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Case Report:
Pure Ankle Dislocation Treated With Casting and Early Range of Motions and Rehabilitation

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ABSTRACT

Introduction: Ankle dislocations are a group of injuries requiring immediate orthopedic interventions to avoid subsequent neurovascular complications and impairments. In most cases, they are associated with a malleolar fracture in the ankle. However, in the sporadic cases, especially the ones due to high-energy traumas, ankle dislocations are not associated with malleolar fractures and are referred to as "pure ankle dislocations".

Case Presentation: Here, we report a rare case of pure ankle dislocation in a 38-year-old female athlete with no previously established predisposing risk factors. The patient was referred to our emergency department following a catastrophic fall down during exercise, resulting in severe ankle pain and deformity. The patient was treated with urgent reduction of the displacement and 6 weeks of immobilization by casting followed by intensive physiotherapy.

Conclusion: At the end of the 3-month follow-up, no symptoms of instability were observed, and the patient could walk normally; at the 6-month follow-up, the patient could perform her sport activates similar to the initial level.

1. Introduction

Usually, ankle (tibiotalar) dislocations are concomitant with fractures, mostly as a result of the high strength and durability of the ligaments of the ankle joint. However, in the very rare circumstances, tibiotalar dislocation of the ankle may take place without any malleolar fractures, which are referred to as “pure ankle dislocations”. Most commonly, pure ankle dislocations result from high-energy traumas, such as fall, injuries during sporting or motor vehicle crashes. Also, several predisposing factors ranging from previous ankle sprains and malleolus hypoplasia to peroneal muscles weakness and ligamentous laxity predispose ankle to pure ankle dislocation [1].

Among the capsular ligaments located in the ankle, anterior and posterior ones are more prone to injury because of their relatively thin diameter. The main goals

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of therapy include an urgent reduction of the joint and alleviation of neurovascular stress [2]. Here, we describe a case of pure ankle dislocation in a female athlete as a result of an accidental fall during exercise. Besides discussing its initial management and imaging findings, we present the outcomes at the end of the 6-month follow-up period.

2. Case presentation

A 38-year-old female athlete was referred to the Emergency Department (ED) following an accidental falling injury during exercise. The clinical examination demonstrated a deformity in the right ankle; however, the swelling was not noticeable. The pulse of the dorsalis pedis was weak, indicating a capillary refill time below one second, but the posterior tibial artery was completely impalpable owing to the resulted deformity. Radiography examination demonstrated posterior ankle dislocation without any concomitant bone fracture (Figure 1). The reduction of dislocation was immediately performed following sedation in the ED. In brief, Achilles tendon was initially relaxed by flexing the knee, and then, the urgent reduction of the deformity was made by applying longitudinal traction with mild forward force.

After the reduction of the dislocation, triphasic pulses of Dorsalis pedis and posterior tibial artery were both detected, using a hand-held Doppler. The correct reduction of the ankle joint was also confirmed with check X-ray images (Figure 2). Next, the CT scan was obtained for the identification of malleolar fracture or possible subtle incongruities and the entrapment of osteochondral fragments in the joint space. As shown in Figure 3, the ankle joint was reduced congruently, and no associated fractures were observed. During the next two weeks, the patient was ambulated without any weight-bearing, which was followed by four weeks of progressive touch weight-bearing. Then, the patient was referred to the physiotherapy department for the initiation of functional rehabilitation and range of motion exercises.

Meanwhile, MRI was taken in the first week to discover the potential extension of injury to the ligamentous. The results of MRI demonstrated that the Anterior Talofibular Ligament (ATFL) and Posterior Talofibular Ligaments (PTFL), as well as Calcaneofibular Ligament (CFL) and spring ligaments were disrupted (Figure 4). At the end of the 12 week follow-up, no sign of instability was observed, and the patient could walk normally and achieved full flexion-extension abduction and adduction (Figure 5). At the end of the 24 week follow-up, the patient could perform her sports exercises almost similar to pre-injury level.

