

## Case Report

# Pantalar dislocation: a rare presentation with review of treatment methods

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**Abstract:** Pantalar dislocation means the simultaneous dislocation of the talocalcaneal, talonavicular, and tibiotalar joint. It is a rare injury comprising only 3.4% of major talar injuries. Treatment of closed Pantalar dislocation is controversial. However, the aim should be to attain a stable anatomic reduction of the Talus in the ankle joint. To prevent further damage to the skin and neurovascular structures, closed reduction of these dislocations should be performed as soon as possible. We report a case of Pantalar dislocation where we tried to reduce the talus both by closed and open methods but it was not possible to reduce the dislocation until the talonavicular joint was reduced first. Intending to improve the clinical knowledge of Pantalar dislocation, we want to convey our clinical experience and results from this rare dislocation.

**Keywords:** Pantalar dislocation, talonavicular joint, closed dislocation, open reduction

### Introduction

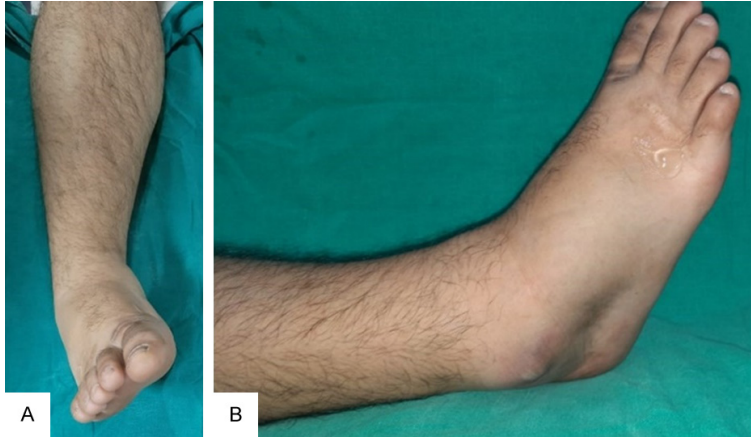
Pantalar dislocation is diagnosed when the Talus is simultaneously dislocated from all its articulations namely the talocalcaneal, talonavicular, and tibiotalar joint without associated fractures of the talus or adjacent bones [1]. They are rare injuries with very few cases and comprise only 3.4% among significant talar injuries based on a few case series and reports in the available literature [2]. It is characterized as the final step in the sequence of dislocation that started with “subtalar dislocation” and progressed to “subtalar with talonavicular dislocation” and finally dislocation of Talus from all the surrounding articulations [3]. They are associated with high-energy injuries and occur predominantly as an open injury with or without talar extrusion [4-9], while closed injuries are less common [3, 10-17]. Associated fractures of the Talus [1, 4] malleoli [10, 11, 18], distal tibia [5], or fifth metatarsal [6] and navicular dislocation [19] can be seen with Pantalar dislocation. Pantalar dislocations are classified according to the displacement of the Talus into anterolateral (most common), posteromedial, or posterior [2, 12, 20, 21]. Treatment of closed Pantalar dislocation is controversial. The objec-

tive of treating any dislocation, including talar dislocations, is to reduce the dislocation as quickly as possible, which can be achieved by closed or open reduction [22]. When a closed reduction is attainable, the results are usually good. Even in the case of a closed talar dislocation, some authors propose primary talectomy with tibiocalcaneal arthrodesis because of the risk of infection, damage to the talar vascularity, and concomitant avascular necrosis [4]. Primary talectomy, on the other hand, has an effect on hindfoot functionality and limits subsequent reconstructive possibilities [23, 24]. Even though Mitchell was the first to partially describe a closed reduction technique in 1924 [17], there are no strict guidelines in the literature and there is no consensus regarding the sequence of reduction of joints involved in Pantalar dislocation [12]. Intending to improve the clinical knowledge of Pantalar dislocation, we want to convey our clinical experience and results from this rare dislocation.

### Case report

We report the case of a 40 years old male who presented with complaints of severe pain and deformity in his right ankle and left leg following

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**Figure 1.** Shows right foot of the patient in plantar flexion and inversion (A). Swelling over the lateral aspect of the right foot (B).

a fall from height. On examination, the right foot was deformed, plantarflexed, supinated, and displaced medially (**Figure 1A**). Talar head was prominent dorsolaterally. The skin was in tension on the talar region without a breach in the continuity of the skin (**Figure 1B**).

Radiological investigations were done, and Pantalar dislocation was diagnosed on the right side, and on the left side fracture shaft left tibia middle 1/3<sup>rd</sup> with butterfly fragment with fracture shaft left fibula middle 1/3<sup>rd</sup> (**Figure 2A**) and fracture Medial malleolus left ankle (**Figure 2B**) was diagnosed.

