

# Combined Ipsilateral Fracture of the Tibial Pilon, Talar Body, and Calcaneus: Outcome at 4 Years

## Abstract

Combined fractures of the talar body and the adjacent bones are rare. We present a case of a 35-year-old male with a complex foot and ankle trauma resulting in an unusual combined ipsilateral fracture of the anterolateral tibial plafond, talar body, and sustentaculum tali of the calcaneus. To the best of our knowledge, this particular combination of fractures has not yet been reported in the literature. The combination of talar body fracture with fractures of the adjacent bones was treated by a bilateral open reduction with anatomic reconstruction of the joint surfaces resulting in an excellent clinical outcome at 4-year followup.

**Keywords:** Ankle trauma, calcaneus fracture, complex foot trauma, pilon, talar body

**MeSH terms:** Tibia; tibial fractures; calcaneus; fracture fixation, internal

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## Introduction

Combined fractures of the talar body and the adjacent bones are rare.<sup>1</sup> We came across a complex foot and ankle trauma resulting in an unusual combined ipsilateral fracture of the anterolateral tibial plafond, talar body, and sustentaculum tali of the calcaneus. To the best of our knowledge, this particular combination of fractures has not yet been reported in the literature.

## Case Report

A 35-year-old male was admitted to our hospital after jumping down from a truck bed. He landed with his left foot on a tree trunk and suffered a combination of rotation and compression trauma. He presented with a severe swelling around the ankle and hindfoot but without signs of a compartment syndrome. No open wounds were seen. The neurovascular status of the forefoot was intact. Plain radiographs and computed tomography scans were obtained and revealed multiple sagittal fractures of the talar body (Marti type IV) with displacement in the ankle and subtalar joints, an anterolateral fracture of the tibial plafond with multiple depression fragments (AO Type B3 pilon fracture) and a fracture of the sustentaculum tali of the calcaneus [Figure 1].

Surgery was carried out when the swelling had subsided 10 days after the injury. A small medial approach was used directly over the sustentaculum tali.<sup>2</sup> The sustentaculum was approached between the tibialis posterior and flexor digitorum longus tendons.<sup>3</sup> The medial facet of the subtalar joint was cleared from debris, and the fracture of the sustentaculum was fixed with a cortical screw aimed laterally toward the calcaneal body. Subsequently, a curved anterolateral approach including an oblique fibular osteotomy for sufficient overview of the fractured talar body and an easy, stable fibular fixation at the end of the surgery was implemented.<sup>4</sup> Gradual reduction of the sagittal talar body fracture was carried out from medial to lateral using K-wires as joysticks and for temporary fixation [Figure 2].<sup>5</sup> Internal fixation was achieved with three headless compression screws and absorbable pins. Small, comminuted bone fragments not amenable to fixation had to be removed. The impacted joint surface of the lateral tibial plafond was disimpacted gently with an osteotome from the subchondral area and filled with local cancellous bone from the distal tibial metaphysis [Figure 3]. The fibular osteotomy was fixed with a locking plate, and the tibial plafond was stabilized with an anterolateral plate. Intraoperative fluoroscopy showed anatomic reduction of the fractures and physiological alignment of the ankle and hindfoot.

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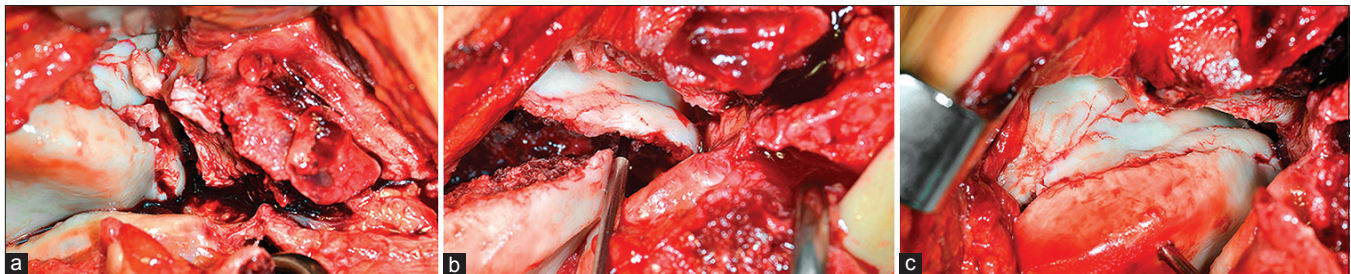
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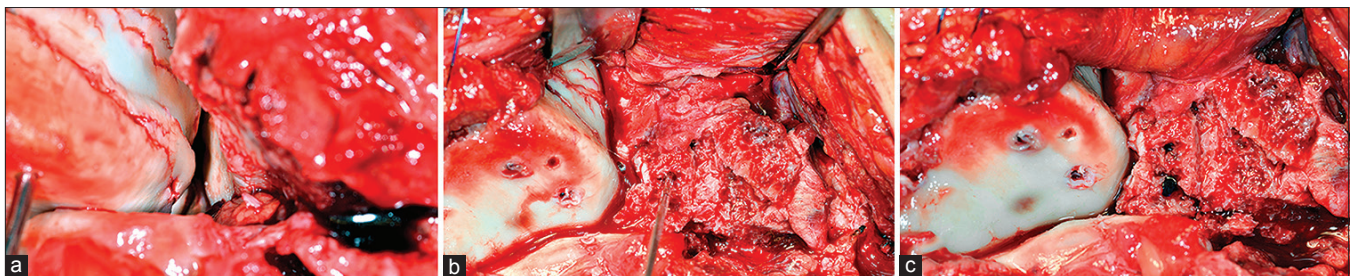