3. Discussion

Presented for the first time by Peraire et al., pure ankle dislocations are the group of rare orthopedic emergencies. They are usually categorized based on the direc-

Figure 1. Plain film X-rays of right ankle, demonstrating os naviculare and complete dislocation of the ankle joint (posteromedial) without any concomitant fractures at the medial or lateral malleolus

Figure 2. Post-reduction X-rays, depicting a convenient reduction of the ankle joint without any associated talar shifts or syndesmotic injuries

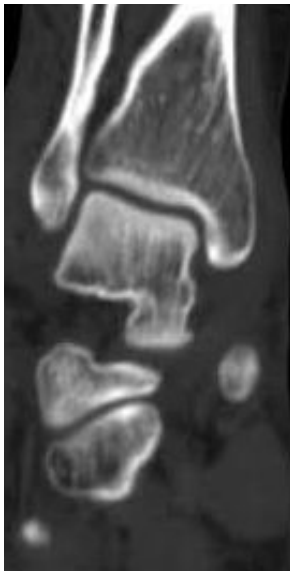

Figure 3. Post-reduction CT scan, confirming the congruent reduction of the ankle joint with no concomitant fractures

tion of talus dislocation into four classes of anterior, posterior, posterolateral, and posteromedial dislocations [3, 4]. The leading cause of these injuries is high-energy traumas. Among the reported cases of pure ankle dislocations thus far, an open injury is the predominant form, making the closed-form presentation even rarer [5]. Medial side ligaments, including superficial deltoid and deep ligaments, together with lateral ligaments of CFL, ATFL, and PTFL provide the stability of the ankle joint, which is further strengthened by the talus setting positioned in the deep ankle mortise [6].

On the other hand, ankle's anterior to posterior stability is merely provided by muscles surrounding the ankle and ankle joint capsule. The robustness of medial and lateral ligament may partly explain the reasons why ankle injuries are mostly associated with fractures as bone failure precedes ligaments failure under harsh stress condition. Thus far, the most widely accepted theory explaining the mechanism of pure ankle dislocation occurrence is related to the exceptional rhomboidal form of talus. So it is less protected in the ankle mortise during maximal plantar flexion of ankle joint, and further addition of axial and inversion forces results in the dislocation of the talus from ankle [7]. Based on Moehring et al. study, some of the predisposing factors for pure ankle dislocation include weakness of peroneal muscles, medial malleolus hypoplasia, and laxity of ligamentous [8].

The convenient, proper, and urgent reduction of dislocation is the most critical step in relieving the stress from the neurovascular building, preventing skin compromisation,

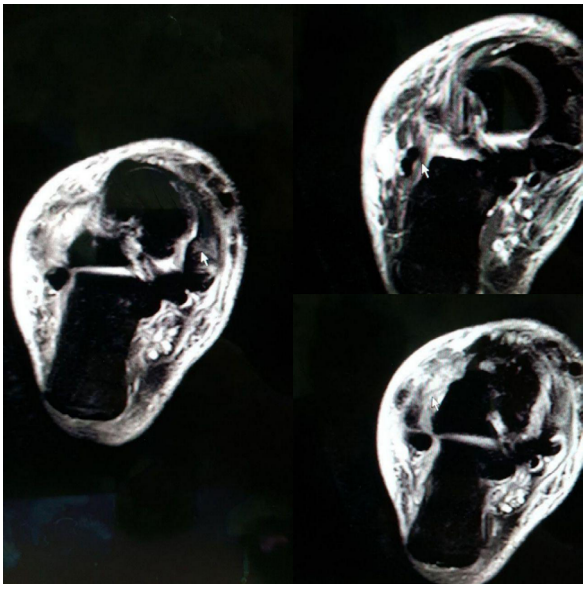

Figure 4. T2 MRI images illustrating high signals in areas of ankle signifying rupture of the Anterior Talofibular Ligament (ATFL) and Posterior Talofibular Ligaments (PTFL), as well as Calcaneofibular Ligament (CFL) and spring ligaments

and reducing the formation of swellings. In this manner, the most recommended approach includes closed reduction under general anesthesia or sedation. A six to nine week period of the short-leg cast is usually applied for joint immobilization following reduction. Based on the results of previously performed randomized controlled trials, treating complete rupture of lateral ankle ligaments with a two to three-week period of joint immobilization in a walking cast or orthosis, immediately continued by the range of motion exercises provides similar treatment outcomes compared to ligament repair [9-11].

