anterior Talofibular Ligament Rupture: A Case Report and Literature Review

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Abstract

Background: The talus bone is the second-largest bone in the tarsal region. Talar fractures are rare injuries that occur due to high-energy traumas. Open reduction and internal fixation (ORIF) is the treatment of choice in the talar body fracture-dislocation. Avascular necrosis (AVN), osteoarthritis (OA), malunion, non-union, skin infections, and ankylosis of the subtalar joint are complications that can happen following the talar body fracture.
Case Report: We reported a rare open fracture-dislocation of the talar body concomitant with the anterior talofibular ligament (ATFL) rupture in a 24-year-old motorcyclist man. ORIF with two 4.5 mm cancellous screws and ATFL repair were performed. After 6 months of follow-up, the radiographic bone union was achieved, and the patient had no complaints of pain, disability, and discomfort.
Conclusion: According to the blood supply of the talus bone, appropriate management and follow-up should be considered to prevent severe consequences. Due to the lack of literature on this lesion, in this report, we tried to provide more comprehensive information regarding the diagnosis, treatment, and follow-up of this group of patients. To the best of our knowledge, our case will probably be the second case of the talar body fracture concomitant with rupture of the ATFL.

Keywords: Talus; Tarsal Bone; Lateral Collateral Ligaments; Open Fracture Reductions; Internal Fracture Fixations

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Background

After the calcaneus, the talus bone is the largest in the tarsal region. Three major arteries supply blood to the tarsal bones, including anterior and posterior tibial and peroneal arteries. Most of the blood supply to the body of the talus is provided from branches of the posterior tibial artery (1).

In closed fractures of the talus bone, swelling and hematoma around the ankle can be seen (2). Open fractures are more prone to displacement. In these cases, immediate surgical debridement should be performed in the surgery room (1). Compartment syndrome should be considered in comatose patients with soft tissue damage (3).

As with all orthopedics procedures, the anteroposterior (AP) and lateral radiographs, computed tomography (CT) scan, and magnetic resonance imaging (MRI) in soft tissue injuries are helpful (1). Both non-operative and operative treatments can be considered. In un-displaced fractures, non-ambulatory patients, and in the situations that patients could not tolerate surgery, non-operative treatment by short leg casting for six weeks should be performed (3).

For better exposure in talus body fixation, two approaches (anterolateral and posteromedial) are required. In the posteromedial approach, medial malleolus osteotomy is needed for better accessibility which can lead to complications such as non-healing wounds and non-union of the medial malleolus. Here, we reported a rare case of open fracture-dislocation talar body fractures in a 24-year-old healthy man following a motorcycle accident. Intraoperatively, we noted that the anterior talofibular ligament (ATFL) was ruptured. Due to the ATFL rupture, a single approach (anterolateral) was used for fixation, which is the advantage of our case.

Case Report

A 24-year-old motorcyclist man was brought to the emergency room after an accident. On presentation, he was in a stable cardiovascular state and had a Glasgow Coma Scale (GCS) of 15. Any significant past medical history, as well as the history of surgery, was not mentioned. Smoking and drug addiction was denied.

Clinical examination revealed some lacerations on his face, hands, and feet and a wound on the anterolateral aspect of his right ankle. The wound measured 5 × 2 cm (Figure 1). It was classified as type II according to the Gustilo-Anderson classification. No neurovascular deficit was noticed. There were no other associated musculoskeletal injuries.

Figure 1. The 5 × 2 cm wound on the right ankle

AP and lateral ankle radiographs demonstrated a talar body fracture-dislocation (Figure 2).

Further investigations for ruling out life-threatening symptoms in terms of brain and vital organ damage were performed, which did not reveal any specific problem. He was hospitalized with the diagnosis of open fracture-dislocation of the right talus.

Figure 2. Anteroposterior (AP) and lateral radiographs of the ankle demonstrating a talar body fracture-dislocation

After all, the patient underwent surgery under spinal anesthesia. He was positioned supine, the original wound was extended as an anterolateral approach to the talar bone, and debridement was initiated. Rupture of the ATFL from the distal attachment to the lateral process of the talus was detected intraoperatively. As the ATFL was ruptured, we could approach the talus bone through the same incision without needing an extra anteromedial approach. The fracture site was freshened with a curette. Open reduction and provisional fixation with two Kirschner wires (K-wires) was performed, and then internal fixation was done with two crossed 4.5 mm cancellous screws passing from the anterolateral to posteromedial (Figure 3). The reduction was checked by C-arm, which was successful.

