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# Arthrodesis for chronic lateral subtalar joint dislocation caused by posterior tibial tendon dysfunction: A case report

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## ABSTRACT

**INTRODUCTION:** Adult acquired flatfoot deformity (AAFD) caused by posterior tibial tendon dysfunction (PTTD) can lead to the development of peritalar subluxation (PTS) and much more rarely to lateral subtalar dislocation.

**PRESENTATION OF CASE:** A 75-year-old woman was referred to our hospital with an approximately 15-year history of pain in her right foot without obvious trauma. The lateral shifting foot deformity had worsened in the previous 5 years. On presentation, she had tenderness over the talonavicular joint, and the skin overlying the talar head on the medial foot was taut. Imaging revealed lateral displacement of the calcaneus with simultaneous dislocation of the talonavicular and talocalcaneal joints. We diagnosed lateral subtalar dislocation including the talonavicular and talocalcaneal joints caused by PTTD, which we treated by reduction and fusion of the subtalar joint complex. The foot and ankle were immobilized with a cast for 6 weeks.

**DISCUSSION:** At the 1-year follow-up visit, the patient reported no pain during daily activities, although flatfoot persisted.

**CONCLUSION:** We report a rare case of chronic lateral subtalar dislocation caused by PTTD that was treated by fusion of the talonavicular and talocalcaneal joints.

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## 1. Introduction

Subtalar dislocation involves bi-articular dislocation of both the talonavicular and talocalcaneal joints without involvement of the calcaneo-cuboid or tibio-talar joints and without fracture of the neck of the talus [1]. It is usually caused by trauma and has an estimated incidence of less than 1% of all traumatic dislocations [2]. A lateral subtalar dislocation resembles “acquired flat foot” after injury and accounts for 15%–35% of all subtalar dislocations [3,4]. Lateral subtalar dislocation is therefore rare, in even trauma.

The most common etiology of adult acquired flatfoot deformity (AAFD) is posterior tibial tendon dysfunction (PTTD). PTTD is characterized by attenuation of the medial soft tissues with subsequent posterolateral subluxation of the calcaneus and increased valgus orientation of the subtalar joint in the coronal plane [5]. AAFD caused by posterior tibial tendon dysfunction (PTTD) can lead to the development of peritalar subluxation (PTS), as described in a report in 1999 [6], or much more rarely to lateral subtalar dislocation.

Here, we report a rare case of chronic lateral subtalar joint dislocation caused by PTTD that was successfully treated by arthrodesis of the subtalar joint complex, which comprises the talonavicular and talocalcaneal joints. This has been reported in line with the SCARE criteria [7].

