BRIEF REPORT

Pure Closed Posteromedial Dislocation of the Tibiotalar Joint without Fracture

Yun-tao Wang, MD, PhD, Xiao-tao Wu, MD, PhD, Hui Chen, MSc

Department of Orthopaedics, Zhongda Hospital, Southeast University, Nanjing, China

Pure tibiotalar dislocation without an associated fracture is an extremely rare injury. We present three cases of closed posteromedial tibiotalar dislocation without any associated fractures to the foot, ankle, or leg. All patients were treated conservatively with immediate closed reduction under general or local anaesthesia and immobilised in a short leg cast for six weeks without weight-bearing resulting in a satisfactory outcome at the final follow-up. A review of the literature is also presented in this paper.

Key words: Ankle; Closed dislocation; Tibiotalar dislocation

Introduction

Tibiotalar joint dislocation without an associated fracture is a very uncommon injury¹⁻⁴. The rarity of this injury is due to the mechanical efficacy of the ankle mortise and the resistance of ligaments being greater than bone, making fracture common. To the best of our knowledge, approximately 80 cases of this type of injury have been reported since 1913. We present here three cases of closed posteromedial dislocation and discuss the mechanism, management and prognosis of this rare injury.

Cases Reports

Patient 1

A 24-year-old male injured his left ankle while playing football. Immediately after injury, he had pain and could not move his ankle. On initial examination, the ankle swelling with diffuse tenderness and deformity drew attention. The hindfoot seemed to be displaced posteromedial to the ankle. The lateral skin of the ankle was taut, tense and ecchymotic with no open injury. There were no signs of injury to the neurovascular structures. Radiographs showed a posteromedial dislocation of the tibiotalar joint without fracture or widening of the tibiofibular syndesmosis (Fig. 1a,b).

An urgent closed reduction was performed by longitudinal traction with one hand on the heel and the other on the

forefoot under general anaesthesia. Post-reduction radiographs revealed satisfactory reduction although abnormal talar tilt was still noted (Fig. 1c,d). After the ankle was immobilised in a short leg cast, control radiographs confirmed good anatomic alignment and loss of the post-reduction talar tilt (Fig. 1e,f).

The cast was maintained for 6 weeks, and the patient then followed a course of gradual increase in range-of-motion and muscle-strengthening exercises and weight-bearing activities. Sixteen weeks later, there was minimal swelling of the transmalleolar region and a stable ankle with near full range of motion and normal gait. At last follow-up (17 months after injury), the patient had returned to full activities and the assessment of the functional result using the Mazur score was excellent (100/100).

Patient 2

A 17-year-old male suffered closed dislocation of the right ankle following a fall from a height of approximately 6.5 feet (Fig. 2a,b). After reduction and immobilization of the ankle with a cast for 6 weeks (Fig. 2c,d), the patient began weight-bearing. At the final follow-up, 29 months after injury, he was asymptomatic and without any complaints, and the assessment of the functional result using the Mazur score was excellent (100/100).

Address for correspondence Yun-tao Wang, MD, PhD, Department of Orthopaedics, Zhongda Hospital, Southeast University, Nanjing, Jiangsu Province, China 210009 Tel: 0086-13851682527; Fax: 0086-25-83272207; Email: wangyttod@yahoo.com.cn

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Fig. 1 A 24-year-old male injured his left ankle while playing football. (a) Anteroposterior and (b) lateral radiographs demonstrate posteromedial dislocation of the left tibiotalar joint without fracture or widening of the tibiofibular syndesmosis. An urgent closed reduction was performed. Post-reduction (c) anteroposterior and (d) lateral radiographs reveal satisfactory reduction of the ankle joint although abnormal talar tilt is still noted. (e) Anteroposterior and (f) lateral radiographs confirm good anatomic alignment and loss of the post-reduction talar tilt after immobilization in a short leg cast.

Patient 3

A 20-year-old male presented with a closed dislocation of the left ankle while playing basketball (Fig. 3a,b). Reduction was carried out under local anaesthesia and the joint was immobilised for 6 weeks (Fig. 3c,d). The patient underwent rehabilitation for 13 weeks and regained comfortable ankle movement with near full range of motion. At the final follow-up, 33 months after injury, his only ailment was mild, self-resolving

morning stiffness in the ankle, especially on cloudy days. The assessment of the functional result using the Mazur score was excellent (96/100).

Discussion

Tibiotalar joint dislocation without associated fractures is a very rare injury¹⁻⁴. The rarity is due to the anatomical characteristics of the ankle. The ankle is a hinge joint formed

Fig. 2 A 17-year-old male suffered closed dislocation of the right ankle following a fall from a height of approximately 6.5 feet. (a) Anteroposterior and (b) lateral radiographs demonstrate posteromedial dislocation of the right tibiotalar joint without fracture or widening of the tibiofibular syndesmosis. Post-casting (c) anteroposterior and (d) lateral radiographs confirm satisfactory reduction of the ankle joint.

by the distal tibia and fibula that enclose the talar dome, which fits with the malleoli into the mortise limiting the rotation of the talus and giving mechanical stability³. Medially and laterally, the joint has strong collateral ligamentous complexes that reinforce the thin capsule^{3,4}. The distal tibia and fibula themselves also form the osseous part of syndesmosis and are linked by four main ligaments⁵. Furthermore, the collateral ligaments have greater relative strength compared with the malleoli⁶.