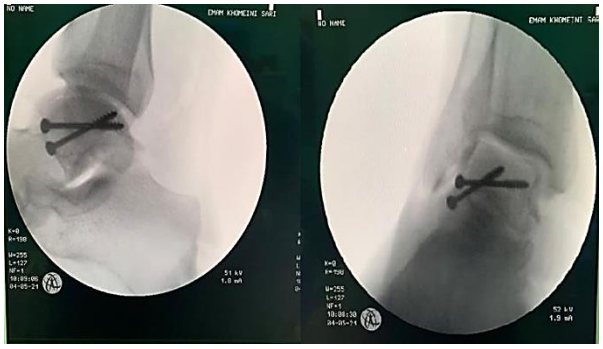

Figure 3. Fixation with two 4.5 mm cross-cancellous screws

The ruptured ligament was sutured back to the lateral process with Ethibond thread intraosseously. After repairing the lateral ligament complex of the ankle, the wound was sutured, and a below-knee splint was applied.

Postoperatively, 2 g intravenous (IV) cefazolin three times a day (TDS) and 80 mg IV gentamicin TDS were prescribed. The patient was hospitalized in the orthopedic ward for two days, and wound dressings were checked daily. As there were no signs of infection, and we ensured adequate vascularity of the foot, the patient was discharged after two days with an oral antibiotic. After two weeks, the sutures were removed, and a short leg cast was applied for ten weeks. Weight-bearing was not allowed during this time. After 3 months of follow-up, the radiographic union was achieved. Progressive weight-bearing was resumed after that.

The patient was followed up for one year postoperatively and did not have any complaints of pain or disability. No avascular necrosis (AVN) of the talus occurred at the last follow-up examination.

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Discussion

About one percent of all fractures and 3 to 6 percent of foot fractures are related to the talus fractures (1). Talar body fractures make up 13% to 23% of talar fractures (4, 5). The main cause of these fractures is high-energy trauma such as motor vehicle accidents or falls from height (4). Here, we reported a rare case of displaced talar body fracture concomitant with ATFL rupture due to a motor vehicle accident.

Osteoarthritis (OA) and AVN are two major complications associated with talar body fractures, so that the association of head or neck fractures with body fractures increases the probability of these complications (6). AVN or osteonecrosis usually leads to the destruction of joint surfaces if it involves the bony components of the joint (7). The severity and range of tibiotalar joint damage are related to the incidence of AVN, so that with joint dislocation, the risk is 50%, and without dislocation, it is 25%, and about 50% of patients with body fractures also develop OA (5). Other complications such as malunion, non-union, skin infections, and ankylosis of the subtalar joint may also happen (1). In our case, although we faced a fracture-dislocation injury, fortunately, no complications were observed until the last follow-up examination.

Treatment of talar body fractures in the absence of dislocation can be conservative, but in cases with dislocation, open reduction and internal fixation (ORIF) is the treatment of choice (6). We also used this technique.

Based on a study by Golano et al., the most common ligament injury in the ankle is related to the ATFL (8). Anatomically, the ankle ligaments are divided into three groups: the lateral collateral ligament (LCL) complex, the medial collateral ligaments (MCL), and the ligaments of tibiofibular syndesmosis (8). The ATFL is placed in the LCL group, and it is the weakest one among other ligaments in this group. ATFL passes from the anteroinferior margin of the lateral malleolus to the front of the lateral articular facet of the talus bone (9) and typically consists of two bands separated by the perforating peroneal artery branches and its anastomosis with the lateral malleolar artery (8).

This ligament has a role in limiting the anterior displacement of the talus and plantarflexion of the ankle (9). Naturally, this tendon is almost horizontal, but in dorsiflexion and plantarflexion, its position changes and is placed in the upward and downward position, respectively. In plantarflexion, the ligament is pressed, and the risk of injury increases (8). Ankle ligament injuries are shown with symptoms such as tenderness over the injured ligament, swelling around the site of involved ligament, and limited weight-bearing due to the pain (10).