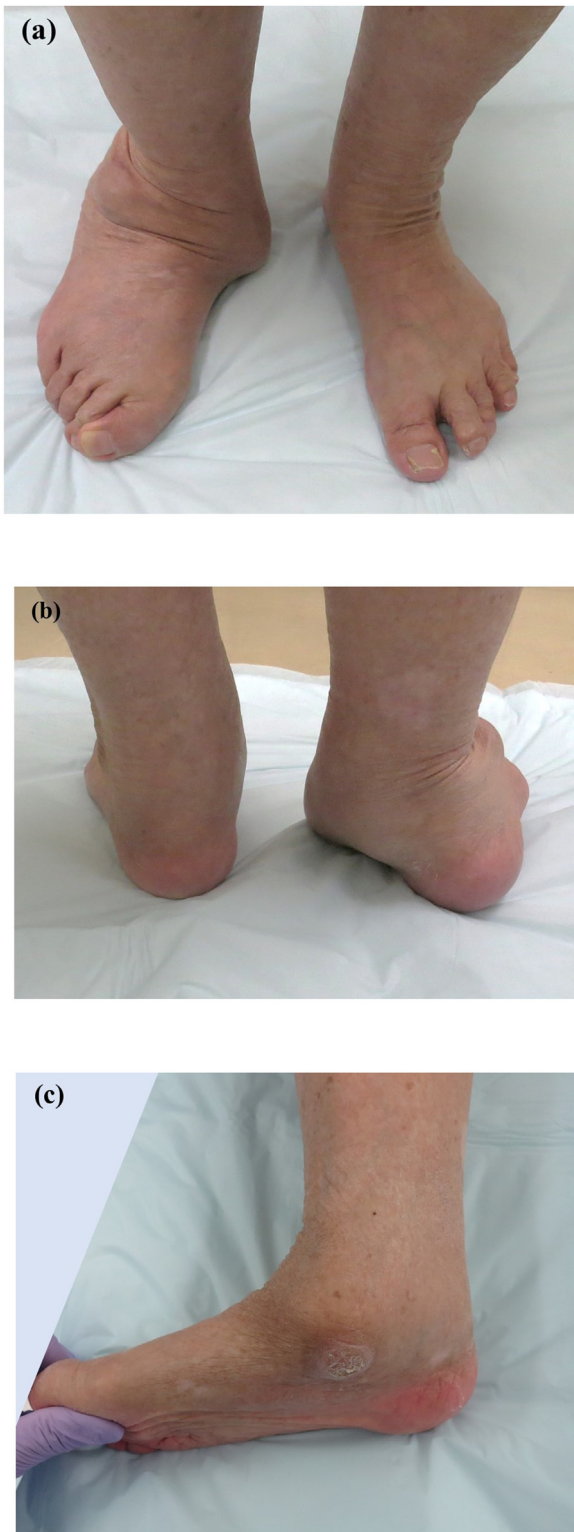
## 2. Presentation of case

Informed consent was obtained from the patient for this report to be published. The patient was a 75-year-old woman with an approximately 15-year history of right foot pain without trauma. She noticed some deformity of her right ankle and foot and right lateral shifting, which deteriorated around the age of 70. She had no family history of relevant genetic information and psychosocial history. She received conservative treatment including a custom insole and brace at a local clinic. However, her symptoms did not improve and she was referred to our hospital at age 75. She visited our hospital with a wheelchair, assisted by her daughter.

On presentation, we noted severe adduction of the right foot and pes planovalgus with the heel displaced lateral to the long axis of the leg on standing in frontal view (Fig. 1a) and rear view (Fig. 1b). The talar head was prominent and palpable medially (Fig. 1c). The neurovascular status was intact with palpable pulses. She could not perform the single heel rise test and had difficulty

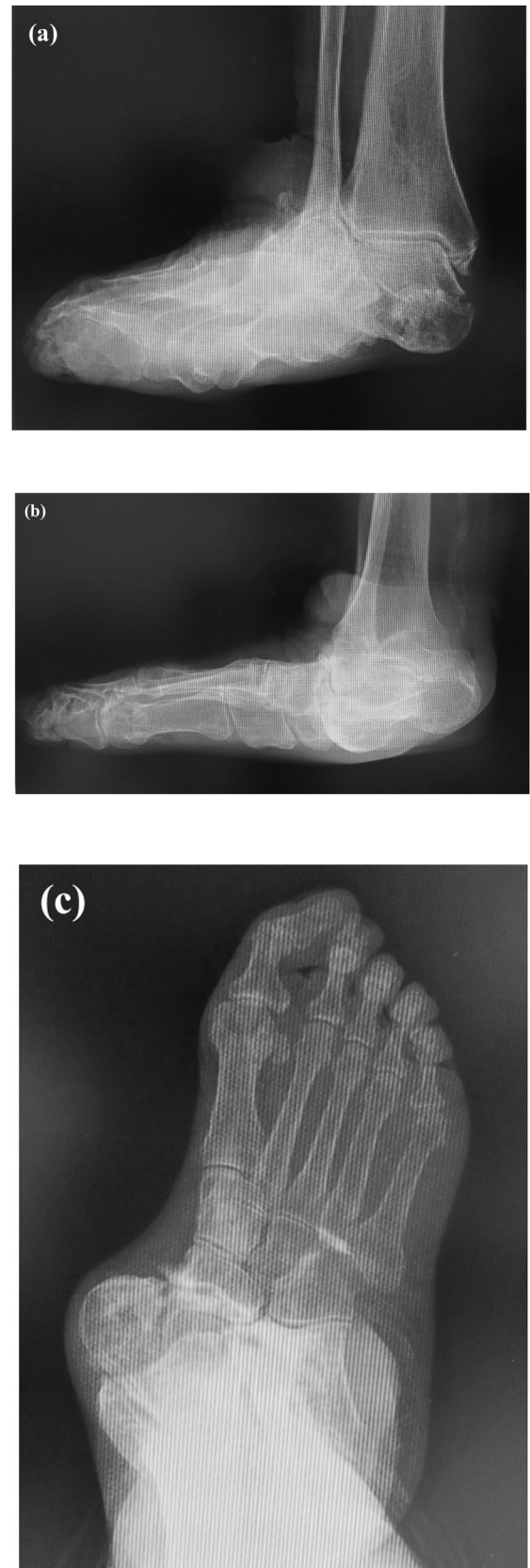
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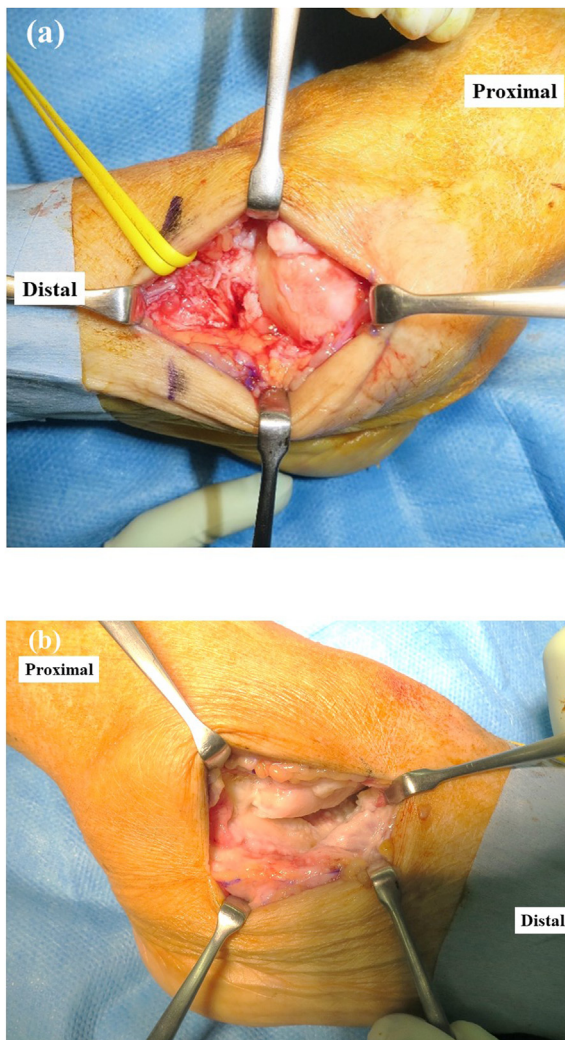


