

Ipsilateral Type IV Closed Talus and Calcaneal Fractures: A Case Report and Review of Literature

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ABSTRACT

Talar and calcaneal fractures are commonly associated with other musculoskeletal injuries and systemic trauma. Both injuries in isolation have a guarded clinical outcome, and are associated with numerous complications whether treated operatively or non-operatively. Few studies, however, have reported cases with ipsilateral closed talus and calcaneal fractures. We report one such rare case presenting with closed ipsilateral type IV talar neck fracture and type IV comminuted intra-articular calcaneal fracture as a result of high energy trauma. Unfortunately the patient had a concurrent vascular injury at the proximal tibia level which ultimately necessitated amputation. Through our report we highlight the universally poor results in such cases and discuss the management options if encountered with such a rare pattern of injury.

Keywords: Ipsilateral, Talus, Calcaneum, Fracture, ORIF.

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INTRODUCTION

Talus and calcaneum are the commonest tarsal bones to be fractured. Isolated talar and calcaneal fractures are serious injuries. The combined effect of an ipsilateral talar and calcaneal fracture is unknown. When occurring in combination, these fractures are typically the result of high-energy injuries resulting in significant comminution, marked fracture displacement and substantial soft tissue damage. Individual isolated fractures of the talar and calcaneal comprise approximately 2% of all lower extremity fractures.¹ Combined ipsilateral calcaneal and talar injuries are extremely rare and have been rarely reported in literature.²⁻⁵ We report one such rare presentation and discuss in detail the management principles in such cases.

CASE REPORT

An unconscious 25 years old male was brought to the emergency trauma room. He had sustained a high velocity road traffic accident 14 hours ago. The bystanders noted that the patient, who was riding a two wheeler vehicle, was hit and run over by a speeding truck. On primary survey, the patient was unconscious, tachypneic and in shock. Resuscitative measures were carried out and vital parameters were stabilized. On secondary survey, multiple bony injuries were recognized. He had sustained a closed left foot injury

along with proximal tibia fracture which was associated with vascular injury. X-rays (Fig. 1) and CT scan (Fig. 2) of the left foot revealed that he had an ipsilateral closed fracture of talus and calcaneum along with medial cuneiform, 2nd, 3rd, 4th and 5th metatarsal heads. The talar fracture was a Hawkins's type IV fracture having a talonavicular dislocation with a talar neck fracture. Calcaneal fracture was comminuted Saunderson's type IV intra-articular fracture. Surprisingly all of these were closed fractures but foot was grossly swollen and showed bluish discoloration. An urgent fasciotomy of foot was done but CT angiography of the left lower limb revealed a concurrent unsalvageable vascular injury at the level of proximal tibia fracture and the limb had to be disarticulated at the knee.

DISCUSSION

The ipsilateral talar and calcaneal fracture is a rare combination of injuries that has only recently been recognized in the literature. It is reflected by the fact that a PubMed search with the key words 'ipsilateral talus and calcaneum fractures' gave just 6 results with only 3 being relevant and with further manual search we were able to find one more case report with similar foot injury.³ In a study by Seybold et al,⁴ the authors reported 11 patients of whom nine had extra-articular calcaneal fractures resulting from relatively low-energy trauma. In their case series, all injuries were closed and it was concluded that most patients had a favorable clinical outcome. The other known case series of ipsilateral talar and calcaneal fractures was from Gregory et al.² They reported nine patients, all with good to excellent results after treatment based on the Maryland Foot Score. Most of these low energy trauma patients had a history of fall from height. The incidence of ipsilateral fractures of the



Fig. 1: X-rays (lateral and AP) showing ipsilateral calcaneus and talus fractures

talus and calcaneum appears to be increasing with other high-energy lower extremity injuries. This finding may correlate with the reduced mortality rate of automobile collisions following improved safety measures, such as airbags.

A study by Aminian et al⁵ suggested that these combined injuries are the result of extremely high-energy and are frequently associated with other fractures of the limb. Multiple procedures and significant residual complications are the norm and not the exception. In this series there was a 40% rate of associated foot and ankle fractures which included pilon, ankle, midfoot and forefoot fractures. Twenty-nine percent¹³ of the injuries were open and 62% of these resulted in an immediate or delayed below knee amputation⁸ and two more had been advised to undergo amputation due to persistent infection or severe pain. In this series, results depended on severity of initial injury with all patients with poor outcome had joint depression fracture of calcaneum combined with either fracture of body or neck of talus. Authors concluded that universally poor results in their series as compared to favorable results in earlier series were a result of high energy trauma in their patients as opposed to low energy trauma in previous series. Among all published literature, only one case in the series

by Aminian et al had a Hawkin’s type IV fracture of talar neck with a fracture of anterior process of calcaneum. Our case is thus, unique in respect to severity of injury with both tarsal bones having highest grade of injury.