Calcaneum and the rest of the foot were displaced in relation to the Talus. The calcaneus was dislocated medially in the AP and remained neutral on the lateral view (**Figure 2C**). NCCT right ankle with 3-dimensional reconstruction was done, which showed dislocation of the foot and calcaneus medially and rotation and dislocation of Talus dorsolaterally (**Figure 2D**). So, it was diagnosed as case of anterolateral pantalar dislocation.

We carried out the manoeuvres described for closed reduction of the dislocation [17], but we were not successful. Open reduction was then tried through the lateral (sinus tarsi) approach. An inspection of lateral talonavicular joint and ankle ligaments was performed, and reduction was attempted, but it was unsuccessful. A medial incision was given centered over the talonavicular joint, ligamentous structures such as the deltoid ligament and spring ligament were found to be disrupted. The joint was evalu-

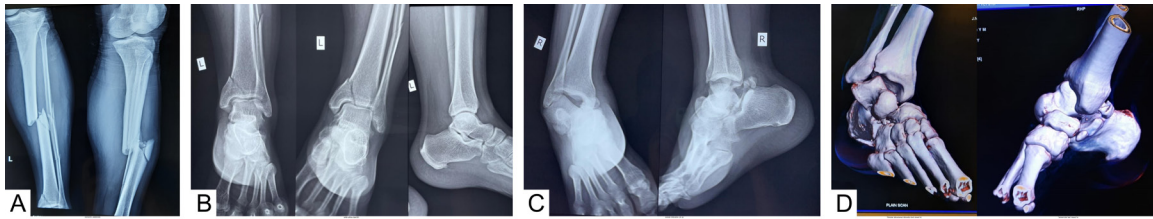
ated for loose osteochondral fragments, which were removed. No tendons were interposed in the talar head, which might have been preventing reduction. First we tried to reduce the tibiotalar and talocalcaneal joint however we couldn't reduce them. Later on we tried to reduce the talonavicular joint which got reduced and subsequently tibiotalar and talocalcaneal joint were reduced easily. Since the tibiotalar joint was not stable, we put a k-wire, and below knee slab was applied (**Figure 3C**).

Closed reduction and internal fixation with Tibia interlocking nail was done for fracture shaft of left tibia (**Figure 3A**). Closed reduction internal fixation with 2 Cannulated cancellous screws was done for fracture Medial malleolus left ankle (**Figure 3B**). Fixation of the subtalar and tibiotalar joint of the right side was done with K wire, and below knee slab was applied (**Figure 3C**). Below knee slab and k-wire was removed at 6 weeks. At 6 months of follow up patient was able to walk full weight bearing and was painfree.

### Discussion

Pantalar dislocation is diagnosed when the Talus is simultaneously dislocated from all of its articulations namely the talocalcaneal, talonavicular, and tibiotalar joint without associated fractures of the talus or adjacent bones which can be confirmed on radiographic examination [1]. They are rare injuries [1] caused by high-energy trauma, with road traffic accidents and falls from a height being the most common contributors [3, 12]. The usual mechanism of talus dislocation is a combination of plantar flexion and supination or pronation of the foot, and the dislocation can be anterolateral (the most common) or posteromedial, respectively [12, 20, 21]. There is no muscular or tendinous attachment on Talus, with 60% of its surface remaining articular. The anatomic position of Talus is maintained by its unique ligamentous support with anterior/posterior tibiotalar deltoid ligaments medially and the anterior/posterior talofibular ligaments laterally and talocalca-

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**Figure 2.** Fracture shaft left tibia middle 1/3<sup>rd</sup> with butterfly fragment with fracture shaft left fibula middle 1/3<sup>rd</sup> (A). Fracture medial malleolus left ankle (B). Medial displacement of the calcaneus and the rest of the foot in relation to the Talus and tibiotalar dislocation with comminution of Talus on the right side (C). NCCT with a 3D reconstruction of the right ankle shows dislocation of the foot and calcaneus medially and rotation and dislocation of Talus dorsolaterally (D).



**Figure 3.** Closed reduction and internal fixation with Tibia interlocking nail for fracture shaft of the left tibia (A). Closed reduction internal fixation with 2 Cannulated cancellous screws for fracture Medial malleolus left ankle (B). Fixation of right subtalar and tibiotalar joint with K-wire (C).