Delayed physical examination is the gold standard for diagnosing lateral ankle ligament injury. Swelling, hematoma, positive anterior drawer test, and localized pain are some features that should be considered in physical examinations (11).

In the early days, when there is pain and swelling, Rest, Ice, Compression, and Elevation (RICE) therapy can be the treatment of choice (12). There are different theories about early mobilization or short-period immobilization. Surgical repair can be a choice in situations that we face with chronic injuries to the LCL (11).

We found only limited articles in the literature that reported ATFL with or without association with bone fractures. Gordon et al. first described 11 cases of young athletic adults who experienced LCL injury in 1976. Among them, one case had a minimal avulsion fracture of the lateral malleolus. The primary diagnosis was tearing of the lateral ligament and a minimal avulsion fracture of the lateral malleolus, but intraoperatively, they noticed that both ATFL and calcaneofibular ligament (CFL) were completely avulsed from the lateral malleolus (13). Wang et al. reported a rare case of talar body fracture combined with traumatic rupture of the ATFL and peroneal longus tendon, in 2004, for the first time (5). In most cases, ATFL rupture was diagnosed before the surgery. Wang et al. reported a case in which intraoperatively, they noticed the rupture of ATFL (5). All cases reported a traumatic rupture of ATFL, and none of them was a pathologic rupture. All the studies that have been published so far reported acceptable results in their follow-ups, and all patients returned to their previous activity successfully. No complications about ATFL rupture have been reported until now. Literature focusing on cases with talar body fracture concomitant with ATFL rupture is rare.

To the best of our knowledge, only one report has been associated with this injury. Our case will probably be the second case of the talar body fracture concomitant with rupture of the ATFL. On the other hand, we have used the single approach technique for this patient. Considering our experience, with this approach, in cases where the open dislocation fracture of the talus in the lateral part of the ankle joint is accompanied by an ATFL or CFL tear, we can access the articular surface fracture in the posterior part of the talus body without the need for lateral malleolus or medial malleolus osteotomy.