**Figure 1:** Anteroposterior radiograph (a) and computed tomography scans (b) of ankle joint showing multiple sagittal fractures of the talar body, an anterolateral impression fracture of the tibial plafond, and a fracture of the sustentaculum tali of the calcaneum



**Figure 2:** Intraoperative photographs showing the multiple fractured talar body (a) Gradual reconstruction of the talar body from medial to lateral using resorbable pins (b) and K-wires introduced from lateral side (c)



**Figure 3:** Intraoperative photographs illustrating the impacted joint surface of the lateral tibial plafond (a) after disimpaction (b) and filling with cancellous bone grafting from the distal tibial metaphysis (c)

Postoperatively, the leg was immobilized using a split below knee cast until wound healing followed by a circular below knee cast for 6-week postoperatively. The patient was mobilized with 20-kg partial weight-bearing for 6 weeks followed by gradual increase to full weight-bearing within 2 weeks under physical therapy. Three months later, the range of motion at the ankle joint was 10° of dorsiflexion and 25° of plantar flexion and the range of

motion at the subtalar joint was 10° of pronation and 20° of supination. Radiographs at 3 months showed a complete bony consolidation of the fractures [Figure 4]. One year postoperatively, ankle motion was still restricted and the two plates were removed followed by arthrolysis of the ankle joint [Figure 5]. Intraoperatively, a complete cartilage cover of the ankle joint was noted with I° chondromalacia at the lateral tibial plafond, and talar dome was detected.





Figure 4: (a) Anteroposterior and (b) lateral radiographs of ankle joint 3 months after surgery showing a complete bony consolidation of the fractures

At final followup, 4-year postoperatively, the patient reported an excellent subjective outcome. Slight pain was noted only after several hours of riding, long distance running, or soccer matches. Clinical examination revealed a normal gait, no malalignment, and uneventful scars. Range of motion at the ankle joint was 20° of dorsiflexion and 50° of plantar flexion which was identical to the formerly uninjured side. Likewise, subtalar range of motion did not show any side-to-side differences [Figure 6]. The American Orthopedic Foot and Ankle Society Score was 85/100 at the final followup. Weight-bearing radiographs at the time of followup displayed anatomic joint alignment without significant signs of osteoarthritis except for a small osteophyte at the anterior tibial rim [Figure 7].

### Discussion

Talar fractures usually result from high energy trauma due to the considerable forces that are needed to break the strong cortical shell. The majority of talar body fractures involve both the ankle and subtalar joint surfaces and are associated with a high risk of lasting functional restrictions and osteoarthritis.<sup>6</sup>