neal interosseous ligament [23]. Talar dislocations can be subtalar or pantalar. The talocalcaneal and talonavicular joints are dislocated in subtalar dislocation, whereas pantalar dislocation involves tibiotalar dislocation along with subtalar dislocation. Pantalar dislocation can be anterolateral (most common), posteromedial or posterior [2, 12, 20, 21]. In our case it was an anterolateral pantalar dislocation. Pantalar dislocations are usually compounding injuries, closed dislocations being extremely rare [10]. Compounding injuries need surgical debridement and open reduction, while closed dislocations can be reduced under sedation by traction and manipulation. Ours was a closed dislocation that needed open reduction. Various treatment options are there for open pantalar dislocation like debridement, fracture fixations, closed or open reductions, talectomy, which may include tibiocalcaneal arthrodesis [24]. Literature is scarce regarding the management of closed injuries. However, the aim should be to attain a stable anatomic reduction of the Talus in the ankle joint. When a closed reduction is attainable, the results are usually good. Patients are immobilised in a cast after

reduction and maintained non-weight-bearing for 6 weeks [15, 17]. The rate of AVN as a complication rises when open reduction of a closed dislocation is required [4, 16]. Patients who develop AVN after an open reduction are kept non weight bearing till the necrotic bone is replaced, and they have a good outcome. If the patient remains symptomatic as a result of the AVN, surgery may be required. In patients who develop AVN after an open reduction of a closed injury, tibiotalar arthrodesis and talectomy have been performed with good results [16, 27]. Even in the case of a closed talar dislocation, some authors propose primary talectomy with tibiocalcaneal arthrodesis because of the risk of infection, damage to the talar vascularity, and concomitant avascular necrosis [4]. Primary talectomy, on the other hand, has an effect on hindfoot functionality and limits subsequent reconstructive possibilities [23, 24]. To prevent further damage to the skin and neurovascular structures, closed reduction of these dislocations should be performed as soon as possible. After every closed reduction attempt, a neurovascular examination should be repeated to check for vascularity and whether any

new sensory or motor deficit has appeared. If this is not successful multiple attempts at a closed reduction are not preferred due to further damage to soft tissues, and one should proceed with open reduction [25]. Successful attempts in a closed reduction under anaesthesia have been reported in cases of closed anterolateral pantalar dislocation by Mitchell [17], Xarchas et al. [12], Taymaz and Gunal [13], Papanikolaou et al. [15], El Ibrahimy et al. [10], and Kenwright and Taylor [1]. In our case the technique for closed reduction, as described by Mitchell [17], was used. All attempts of closed reduction failed, so open reduction was performed. Various reasons for irreducibility of talus have been described like trapping of talar neck between flexor tendons [3], buttonholing of head of talus between the tendons of tibialis posterior and flexor digitorum longus [21], non-displaced medial malleolus [30]. JT Weston et al. [31] reviewed 39 articles with a total of 86 cases of pantalar dislocation, in which 73 were open, and 13 were closed dislocations. Closed reduction was possible in only 3 (3.5%) cases, the rest 83 (96.5%) patients required open reduction. Boden KA et al. [32] studied 19 patients with pantalar dislocation in which 14 were open, and 5 were closed injuries. Closed reduction was possible in only 2 out of 3 patients who had closed injuries. In our case even with an open approach, it was not possible to reduce the dislocation. First, we tried to reduce the tibiotalar and talocalcaneal joint, but the reduction could not be achieved. Then we resorted to reducing the talonavicular joint first. When this joint was reduced, all the other dislocations were reduced easily. So we recommend that in case of pantalar dislocations talonavicular joint should be reduced first then reduction of other joints should be attempted. K-wire fixation may be done in unstable dislocation, and immobilization in plaster is recommended for six to eight weeks [27]. In our case, we inserted one K-wire through the subtalar and tibiotalar joint, and below knee slab was applied, which were removed at 6 weeks. Since this combination of injuries is exceptionally rare, we believe our study contributes significantly to the available literature, and the contribution from our case will aid many orthopaedic surgeons who meet similar situations in the future. To acquire a better clinical knowledge and treatment protocol for Pantalar dislocations, further research with a higher quality of

the data and a more significant number of cases are required.

### Conclusion

If feasible, the closed reduction should be done first for closed Pantalar dislocation to avoid jeopardizing the residual vascular supply of the Talus. If it fails, one should proceed to open reduction where talonavicular joint reduction should be attempted first among tibiotalar and subtalar joint.

### Disclosure of conflict of interest

None.