**Fig. 1.** Photographs showing lateral displacement of the right foot at the (a) talonavicular joint level in frontal view and (b) talocalcaneal joint level in rear view on standing. (c) Photograph showing a prominent talar head that was palpable medially.

walking smoothly. Standing radiography showed displacement of the calcaneus and the rest of the foot relative to the talus in anteroposterior view of the right ankle (Fig. 2a) and in lateral view (Fig. 2b) and frontal view of the right foot (Fig. 2c). This indicated instability of the talonavicular and talocalcaneal joints. The tibiotalar and



**Fig. 2.** Radiographs of the right foot and ankle. The calcaneus is laterally displaced with simultaneous dislocation of the talonavicular and talocalcaneal joints in the (a) anteroposterior view of the right ankle and (b) lateral and (c) frontal views of the right foot.



**Fig. 3.** Intraoperative photographs showing (a) the exposed talar head on the medial side and absence of the PTT, and (b) osteoarthritic change of the talocalcaneal joint on the lateral side.

calcaneocuboid joints remained intact. The preoperative Japanese Foot and Ankle Society (JFFS) score was 14/100 (pain 0/40, function 14/50, alignment 0/10). We diagnosed talar head displacement from the concave navicular surface with the navicular lateral to the talar head in a lateral subtalar dislocation, caused by AAFD, and decided on open reduction of the subtalar joint and subtalar arthrodesis for treatment due to the obvious pain on subtalar motion with lateral displacement of the foot.

The surgery was performed by I.T. who graduated from the medical university in 2004 and was a foot and ankle surgeon. Medial incision of the foot was made over the palpable talar head, and lateral skin incision was made over the displaced talocalcaneal joint. On the medial side, the posterior tibial tendon (PTT) was absent and the talar head was exposed (Fig. 3a). On the lateral side, osteoarthritic change of the talocalcaneal joint was observed (Fig. 3b). Residual cartilage in the talonavicular and talocalcaneal joints was removed, and the subchondral bone in the talonavicular and talocalcaneal joints was then curetted. The talus was reduced and repositioned. The talonavicular joint was fixed with three 3.5-mm cannulated cancellous screws through the navicular into the talar head. The talocalcaneal joint was fixed with two 6.0-mm cannulated cancellous screws through the talar head into the calcaneus, and through the calcaneus into the talus, to prevent excessive hindfoot eversion and talar plantar flexion and rotation,

thereby restoring hindfoot alignment and correcting talonavicular uncoverage.

A lower leg cast ensured immobilization for a total of 6 weeks after surgery: non-weightbearing for 4 weeks and then with partial weight bearing for 2 weeks. After the cast was removed, the patient started to follow a mobilization protocol with progressive passive and active range of motion exercises. She was instructed to bear full weight at about 10 weeks after the surgery with an ankle support attached to her right foot and ankle for 2 months in place of the cast.

