

Management of a Medial Peritalar Dislocation

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Received: September 26, 2016; **Published:** October 19, 2016

Abstract

Peritalar dislocations are uncommon injuries involving the talocalcaneal and talonavicular joints. A high energy mechanism of injury is typical. Dislocations are either lateral or medial. Early anatomic reduction, usually by closed means, is crucial for good outcome. This article will review the anatomy, pathoanatomy, mechanism of injury, diagnosis, initial management, and surgical intervention, period of immobilization/ rehabilitation, complications and prognosis of patients sustaining medial peritalar dislocations.

Keywords: Dislocation; Peritalar; Medial

Abbreviations

CT: Computed Tomography; ROM: Range of Motion; AVN: Avascular Necrosis

Introduction

Peritalar dislocation is an uncommon injury which occurs in the talocalcaneal and talonavicular joints [1,2]. It often results from high energy trauma, such as falls from a height, athletic injuries and motor vehicle accidents [1,3]. There are two major types of dislocation, medial and lateral [2]. In medial peritalar dislocations, the talar head is lateral to the rest of the medially dislocated foot [2].

Immediate reduction is important to avoid skin necrosis and peripheral vascular compression [4,5]. Closed reduction is possible in the majority of cases [3], however open reduction is required in approximately 10 - 20% of cases, in which closed reduction was unsuccessful [4].

Discussion

Peritalar dislocation (also known as subtalar dislocation) refers to an injury involving the simultaneous dislocation of the talonavicular and talocalcaneal joints without a fracture of the talar neck or tibiotalar joint disruption [6-12]. Several authors have stated that this is a rare injury [2,13-15] however, due to an increase in the number of road accidents, trauma in general and improved radiological diagnostic techniques, there has been an increase in the number of cases reported. It accounts for approximately 1 - 2% of all dislocations [3, 8]. Most dislocations occur in young males at approximately 6: 1 [1,2,16].

Anatomy

The talonavicular and talocalcaneal joints act as a hinge that transmits load and movements from the foot and ankle. There is triplane movement across these joints which include a combination of flexion, supination and adduction or extension, pronation and abduction

[8]. The talocalcaneal joint is composed of three separate articulations. The anterior, middle and posterior facets provide bony stability to the joint which is reinforced by ligamentous restraints [11]. The interosseous ligaments within the sinus tarsi provide the majority of ligamentous stability. The deep deltoid and calcaneofibular ligaments provide restraint to eversion and inversion forces respectively [11]. The strong calcaneonavicular ligament resists disruption during inversion and eversion forces which are dissipated through the weaker talonavicular and talocalcaneal ligaments, thus disrupting these two joints and allowing displacement of the calcaneus, navicular and all distal bones of the foot as a unit, either medially or laterally [9,12,17,18]. In medial dislocations, the sustentaculum tali acts as a fulcrum about which the foot rotates to lever apart the talus and calcaneus [9,12,13,19]. With this mechanism, two types of fracture dislocations are possible, 1) fracture of the lateral aspect of the navicular and 2) fracture of the posterior process of the talus. It is important to recognize the associated fracture because it involves the weight bearing surface [20].

The dorsalis pedis, peroneal and posterior tibial arteries provide the blood supply to the talus. The dorsalis pedis provides the majority of the dorsal blood supply while the lateral and inferior blood supply arises from branches of the dorsalis pedis and peroneal arteries as they traverse through the sinus tarsi. Branches of the posterior tibial artery supply the medial talus [11]. The blood supply to the body of the talus is supplied mainly by the tarsal canal artery which may be damaged by a peritalar dislocation especially when associated with a fracture of the posterior tubercle and lead to avascular necrosis (AVN) [21].

Pathoanatomy

The classification is based anatomically on the position of the foot in relation to the talus [7,11,12,13]. Peritalar dislocations may occur in any direction: anterior, posterior, medial, or lateral [2,12,13]. In reality, anterior and posterior dislocations always have some degree of medial and lateral displacement [5,21,22]. Based on this fact, these dislocations are diagnosed as medial or lateral [1,2]. Regardless of the direction, there is always significant deformity [2,12,13].

Medial dislocations are also called acquired clubfoot [1,2] as well as basketball foot [14,18,23]. It is said to comprise 80 - 85% of all peritalar dislocations [8,13,24,25,26]. Rivera [27] in his literature search found that 76% of 223 cases of peritalar dislocations were medial. In medial dislocations, an inversion force is applied to a plantar flexed foot which twists the tarsus out of the talonavicular joint then the subtalar joint. The calcaneus is displaced medially, while the head of the talus appears dorsolateral [1,13,23]. Medial dislocation is the most common because the subtalar joint is only unstable in inversion [12] and the tendency of the foot to be inverted and plantar flexed after a fall from height [27].