Pure tibiotalar dislocation occurs most commonly in young adults⁴. Up to 2010, only six cases were reported under

this term in children in English-language literature^{7,8}. The scarcity of this lesion in children is attributed to the relatively low resistance of the growth cartilage, which makes epiphyseal separation fractures more frequent at this age⁷. This injury is caused primarily by motor vehicle accidents, sports trauma, and falls. There is a predominance of male over female, which could be explained by the fact that men do more aggressive sports. Closed dislocations are reported to be more common⁸. Although the neurovascular complication from this injury is rare, some associated injuries are still reported such as dorsal

Fig. 3 A 20-year-old male presented with a closed dislocation of the left ankle while playing basketball. (a) Anteroposterior and (b) lateral radiographs demonstrate pure posteromedial dislocation of the left tibiotalar joint. Post-reduction (c) anteroposterior and (d) lateral radiographs reveal satisfactory reduction of the ankle joint.

pedal artery, superficial peroneal nerve and deep peroneal nerve^{4,8}. All patients were closed dislocation and no neurovascular complication was noted in our cases.

Fahey and Murphy classified this injury according to the anterior, posterior, medial, lateral, and upward direction of the displacement as well as the combined forms⁹. The tibiofibular syndesmosis is undisrupted, except in the upward dislocations¹. At present, plantarflexion has been suggested to be the main component in combined movements causing tibiotalar dislocation because the tibiotalar joint is relatively unstable in

the maximal plantarflexion position⁴. Furthermore, there are no stabilising structures on the anterior or posterior aspect of the tibiotalar joint except the capsule, allowing anterior or posterior dislocation. Posteromedial dislocation is the most common type of tibiotalar dislocation because of the tendency to land with plantarflexion, inversion and axial loading of the ankle in a fall from a height^{3,6,7}. In our cases, the mechanism of injury also appeared to be plantarflexion and inversion.

Predisposing factors in the pathogenesis of tibiotalar dislocation are medial malleolus shortness, lack of coverage of the

talus, ligamentous laxity, previous sprains, and weakness of the peroneal muscle⁸. Our patients had no previous ankle injury. The medial malleolus ratio and the coverage of talus ratio evaluated by the method of Elisé *et al.*² were normal. The ligamentous laxity was not also found in our cases.

Although the combined plantarflexion and inversion loading inevitably results in injury of the soft tissue structures around ankle joint¹⁰, such as the anterior ankle capsule, the anterior talofibular ligament, and the deep fibers of the deltoid ligament, the closed dislocation can be treated usually by non-operative methods with satisfactory results^{2,3,8}. In the absence of complication and contraindication, closed reduction and cast immobilization should be performed immediately to the patient under general or local anesthesia for adequate muscle relaxation⁸. In our cases, we could achieve closed

reduction easily and applied short leg cast for 6 weeks without weight-bearing. Negative prognostic factors include advanced age, injury to the inferior tibiofibular ligament, presence of vascular injuries and delayed reduction⁶. Although some late complications are reported such as joint instability, stiffness, degenerative changes and capsular calcification^{2,4,8}, the prognosis after the pure closed ankle dislocation is usually good³. In our series, no instability was detected at the final follow-up.

In conclusion, pure tibiotalar dislocation remains uncommon. Immediate closed reduction should be performed as quickly as possible. Care must be taken for neurovascular injury before and after reduction. Six weeks of immobilization is usually enough to achieve a stable tibiotalar joint and prognosis is good.

References

1. Alami M, Bassir R, Mahfoud M, *et al.* Upward tibiotalar dislocation without fracture: a case report. *Foot (Edinb)*, 2010, 20: 149–150.
2. Elisé S, Maynou C, Mestdagh H, Forgeois P, Labourdette P. Simple tibiotalar luxation. Apropos of 16 cases. *Acta Orthop Belg*, 1998, 64: 25–34.
3. Georgilas I, Mouzopoulos G. Anterior ankle dislocation without associated fracture: a case with an 11 year follow-up. *Acta Orthop Belg*, 2008, 74: 266–269.
4. Rivera F, Bertone C, De Martino M, Pietrobono D, Ghisellini F. Pure dislocation of the ankle: three case reports and literature review. *Clin Orthop Relat Res*, 2001, 382: 179–184.
5. Hermans JJ, Beumer A, de Jong TA, Kleinrensink GJ. Anatomy of the distal tibiofibular syndesmosis in adults: a pictorial essay with a multimodality approach. *J Anat*, 2010, 217: 633–645.
6. Shaik MM, Tandon T, Agrawal Y, Jadhav A, Taylor LJ. Medial and lateral rotatory dislocations of the ankle after trivial trauma—pathomechanics and management of two cases. *J Foot Ankle Surg*, 2006, 45: 346–350.
7. Prost à la Denise J, Tabib W, Pauthier F. Long-term result of a pure tibiotalar dislocation in a child. *Orthop Traumatol Surg Res*, 2009, 95: 558–562.
8. Uyar M, Tan A, İşler M, Cetinus E. Closed posteromedial dislocation of the tibiotalar joint without fracture in a basketball player. *Br J Sports Med*, 2004, 38: 342–343.
9. Fahey JJ, Murphy JL. Dislocations and fractures of the talus. *Surg Clin North Am*, 1965, 45: 79–102.
10. Funk JR. Ankle injury mechanisms: lessons learned from cadaveric studies. *Clin Anat*, 2011, 24: 350–361.