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### References

- [1] Kenwright J and Taylor RG. Major injuries of the talus. *J Bone Joint Surg Br* 1970; 52: 36-48.
- [2] Benjamin J, Nick R and Amit P. Total dislocation of the talus. *Eur J Orthop Surg Traumatol* 2011; 22: 633-637.
- [3] Sharifi SR, Ebrahimzadeh MH and Ahmadzadeh-Chabok H. Closed total talus dislocation without fracture: a case report. *Cases J* 2009; 2: 9132.
- [4] Detenbeck LC and Kelly PJ. Total dislocation of the talus. *J Bone Joint Surg Am* 1969; 51: 283-288.
- [5] Schiffer G, Jubel A and Elsner A. Complete talar dislocation without late osteonecrosis: clinical case and anatomic study. *J Foot Ankle Surg* 2007; 46: 120-123.
- [6] Krasin E, Goldwirth M and Otremski I. Complete open dislocation of the talus. *J Accid Emerg Med* 2000; 17: 53-54.
- [7] Burston JL, Isenegger P and Zellweger R. Open total talus dislocation: clinical and functional outcomes: a case series. *J Trauma* 2010; 68: 1453-1458.
- [8] Fleming J and Hurley KK. Total talar extrusion: a case report. *J Foot Ankle Surg* 2009; 48: 690, e19-23.
- [9] Duncan ST, Wright RD and Lawrence SJ. Pantalar dislocation without extrusion. *Journal of Orthopaedics and Trauma* 2011; 1.
- [10] El Ibrahimy A, Shimi M and Elidrissi M. A case of closed total dislocation of talus and literature review. *Am J Emerg Med* 2011; 29: 475. e1-475.e3.

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- [11] Heylen S, De Baets T and Verstraete P. Closed total talus dislocation: a case report. *Acta Orthop Belg* 2011; 77: 838-842.
- [12] Xarchas KC, Psillakis IG and Kazakos KJ. Total dislocation of the talus without a fracture. Open or closed treatment? Report of two cases and review of the literature. *Open Orthop J* 2009; 3: 52-55.
- [13] Taymaz A and Gunal I. Complete dislocation of the talus unaccompanied by fracture. *J Foot Ankle Surg* 2005; 44: 156-158.
- [14] Segal D and Wasilewski S. Total dislocation of the talus. Case report. *J Bone Joint Surg Am* 1980; 62: 1370-1372.
- [15] Papanikolaou A, Siakantaris P and Maris J. Successful treatment of total talar dislocation with closed reduction: a case report. *Foot Ankle Surg* 2002; 8: 245-248.
- [16] Ritsema GH. Total talar dislocation. *J Trauma* 1988; 28: 692-694.
- [17] Mitchell JI. Total dislocation of the astragalus. *J Bone Joint Surg Am* 1936; 18: 212-214.
- [18] Mnif H, Zrig M, Koubaa M, Jawahdou R, Hammouda I and Abid A. Reimplantation of a totally extruded talus: a case report. *J Foot Ankle Surg* 2010; 49: 172-175.
- [19] Ely EE, Konstantakos EK and Laughlin RT. Total dislocation of the talus and the navicular: a case report. *J Orthop Trauma* 2009; 23: 546-549.
- [20] Van Opstal N and Vandeputte G. Traumatic talus extrusion: case reports and literature review. *Acta Orthop Belg* 2009; 75: 699-704.
- [21] Bas T, Vicent V, Alcantara P and Llabres AJ. Complete dislocation of the talus: a report of 5 cases. *Foot* 1994; 4: 102-5.
- [22] Alrashidi Y, Wali Z and Khoshhal K. Closed anterolateral total talar dislocation: a case report and technical notes. *ORR* 2014; 47.
- [23] Assal M and Stern R. Total extrusion of the talus. A case report. *J Bone Joint Surg Am* 2004; 86: 2726-31.
- [24] Smith CS, Nork SE and Sangeorzan BJ. The extruded talus: results of reimplantation. *J Bone Joint Surg Am* 2006; 88: 2418-24.
- [25] Hiraizumi Y, Hara T and Takahashi M. Open total dislocation of the talus with extrusion (missing talus): report of two cases. *Foot Ankle* 1992; 13: 473-477.
- [26] Palomo-Traver JM, Cruz-Renovell E and Granell-Beltran V. Open total talus dislocation: case report and review of the literature. *J Orthop Trauma* 1997; 11: 45-49.
- [27] Wagner R, Blattert TR and Weckbach A. Talar dislocations. *Injury* 2004; 35 Suppl 2: SB36-45.
- [28] Itsiopoulos I, Vasiliadis AV and Goulios V. Open treatment of closed talus dislocation without fracture: a case report and literature review. *J Orthop Case Rep* 2018; 8: 34-37.
- [29] Sharma S and Mainds CC. Closed total talar dislocation-a case report. *Grand Rounds* 2002; 2: 29-31.
- [30] Yapici F, Coskun M and Arslan MC. Open reduction of a total talar dislocation: a case report and review of the literature. *World J Clin Cases* 2019; 7: 1850-1856.
- [31] Weston JT, Liu X and Wandtke ME. A systematic review of total dislocation of the talus: total talar dislocation. *Orthop Surg* 2015; 7: 97-101.
- [32] Boden KA, Weinberg DS and Vallier HA. Complications and functional outcomes after pantalar dislocation. *J Bone Joint Surg Am* 2017; 99: 666-675.