Case report

A rare combination of sagittal plane fracture of talar body with medial malleolus fracture: Case report and review of literature

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ABSTRACT

Fractures of talus are relatively uncommon injuries with majority of them involving the neck region. Talar body fracture in sagittal plane in combination with medial malleolus fracture is very rare with few cases being reported in the literature earlier. We report such an unusual combination in an adolescent, which was treated with open reduction and internal fixation with screws for both talus and medial malleolus. This was followed by physiotherapy and non-weight bearing till the fracture united.

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1. Introduction

Fractures of the talus are relatively uncommon accounting for 0.1 to 0.85% of all fractures.¹ Most are high energy injuries (e.g. motor vehicle accident). More than 50% of all fractures involve talar neck,² and up to 25% fractures involve body of talus.³ Those involving body of talus are associated with high incidence of complications such as ankle and subtalar osteoarthritis and osteonecrosis. The combination of talar body fracture in sagittal plane along with medial malleolus fracture is an unusual pattern of injury and rarely reported in the literature.^{4–10} The clinical outcome of such fracture pattern depends on severity of injury, preservation of remaining precarious blood supply during surgery and quality of reduction and fixation. One advantage of this injury pattern is that medial malleolus fracture preserves some amount of blood supply to talar body through its intact deltoid ligament branches, another advantage is the naturally improved exposure of the fracture pattern.

2. Case report

A 14-year-old boy met with an accident while going to school in his school van with his foot being caught in the bumper in dorsal hyper flexion and inverted position. His left foot and ankle were

grossly swollen when he presented in the casualty after few hours. The overlying skin was intact and there was no neurovascular deficit. Radiographs and CT scan revealed fracture of talar body in sagittal plane in association with vertical fracture of medial malleolus and also fracture of lateral process of the talus. (Figs. 1 and 2)

Surgery was delayed to allow for the swelling to settle and soft tissues to recover. Surgery was performed after 4 days of limb elevation, ice packs, and calcaneal pin traction. During surgery, talus was exposed through a combined anteromedial and anterolateral approach. The additional exposure through anterolateral side provided better visualization of entire articular dome. Medial malleolus was elevated along the fracture line carefully, and then reflected distally based on intact deltoid ligament. It was found that fracture line has extended vertically involving the lateral process, body of talus and medial malleolus (Fig. 3).

The fragments were initially fixed with k-wires ensuring perfect reduction to avoid any articular step. This was followed by fixation with 2.4 mm headless cancellous screws with one from medial to lateral direction and the other from reverse direction. Medial malleolus fragment was then reduced and fixed with two 4 mm partially threaded cannulated cancellous screws (Fig. 4). The associated lateral process fracture was found to be a small fragment with minimal displacement and hence fixation was not done. Drain was inserted before meticulous wound closure in layers.

Bulky dressing and a below knee plaster slab was applied. Leg was elevated on a Bohler-Braun splint in the ward. Dressing was done after 24 h and drain was removed after 48 h. Patient was discharged after 7 days on a below knee slab and advised

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Fig. 1. Anteroposterior (a) and lateral (b) radiograph of left ankle showing fractures of talar body in sagittal plane and medial malleolus and lateral process of the talus.

Fig. 2. Computed tomography coronal section images (a and b) showing fracture pattern involving talus and medial malleolus.

Fig. 3. Intra operative views showing fracture fragments displacement (a), their reduction (b) and fixation with screws (c).

Fig. 4. Anterior posterior (a) and lateral (b) X-rays in the immediate post operative period.

Fig. 5. X-rays at 6 weeks follow up showing Hawkins sign (a).

non-weight bearing. Sutures were removed at 2 weeks, and a below knee cast was given for a further period of 4 weeks. Non-weight bearing mobilization was allowed. After 1-month, cast was removed and aggressive physiotherapy was started but patient remained non-weight bearing for another 6 weeks (i.e. total 12 weeks). This was followed by progressive weight bearing and continued physiotherapy. Range of motion gradually improved and at 6 months follow-up, it was equal to the opposite ankle except for a 5° loss of terminal dorsiflexion. Radiographs revealed union of fractures and no signs of avascular necrosis or secondary osteoarthritis (Figs. 5 and 6). Patient complained of occasional pain after prolonged standing or walking, but was otherwise highly satisfied with the outcome.