Table 1. Summary of published observations

Authors (year)	Age/sex	Primary diagnosis	ATFL rupture diagnosis	Management of ATFL rupture	Result
Gordon et al. (13) (1976)	16/male	Complete tear of the lateral ligaments (ATFL + CFL) after falling into the hole while playing football	Stress X-ray was used for diagnosis of the lateral ligaments tear; the tear was seen intra-operatively too	Primary repair	Good after 8 weeks of follow-up
	19/male	Abnormal talar tilt on the right side due to falling from a height	A stress X-ray revealed an abnormal talar tilt on the right side	Open repair	Good after 8 weeks of follow-up
	19/male	Increased talar tilt on the right side due to recurrent injuries to his right ankle	Stress X-ray revealed an increased talar tilt on the right side	Primary repair + Watson-Jones technique	Good time of the follow-up was not mentioned
	29/male	Abnormal talar tilt on the left side due to ankle sprain	A stress X-ray revealed a positive talar tilt on the left side	Open repair	Good after 8 weeks of follow-up
	17/male	Abnormal talar tilt on the right side due to an inversion injury to his ankle while playing football	A stress X-ray revealed an abnormal talar tilt on the right side	Open repair	Good after 8 weeks of follow-up
	16/male	Abnormal talar tilt on the right side and lateral instability due to an inversion injury to his right ankle	Stress X-ray revealed abnormal talar tilt and lateral instability on the right side	Open repair	Good after 8 weeks of follow-up
	20/male	Tear of the lateral ligament and a very minimal avulsion fracture of the lateral malleolus	Intraoperatively, they noticed that ATFL was completely avulsed	Not mentioned	Good after 8 weeks of follow-up
	14/female	Acute tear of the lateral ligament (ATFL + CFL) due to gymnastic exercise	Stress films and arthrogram	Open repair	Good after 8 months of follow-up
	20/male	Tear of the lateral ligament (ATFL + CFL) and deltoid ligaments due to a car accident	Stress films and arthrogram	Open repair	Good after 6 months of follow-up
	24/male	Tibiotalar tilt on the right side due to an inversion while playing volleyball	Stress X-ray revealed abnormal talar tilt and lateral instability on the right side	Open repair	Good after 10 weeks of follow-up
	16/male	Complete tear of the lateral ligaments (ATFL + CFL) after falling into the hole while playing football	Stress X-ray was used for diagnosis of the lateral ligaments tear; the tear was seen intra-operatively too	Primary repair	Good after 8 weeks of follow-up
	28/male	Disruption of ATFL + CFL and anterolateral joint capsule due to falling off a loading platform of 4 feet	Stress X-rays and intraoperatively	Open repair	Good after 10 weeks of follow-up
Wang et al. (5) (2004)	40/female	A displaced talar body fracture due to falling from a height	Intraoperatively	End-to-end repair	Good after 2 years of follow-up
Zelent and Neese (14) (2006)	26/male	An oblique medial malleolar fracture with a lesion present in the talar dome laterally due to falling from a height	MRI revealed complete rupture of the ATFL and CFL + completely detached osteochondral fracture at the talar dome	Anatomical reduction	Good after 9 months of follow-up
Yurttas et al. (15) (2009)	12/male	Frank posteromedial dislocation of the talus without associated fracture due to ankle injury while running	MRI revealed ATFL rupture	Conservative management	Good after 1 month of follow-up
Haverkamp et al. (16) (2014)	48/male	Grade III lateral and medial ligament injury due to snowboard injury	MRI revealed a rupture of the ATFL + an intact CFL and PTFL + complete rupture of both the superficial and deep deltoid ligaments	Tightening of the ATFL by mattress suturing	Good after 6 months of follow-up
Hunter and Bowlin (17) (2015)	56/male	A comminuted intra-articular fracture of the medial malleolus due to falling from a height	MRI revealed a rupture of the Achilles tendon + displaced and entrapped posterior tibial tendon + complete tear of the ATFL	Conservative management using cast immobilization	Unable to follow-up
Lee et al. (18) (2019)	16/male	Vertical fracture line in the medial malleolus due to ankle sprain	MRI revealed mild bone marrow edema in the medial malleolar area + total rupture of the ATFL	Broström procedure	Good after 3 months of follow-up
Chun et al. (19) (2019)	20/male	Total rupture of the lateral ligament complex with open wound due to an inversion injury while playing basketball (both cases)	The lateral ligaments and torn capsule were visible through the wound (both cases)	Repair with sutures (both cases)	Good after 9 months of follow-up
	21/male				Wound infection and skin necrosis 2 weeks after surgery but good after 10 months of follow-up

ATFL: Anterior talofibular ligament; CFL: Calcaneofibular ligament; PTFL: Posterior talofibular ligament; MRI: Magnetic resonance imaging

In this way, without any additional damage to the vessels supplying blood to the talus bone, it is possible to fix the bony parts and repair the mentioned ligaments that are responsible for the stability of the ankle joint. However, it is not far-fetched that, like any other surgical technique, there are disadvantages to this method. According to our experience, lack of access to the medial part of the talus articular surface and control of reduction in terms of rotation and angulation are among the disadvantages of this technique. To our knowledge, none of the previous studies have reported the use of this approach.

In our case, the patient had no history of previous surgery or significant past medical history. Besides, he was not an addict or smoker. We were faced with a type II Gustilo-Anderson open fracture-dislocation. The diagnosis of the ATFL rupture was realized intraoperatively. The ruptured ligament was sutured back to the lateral process with Ethibond thread intraosseously. He had a good outcome at the one year of follow-up. We have briefly described some of the previous reports in table 1.

Conclusion

According to the blood supply of the talus bone, appropriate management and follow-up should be considered to prevent severe consequences such as AVN. In the cases with wounds, urgent debridement and antibiotic injection should be performed.

Due to the lack of literature on this lesion, in this report, we tried to provide more comprehensive information regarding the diagnosis, treatment, and follow-up of this group of patients.

We hope our case and previous reports can be helpful for other colleagues who are faced with this situation.

In this study, we were faced with limitations such as the lack of sufficient studies in this field and the lack of proper patient cooperation for long-term follow-up, which is necessary to mention.

Conflict of Interest

The authors declare no conflict of interest in this study.

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