Approximately 3 months after surgery, radiographs showed bony union of the talocalcaneal and talonavicular joints, and lateral subtalar dislocation was improved with weightbearing in the anteroposterior view of the right ankle (Fig. 4a) and in the lateral (Fig. 4b) and frontal (Fig. 4c) views of the right foot, although flat-foot remained. Adduction deformity was improved in the frontal view (Fig. 5). At 1 year after surgery, the patient reported no pain during daily activities and her JFFS score was improved to 85/100 (pain 40/40, function 40/50, alignment 5/10).

### 3. Discussion

There are fewer reports on lateral subtalar dislocation than on PTS in patients with AAFD, and here we reported a case of chronic lateral subtalar joint dislocation caused by PTTD in an elderly woman that we treated successfully with talocalcaneal and talonavicular fusion.

In lateral subtalar dislocation, skin tension over the side of the affected foot increases in the opposite direction to the displacement [8]. This may lead to blistering and skin necrosis from underlying bony pressure [9–11]. In the present case, skin over the talar head was taut, but neither blistering nor skin necrosis was observed. This might have been due to the chronic rather than acute nature of the lateral subtalar dislocation.

Some studies on AAFD have suggested that the bony morphology of the talus including the subtalar facet joint—specifically valgus angulation and not merely a difference in the angle between the 2 facets of the subtalar joint space—may predispose some individuals to developing AAFD [5,12,13]. In our case, the patient might initially have had this bony morphology of the talus and PTS may have occurred initially.

The primary intrinsic ligaments of the subtalar joint are the talocalcaneal interosseous ligament and cervical ligament [14]. Both are critical to maintaining the stability of the subtalar joint. In our case, the PTT was weak due to degenerative change because of the PTTD and it subsequently ruptured. These ligaments were overloaded to the extent that nearly all of the ligaments of the subtalar and talocalcaneonavicular complex probably became disrupted. Finally, the talar head might have been forced medially through the talonavicular joint capsule and the rest of the foot was laterally displaced from the talus. The final dislocation mechanism in this case might be similar to traumatic lateral subtalar dislocation, which results from forceful eversion of the foot with the anterior calcaneal process acting as a fulcrum for the anterolateral corner of the talus [15–20].

According to a study on subtalar arthrodesis by Pell et al., in 111 patients who underwent this procedure with a mean follow-up of 5.7 years, the mean patient satisfaction score was 8.3/10, the union rate was 98%, and the rate of willingness to undergo the procedure again was 91% [21]. In the present case, the patient reported no pain during daily activities and was satisfied with the results of surgery at the 1-year follow-up visit. Follow-up is ongoing to monitor outcome over the longer term.

A limitation in this case is that flatfoot persisted, although the patient was satisfied with the outcome of surgery. Additional cal-



**Fig. 4.** Radiographs 3 months after surgery showing (a) improvement of the dislocation of the subtalar and talonavicular joints on weightbearing in the anteroposterior view. (b) Although flatfoot can be seen to persist in the lateral view of the right foot, (c) the adduction deformity is improved in the frontal view.



**Fig. 5.** Photograph showing improvement of the initially severe adduction of the right foot in frontal view 1 year after surgery.

canal osteotomy might be necessary to correct flatfoot, beyond reduction of the talonavicular and talocalcaneal joints only. Triple arthrodesis, which involves fusion of the talocalcaneal, talonavicular, and calcaneocuboid joints, might be a better alternative to correct flatfoot completely in this case. Another limitation is that we did not reconstruct the deltoid ligament. Deltoid ligament reconstruction might have been effective given that reconstructing the deltoid with a peroneus longus autograft or allograft tendon has resulted in favorable clinical outcome, with the degree of preoperative talar tilt correlating with the outcome [22–24].

#### 4. Conclusion

We encountered a rare case of chronic lateral subtalar joint dislocation caused by PTTD that we treated with fusion of the subtalar joint complex, comprising the talocalcaneal and talonavicular joints. In addition to rupture of the PTT and ligaments after PTS, the anterior calcaneal process might act as a pivot for the anterolateral corner of the talus.

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The authors report no declarations of interest.

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#### Ethical approval

A clinical case report is exempt from ethical approval in our institution.

#### Consent

A written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy

of the written consent is available for review by the Editor-in-Chief of this journal on request.

### Author contribution

Ichiro Tonogai: data collection, writing the paper.  
Koichi Sairyō: Interpretation.

### Registration of research studies

Not applicable.

### Guarantor

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