3. Discussion

The outcome of talar body fractures is worse compared to neck fractures, because of the fact that neck fractures are considered extra-articular (involve only middle facet of subtalar joint) while body fractures are intra-articular (involve both tibiotalar and

subtalar joints).¹¹ There is higher risk of avascular necrosis. Inokuchi et al. defined talar body fractures as those in which fracture line on the inferior surface extends into the subtalar joint.¹² Sneppen et al. classified talar body fractures based on anatomic location into following types: Type A transchondral or osteochondral, Type B coronal shear, Type C sagittal shear, Type D posterior tubercle, Type E lateral process, Type F crush injuries.¹³ Boyd and Knight classification is also used (Type I – coronal or sagittal shear fractures, Type II – horizontal shear fractures).¹⁴ These classifications are seldom used clinically and play little role in the management of these fractures.

The nature of injury in our case is likely to be a sagittal shear splitting talar body and medial malleolus in near vertical direction. The mechanism of such injuries is not entirely clear, but is proposed to be a combination of dorsiflexion with added axial compression, along with a supination element which breaks the medial malleolus.⁴ In an extensive literature search, we came across only 7 other reports of similar kind.^{4–10} These studies are detailed in Table 1. K Shah et al. and J Isaacs et al. have reported using dual side approach for the exposure.^{5,8} Most of the previous

Fig. 6. Post operative X-rays at 12 weeks follow up (a and b) and near normal range of motion in both plantar-flexion (c) and dorsi-flexion (d).

Table 1

Compilation of previous similar case reports.

Authors	Year	Pattern	Approach	Weight bearing	Outcome
A.D. Mendonca et al. ⁴	2004	Talar body fracture in both sagittal and coronal planes with intact neck, with medial malleolar fracture.	Anteromedial	Non-weight bearing for 8 weeks.	Full recovery with no evidence of AVN at 6 months follow up.
K. Shah et al. ⁵	2004	Sagittal fracture of body with medial malleolar fracture. Talus fracture was undisplaced and discovered intra-operatively.	Medial malleolus fixed from medial side. Talus fixed from lateral side (open or percutaneous not mentioned)	Not mentioned	Not mentioned
Kailash Laxman Devalia et al. ⁶	2006	Sagittal fracture of body with medial malleolar fracture.	Anteromedial	Non-weight bearing for 3 months.	Full ROM, with sclerosis of lateral fragment and maintained joint space at 14-year follow-up.
H. Saidi et al. ⁷	2008	Sagittal fracture of body with medial malleolar fracture.	Anteromedial	Non-weight bearing for 3 months.	Good outcome, painless ankle at 6 months.
J. Isaacs et al. ⁸	2009	Talar body sagittal fracture and comminuted talar neck fracture, with medial malleolar fracture.	Dual medial and lateral approach.	Non-weight bearing for 7 weeks.	Mild pain at 12 months; no AVN on radiographs, but mild secondary osteoarthritic changes in subtalar joint.
Aditya Mootha et al. ⁹	2010	Sagittal fracture of body with medial malleolar fracture.	Posteromedial	Non-weight bearing for 6 weeks.	Good outcome at 3 months with no radiological signs of AVN.
Atif Mechchat et al. ¹⁰	2014	Sagittal fracture of body with medial malleolar fracture.	Anteromedial	Non-weight bearing for 3 months.	Little pain, mild secondary arthritis at ankle, and good ROM at 14 months follow-up.

studies have advised non-weight bearing for a minimum of 6–8 weeks and have reported good clinical outcome with mild symptoms on follow up.

The associated lateral process fracture in our case makes it one of its kind. CT evaluation of such injuries should be done routinely to better define the fracture pattern and amount of displacement and comminution. Any displaced fractures should be treated with open reduction and internal fixation taking care to preserve the remaining precarious blood supply and aiming for anatomic

congruous reduction of articular surfaces to avoid complications. Both medial and lateral approaches in combination allow complete view of the talar dome and for the reduction to be visualized from either side, to avoid any malreduction. Medial malleolus fracture along with talar body fracture in sagittal plane is a blessing in disguise as it may preserve some blood supply through its intact deltoid ligament branches of posterior tibial artery to talar body. Hence the risk of avascular necrosis of talus is less in associated medial malleolar fractures. These fractures are slow to unite, hence

to be kept in below knee cast for longer time and non-weight bearing to be followed till fracture unites with monitoring at regular intervals.

4. Conclusion

Talar body fracture in sagittal plane and its combination with medial malleolus fracture are challenging due to its rarity and associated high degree of complications. Surgery should be planned at appropriate time considering the status of surrounding soft tissues and swelling. Proper anatomic reduction and rigid fixation with good surgical technique followed by cast immobilization and non-weight bearing for longer periods (at least 3 months or till radiological union) is the key to good clinical outcome.

Conflicts of interest

The authors have none to declare.

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