There are conflicting views about the mechanism of injury, the complications and the outcomes in the studies published so far. This indicates the rarity of the injury and the scope for further study of this rare injury pattern. Salient features all relevant reported series and reports are tabulated in Table 1.

Regardless of the injury, initial treatment should be based on ATLS protocols as there is high incidence of associated injuries in calcaneum and talar fractures.¹ Conversely, foot injuries are among the most commonly missed injuries in multiply injured patients.⁶ Specifically, musculoskeletal injuries occur in up to 50% cases of both calcaneus or talar fractures with high incidence of other foot injuries and spine injuries.¹ A 10% incidence of calcaneal fractures has also been reported in conjunction with talar neck fractures.⁷ All impending open or open injuries should be treated urgently as the soft tissue envelope is of paramount importance. Following stabilization of the patient and soft tissue healing, the preferred treatment for ipsilateral fractures of the talar and calcaneal should be open reduction and internal fixation, wherever possible, for all displaced fractures.

In case of talus fractures, an anatomic reduction and internal fixation should be done to achieve sufficient stabilization to start early motion exercises. Many surgical techniques have been described for the same.^{8,9} Poor patient outcomes result from residual deformity when treating talar fractures nonoperatively. Biomechanical studies have shown that residual displacements as little as 2 mm of the talar neck altered the contact characteristics of the subtalar joint.¹⁰ Forefoot adduction, calcaneal internal rotation, and loss of subtalar motion may be associated with persistent



Fig. 2: CT scan of the foot of the same patient

Table 1: Summary of published studies on ipsilateral talus and calcaneal fractures

	No. of patients	Treatment	Results	Complications
Gregory et al ²	9	Subtalar arthrodesis (4), ORIF of both fractures (1), BKA (1), immobilization (3)	All excellent or good	None
Newton et al ³	1	ORIF of talonavicular joint	Poor	Malunited calcaneum
Seybold et al ⁴	11	CR and EF (1), ORIF (10)	Excellent or good (9), poor (2)	Ankle arthritis (3), subtalar arthritis (5), AVN with pseudoarthrosis (1)
Aminian et al ⁵	45	Talus: ORIF(32), percutaneous fixation (1), EF(2), debridement and irrigation (1), subtalar arthrodesis (1), BKA (4), conservative (4)	Calcaneum: ORIF (27), EF(2), subtalar fusion (5), BKA (4), conservative (7)	No. complication in 5 Subtalar arthritis (28/35), ankle arthritis (5), AVN (4), infection (6)

varus malalignment.^{10,11} AVN and subsequent collapse of talar body is not an infrequent complication of talar neck fractures and this is a rule rather than an exception in type IV fractures with incidence of AVN reaching 100%.¹

Treatment of calcaneal fractures remains controversial with advocates for both operative and nonoperative treatments.¹²⁻¹⁴ However, most authors agree that nonoperative treatment of displaced fractures yields poor results and hence open reduction should be done in such cases.¹⁵⁻¹⁷ However, in severely comminuted fractures, consideration may be given to primary subtalar fusion to eliminate the need for secondary surgery as these fractures are universally associated with subsequent subtalar arthritis.

Although, primary subtalar arthrodesis is a reasonable choice in comminuted intra-articular calcaneal fractures but success of this procedure is uncertain in association with Hawkins' type IV fracture where talar body frequently undergoes AVN. Thus, we would recommend as an initial procedure an ORIF of talar neck fracture alongwith limited internal fixation of calcaneum fracture combined with external fixation if necessary to maintain length and height of calcaneum. Secondary procedures will invariably be required for this injury but all deformities can be addressed simultaneously and predictably at a later date.

CONCLUSION

Combined ipsilateral talar and calcaneal fractures are rare injuries. Concepts about the mechanism of this injury, complications and its outcome are still evolving. The patients and practitioners should be aware that this combination is a severe injury associated with significant clinical and radiographic morbidity and long-term sequelae. Often, it is accompanied by severe associated injuries of the musculoskeletal system and other systemic trauma. Open fractures and severely crushed injuries of the foot should be approached with a particularly guarded prognosis given the high probability of immediate or delayed amputation.

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