Mechanism of Injury

Many dislocations result from high energy mechanisms (e.g. falls from height, motor vehicle accidents and sports [2,6,12,16,19]). Due to these mechanisms, up to 40% of peritalar dislocations are open and may have significant soft tissue injury related to ligamentous disruption [12,17,28,29]. Lateral dislocations have a worse prognosis due to its association with high energy mechanisms of injury making it more prone to more severe osseous and soft tissue injuries [7,19,28,30].

Diagnosis/Assessment

Patients typically present with significant pain, swelling and deformity to the affected foot [11,12]. With a high energy mechanism, ipsilateral extremity and spine injury must be ruled out [16]. The midfoot deformity includes supination and plantarflexion [17]. Palpation of the talonavicular, anterior fibulotalar and tibiotalar ligaments is painful as well as palpation and mobilization of the midtarsal joints [12]. Medial and lateral peritalar dislocations must be distinguished from each other because the reduction methods and prognosis differ [1,4,13,28]. The overlying skin and neurovascular status must be carefully documented before and after manipulation and reduction [17].

Initial Management

Immediate reduction is important to avoid soft tissue damage e.g. skin necrosis and peripheral vascular compromise [5,17,29,30]. Closed reduction is possible in the majority of peritalar dislocations [4,6,7,22]. The reduction is relatively easy if there is no interposition of tendon or bone fragments [22]. When it is done early the reduction is usually stable [1]. Repeated manipulation must be avoided as this represents repeated trauma with potential vascular insult [1,9,31]. When the initial reduction attempt is unsuccessful, x-ray is immediately obtained which rules out an ankle fracture which is sometimes confused with peritalar dislocations [9]. For complete radiographic analysis, anteroposterior, lateral and oblique views are required [32]. Post reduction, the foot is examined to assess the stability [11]. Following closed reduction, CT scan should be routinely done to assess reduction and to rule out osteochondral lesions [1,13,23], which x-ray may fail to diagnose [11]. When closed reduction for closed injuries fails in the emergency room, closed reduction should be attempted in operating theatre under general anaesthesia.

Surgical Management

If closed manipulation fails, open reduction is performed. Open reduction for closed injuries is infrequently required [31]. It is reserved for irreducible dislocations and osteochondral fractures which block reduction [15,20,26]. Common causes of failure to achieve a closed reduction include buttonholing of the extensor retinaculum or the extensor digitorum brevis, entrapment of the talus in the talonavicular capsule or talocalcaneal impingement by fractures of their articular surfaces [19,17,30,33]. The presence of instability may warrant fixation of the subtalar, talonavicular or calcaneocuboid joints with Kirschner wires. Instability may be due to a severe soft tissue injury or intra-articular fractures [11,23].

Small loose articular fracture fragments must be removed, whereas large fragments must be reduced and fixed with Kirschner wires or small screws to restore joint stability and congruity [20]. Injuries requiring open surgery tend to be more severe with an increased incidence of associated fractures and articular cartilage damage which worsens prognosis. Intra-articular fractures increase the risk of persistent arthritis while associated fractures of adjacent bones increase the immobilisation period [1,29,30].

Open injuries need to be debrided at the time of reduction, irrigated and the wound left open for consideration of delayed primary closure at 3-5 days [2,11,32]. Standard antibiotics and tetanus vaccination is given as indicated [11]. Jungbluth, *et al.* [34] recommended that for open injuries, an external fixator may be used for six weeks.

Immobilisation/Rehabilitation

After a stable reduction, a below knee plaster cast is applied for 3 - 6 weeks [27]. There has been no consensus with respect to the ideal immobilisation period after successful reduction [15]. The duration of immobilisation in a non-weight bearing short cast is variable, as there is a balance between avoiding instability and avoiding stiffness [35]. It has been argued that for simple dislocations, four weeks is the time required to allow for adequate soft tissue healing [12,36]. Perugia, *et al.* [8] recommended four weeks immobilisation based on their study of 45 patients (39 of which were medial dislocations). At an average of 7.5 years he had good results in most patients, when pain, function and alignment were objectively measured. The mean American Orthopaedic Foot and Ankle Society Hindfoot Score in that study at follow-up was 84. No baseline measurements were done. Immobilisation for greater than four weeks has been said to increase the risk of joint rigidity and late onset osteoarthritis [26]. Hence, some authors felt that immobilisation for simple dislocations should not exceed four weeks, and six weeks for those with associated fracture [7,30,36]. Jungbluth, *et al.* [34] however reported good results for simple dislocations with six weeks immobilisation. Some view an immobilisation period of less than four weeks to be associated with an increased risk of instability or recurrence rate [21,26]. Zimmer and Johnson [25] found that for young patients with shorter immobilisation periods, they were at an increased risk of symptomatic subtalar instability. Regardless of the immobilisation period, immediate