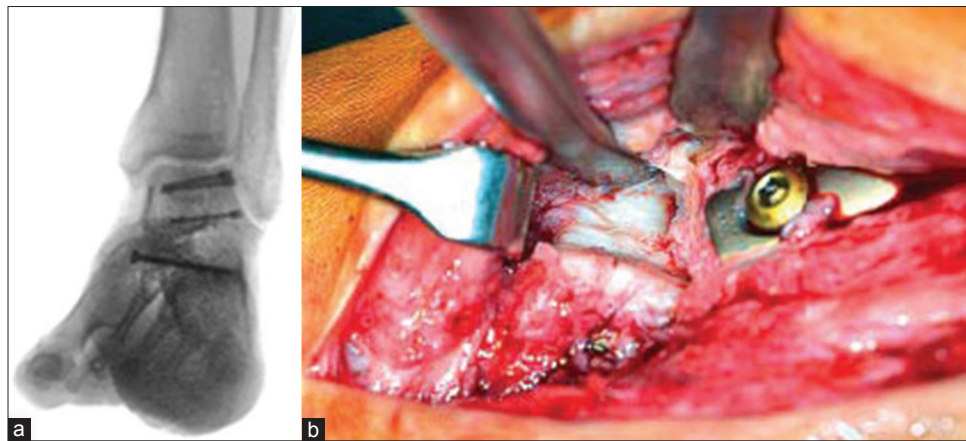


Figure 5: (a) Anteroposterior radiograph after removal of the tibial and fibular plates at 1 year after the accident (b) Intraoperative photograph of the ankle joint showing a full cartilage cover with I° chondromalacia at the lateral tibial plafond and corresponding talar dome



Figure 6: Foot function at 4-year followup. Range of motion at the ankle joint was 50° of plantar flexion (a), 20° of dorsiflexion (b). Range of motion at the subtalar joint was 20° of supination (c) and 10° of pronation (d)



**Figure 7: Anteroposterior (a) and lateral (b) views weight-bearing radiographs 4 years after the surgery showing an anatomic joint alignment without significant signs of osteoarthritis except for a small osteophyte at the anterior tibial rim**

The present case was further complicated by an additional lateral tibial plafond fracture with multiple depression fragments and sustentaculum tali fracture of the calcaneus. To the best of our knowledge, this combination of fractures has not yet been reported. In a thorough review of the scientific literature, we found case series on the combination of talar and calcaneal fractures, case reports on the combination of talar body and tibial plafond fractures as well as one combined talar body, calcaneal, and navicular fracture. It is estimated that 11%–18% of patients with talar fractures also have calcaneal injuries.<sup>1</sup> Behm reported a case of a combined talar body, calcaneal, and navicular fracture after a motocross accident with a good clinical outcome 18 months after open reduction and screw fixation.<sup>7</sup> Faraj and Watters presented a case of combined talar body and anterior tibial plafond fracture as a rare variant of talar body fracture which was operated with a two-incision approach (posteromedial approach with medial malleolar osteotomy and a standard anterolateral ankle approach).<sup>8</sup> In the case presented here, a lateral malleolar osteotomy was needed to gain overview over the fractured lateral talar dome. The combination of a talus and tibia fracture has also been reported by Navarranne *et al.*<sup>9</sup> There are several articles with the combination of talus and calcaneus fractures.<sup>10–12</sup> Furthermore, other groups reported a combination of talar and malleolar fractures<sup>13,14</sup> as well as talar body fracture combined with traumatic rupture of the anterior talofibular ligament and peroneus longus tendon.<sup>15</sup> The present case showed no ligament injury.

Overall, talar fractures occur less commonly than tibial pilon and calcaneal fractures, as the talus is usually the stronger part when it comes to axial trauma with compressive forces across the ankle and/or subtalar joints.<sup>4</sup> To produce a talar fracture, the sustentaculum tali as the strongest part of the calcaneus must act as a fulcrum and the talus as a cantilever between the tibia and calcaneus.<sup>16</sup> Consequently, in the case reported here, the

talar body fracture was accompanied by a fracture of the sustentaculum tali and an irregular fracture of the lateral tibial plafond, most likely due to impaction through the lateral talar dome that was fractured itself because of the high trauma energy.

High energy talar fractures often occur in young patients at the prime of their professional lives.<sup>6</sup> Anatomic restoration of the joint surfaces and axial realignment provides the chance for functional rehabilitation although there are high rates of posttraumatic arthritis.<sup>2</sup> However, not all patients with radiographic signs of arthritis will become symptomatic and require a subsequent fusion. Therefore, anatomic reduction and internal fixation are carried out to preserve as much function as possible in these young patients as neither ankle/subtalar arthrodesis nor total ankle replacement are viable options for them. Combinations of talar body fractures with fractures of the adjacent bones are even more severe injuries. Anatomic open reduction and stable internal fixation lead to an excellent result in this particular patient at a followup of 4 years. This exceptional case shows that meticulous joint reconstruction is well worth the effort in a young and active patient. Bilateral approaches are needed for adequate overview over the ankle and subtalar joints, and a medial or lateral malleolar osteotomy may be necessary to gain access to the fractured talar body.

## Conclusion

This report describes a unique combination of ipsilateral fractures of the tibial plafond, talar body, and sustentaculum tali of the calcaneus, which was treated by a bilateral open reduction with anatomic reconstruction of the joint surface resulting in an excellent clinical outcome at 4-year followup.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his

consent for his images and other clinical information to be reported in the journal. The patient understand that names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

#### Conflicts of interest

There are no conflicts of interest.

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