However, the average duration of immobilization reported in the literature is six weeks. Although conferring

Figure 5. Range of motion of the patient's ankle after 12 weeks

enough time for improving ligament healing, this longer period of immobilization enhances the stiffness of the ankle. Therefore, further studies on the determination of optimum immobilization period seem to be critical [5]. In the case of pure ankle dislocation, CT is highly recommended for excluding the possibility of osteochondral fragments entrapment in joint. Also, MRI provides profounding information about the extent of injuries to the cartilage and ligaments, as well as early arthritic changes, especially when patients suffer from ongoing pain or instability [12]. Based on the results reported by several authors, instability and joint stiffness are uncommon complications associated with pure ankle dislocations [8, 13]. In contrast, Elisé et al. have reported an incidence rate of (25%) for degenerative changes among their 16 studied cases (i.e. four out of 16 cases) [14].

In conclusion, pure ankle dislocations are a group of rare injuries, requiring immediate reduction and immobilization for six weeks, which must be continued by the early range of motion and aggressive physiotherapy and rehabilitation. Overall, the outcome of this conservative treatment for pure ankle dislocation is satisfactory, and most of them are expected to reach their normal pre-injury levels of activity.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the review board of Department of Orthopedics Surgery, Hazrate Rasoole Akram Hospital, Iran University of Medical Sciences, Tehran.

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Authors' contributions

All authors contributed in preparing this article.

Conflict of interest

The authors declared no conflict of interests.

References

[1] Tarantino U, Cannata G, Gasbarra E, Bondi L, Celi M, Iundusi R. Open medial dislocation of the ankle without fracture. J Bone Joint Surg Br. 2008; 90(10):1382-4. [DOI:10.1302/0301-620X.90B10.21015] [PMID]

[2] Sayit E, Sayit AT, Zan E. Open dislocation of ankle without fracture treated with an external fixator. Orthop Surg. 2017; 9(2):247-51. [DOI:10.1111/os.12292] [PMID]

[3] Admi M, Mamai O, Niandou AM, Hassani I, Lahrach K, Marzouki A, et al. [An unusual case of pure posteromedial tibiotalar dislocation following a ski accident (French)]. Foot Med Surg. 2017; 33(3):56-9. [DOI:10.1007/s10243-017-0460-z]

[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; 382:179-84. [DOI:10.1097/00003086-200101000-00024]

[5] Wight L, Owen D, Goldbloom D, Knupp M. Pure ankle dislocation: A systematic review of the literature and estimation of incidence. Injury. 2017; 48(10):2027-34. [DOI:10.1016/j.injury.2017.08.011] [PMID]

[6] Bonnin JG. Dislocations and fracture-dislocations of the talus. Br J Surg. 1940; 28(109):88-100. [DOI:10.1002/bjs.18002810909]

[7] Fernandes TJ. The mechanism of talo-tibial dislocation without fracture. J Bone Joint Surg. 1976; 58(B):364-5.

[8] Moehring HD, Tan R, Marder R, Lian G. Ankle dislocation. J Orthop Trauma. 1994; 8(2):167-72. [DOI:10.1097/00005131-199404000-00015] [PMID]

[9] Ferran NA, Oliva F, Maffulli N. Ankle instability. Sports Med Arthrosc Rev. 2009; 17(2):139-45. [DOI:10.1097/JSA.0b013e3181a3d790] [PMID]

[10] Kerkhoffs GM, Handoll HH, de Bie R, Rowe BH, Struijs PA. Surgical versus conservative treatment for acute injuries of the lateral ligament complex of the ankle in adults. Cochrane Database Syst Rev. 2007; (2):CD000380. [DOI:10.1002/14651858.CD000380.pub2] [PMID]

[11] Pihlajamäki H, Hietaniemi K, Paavola M, Visuri T, Mattila VM. Surgical versus functional treatment for acute ruptures of the lateral ligament complex of the ankle in young men: A randomized controlled trial. J Bone Joint Surg Am. 2010; 92(14):2367-74. [DOI:10.2106/JBJS.I.01176] [PMID]

[12] Mubark I, Anwar S, Hayward K. Closed posterior ankle dislocation without associated fractures: A case report. J Surg Case Rep. 2017; 2017(8):rjx165. [DOI:10.1093/jscr/rjx165] [PMID] [PMCID]

[13] Toohey JS, Worsing JR. A long-term follow-up study of tibiotalar dislocations without associated fractures. Clin Orthop Relat Res. 1989; (239):207-10. [DOI:10.1097/00003086-198902000-00023]

[14] Elisé S, Maynou C, Mestdagh H, Forgeois P, Labourdette P. Tibiotalar dislocations without associated fractures: A report on 16 cases. Acta Orthop Belg. 1998; 64(1):25-34. [PMID]