mobilisation physiotherapy is mandatory and finally, full weight bearing [7,30,34,35]. Delee [3] and Inokuchi [22] recommended active ROM immediately post immobilisation is emphasized to prevent fibrosis and stiffness in the subtalar joint [35]. Fotiadis [15] looked at 328 patients via a literature search from 26 studies and found that 86% were treated conservatively with a below knee cast and non-weight bearing for 3 - 6 weeks. The results were generally good in terms of objective pain, functional and alignment scores, despite residual pain and stiffness in the subtalar and ankle joints. Delee [3] found that for simple dislocations, three weeks of immobilisation provided sufficient stability and near normal ROM. There was a 50% decrease in subtalar motion when immobilisation went beyond six weeks.

Complications

Late complications include tarsal bone osteonecrosis, osteoporosis and post traumatic arthritis [35]. Post traumatic arthritis is the most common of these [7,27,30]. It may be a manifestation of occult or recognized intra-articular fractures secondary to high energy trauma [27]. CT scan may be used to rule out intra-articular fractures. The most consistent problems in simple dislocations are limited subtalar joint motion with associated symptoms of difficulty walking on uneven ground and foot pain with weather change [1,5,10,18]. Arthritic symptoms occur more often in dislocations associated with fractures [14,21]. They usually occur in the subtalar joint and rarely involve the talonavicular joint or ankle joint [7,21,28]. Goldner, *et al.* [28] looked at type III, open fracture subtalar dislocation at 18 years follow up in 15 adolescents or adults. He found that the combined articular and soft tissue injuries inevitably lead to progressive narrowing and stiffness of the subtalar and adjacent joint. DeLee and Curtis [3] stated that open injuries and intra-articular fractures involving the talonavicular and subtalar joints are independent factors in the development of arthrosis. Monson and Ryan [19] found in their study that pure subtalar dislocations without major fracture of the talus results in minimal long range disability with minimal or no pain.

Avascular necrosis (AVN) is a rare complication despite a poor blood supply [1,29,30], even in open injuries with marked displacement [10]. AVN usually occurs as a consequence of a high energy mechanism causing significant soft tissue compromise and associated devascularisation of the talus [22]. Bohay and Manoli [5] noted an increased incidence of AVN in dislocations associated with fractures of other bones. The extensive soft tissue damage during dislocation interrupts the vascular interosseus arcade which remains so until reduction is achieved, therefore early reduction reduces the AVN risk [37].

Prognosis

Prognosis of isolated medial talar dislocations are related to immediate reduction, the energy absorbed by soft tissues at time of impact and immobilisation period [37]. Thus, after immediate reduction, early mobilisation may improve outcome [37]. In the first prospective study to analyse immobilisation time, Lasanianos, *et al.* [37] using a prespecified protocol achieved good results using an immobilisation period of 2-3 weeks in a cast, early ankle ROM and partial weight bearing. The study suggested that further immobilisation causes further joint stiffness and reduce foot and ankle functionality as well as preserve proprioception.

High energy trauma, the degree of soft tissue injury, lateral dislocation, associated fractures and long immobilisation have all been implicated as independent risk factors for poor prognosis [27,28]. The mechanism of injury is most important factor predicting long term outcome. A simple inversion injury rarely causes long term morbidity but motor vehicle accidents, falls from a height and other high energy mechanisms are more likely to be associated with concomitant fractures, severe soft tissue injury, open fractures and persistent long term symptoms [3,10,12,].

Conversely a low energy mechanism of injury is associated a good prognosis [36]. The poor results related to open injuries are attributed to increased infection rates [10,19]. Associated fractures of the foot and ankle and open injuries are strongly associated with poor results including chronic foot swelling, arthritis and AVN [31,38]. Poor anatomic and functional results may require triple arthrodesis, which is not an uncommon end result in open subtalar dislocations [33].

Conclusion

Peritalar dislocations are uncommon injuries usually sustained by high energy trauma which may lead to significant complications including AVN of the talus and subtalar arthrosis. Accurate and timely diagnosis of occult osteochondral fragments; urgent reduction, adequate immobilisation time and adequate rehabilitation are the most important factors in preventing a poor result.

Acknowledgement

Thank you to Kaye Lambert Fletcher for invaluable technical support.

Conflict of Interest

Nil.

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Volume 4 Issue 2 October 2016

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