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## Pure ankle dislocation after modified Broström repair for chronic lateral instability: Case report and literature review

Athanasios Galanis, Panagiotis Karampinas, John Vlamis, Michail Vavourakis<sup>\*</sup>, Eftychios Papagrigorakis, Christos Vlachos, Dimitrios Zachariou, Spiros Pneumaticos

3rd Department of Orthopaedic Surgery, National & Kapodistrian University of Athens, KAT General Hospital, Athens, Greece

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### ABSTRACT

Ankle dislocation with no concomitant malleolar fracture is an overwhelmingly rare injury, and only a relatively limited number of cases have been reported. Diligent management regarding the treatment of these injuries is requisite to attain an auspicious outcome. Lateral ankle instability is a frequent condition that can derive from recurrent sprains, predominantly at a young age. Broström repair, with its modifications and updates, has been established as the optimal solution when treating chronic lateral unsteadiness. We present a peculiar case of a posteromedial ankle dislocation without accompanying fracture in a patient operated on many years before the injury for chronic lateral instability with a modified Broström procedure. No similar case could be retrieved in the existing literature. After the initial clinical and radiological assessment, urgent closed reduction of the dislocation was achieved, and the foot was immobilized. Further imaging was carried out to evaluate the features of the injury. It was deduced that the repairs from the previous operation were intact. The patient was operated on to repair the distal tibiofibular syndesmosis. The postoperative course was uneventful, and absolute functional capacity was eventually accomplished. Demonstrating this rare case, we accentuate the role of implementing the modified Broström procedure in the surgical treatment of chronic lateral ankle instability.

### Introduction

Posteromedial ankle dislocation without accompanying fracture is an infrequent, ordinarily high-energy injury, and only a narrow number of cases have been reported in the existing literature. Emergent reduction, proper wound care in open injuries, one-stage ligament restoration and accurate joint stabilization with a cast or external fixator are regarded as the cornerstone of treatment as they yield satisfactory clinical outcomes [1,2]. Complications correlated to these injuries include superficial infection, moderate-to-severe ankle stiffness, degenerative ankle alterations and residual numbness, while an associated chondral lesion is a pivotal contributing element in the development of ankle osteoarthritis [1,2].

Lateral ankle injuries are regularly concomitant with deltoid injuries and are notably connected to ankle fractures with or without dislocation [3]. Surgical procedures regarding the treatment of chronic lateral instability involve direct ligament repair. Anatomic reconstruction repair provides a higher reduction of talar tilt angle, which is of paramount significance [3,4]. Non-anatomic reconstruction alternatives, such as static tenodesis, achieve good clinical results and are related to substantial patient satisfaction and fewer

<sup>\*</sup> Corresponding author at: Chelmou 6, Neo Irakleio, Athens 14122, Greece.  
E-mail address: [michail.vavourakis@outlook.com](mailto:michail.vavourakis@outlook.com) (M. Vavourakis).

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subsequent sprains. Complications of ankle instability treatment include recurrent instability, superficial peroneal nerve injury and symptomatic limited ankle functionality [3,4].

Up to 40 % of repeated lateral ligament sprains can trigger chronic lateral ankle instability that requires surgical treatment [4]. Broström repair has been recommended since its establishment in 1966 as a particularly fruitful surgical approach when treating chronic lateral ankle instability. The procedure has pronouncedly expanded with the advent of arthroscopy, ultrasound and other techniques with plentiful clinical outcomes [5]. Modified techniques have been gradually launched, and specifically, the double anchor technique is considered to produce superior outcomes in terms of reduction of talar tilt compared to the single anchor procedure. Also, primary reconstruction in combination with advanced ligament reinforcement prompts greater clinical results [3–5]. There is exiguous evidence suggesting that the exertion of suture tape augmentation in Broström reconstruction diminishes recurrence rates of instability when contrasted to the modified Broström technique alone [5]. However, suture amplification may precipitate congruous rehabilitation and earlier return to pre-injury levels of activity [5].

We present an exceedingly rare case of pure posteromedial ankle dislocation in a patient operated with modified Broström technique for chronic lateral instability several years prior to the injury. It is an unexpected event in the course of observing and treating a patient with ankle instability. We could not detect a paper of a similar case in the existing literature, and therefore we gauge that it is a thought-provoking case demonstrating the effectiveness of modified Broström technique in reinstating lateral ankle stability.

### Case presentation

A 33-year-old Caucasian female with a BMI of 32 was presented at the Emergency Department of our Institution complaining about acute right ankle pain and inability to walk, even with partial weight-bearing, due to a fall from a long staircase on a rainy day. The patient recalled that she lost her balance in the middle of the stairway owing to the slippery surface.

Past medical history, apart from hypothyroidism, included recurrent lateral ankle sprains when she was an amateur volleyball player that led to established instability, which required surgical intervention. She was operated on in our Institution approximately nine years before the injury, and the modified Broström technique was the treatment of choice. The surgery involved the repair of the ruptured anterior talofibular and calcaneofibular ligaments, along with augmentation of the reconstruction with the inferior extensor retinaculum (Broström-Gould procedure). The postoperative course was uneventful, and she was delighted with the outcome, having a painless stable joint with a full range of motion (Fig. 1).

On clinical examination, remarkable ankle deformity and severe swelling were conspicuous, with no skin lacerations. Punctilious neurovascular examination revealed no impairment. Plain radiographs corroborated the initial clinical diagnosis of dislocation. Posteromedial dislocation of the tibiotalar joint without associated malleolar fractures was observed (Fig. 2). Distal tibiofibular syndesmosis widening was noticed, while fibula's position was utterly unaffected by the injury secondary to her previous ankle surgery (Fig. 2).



Fig. 1. X-rays four years after the modified Broström treatment.



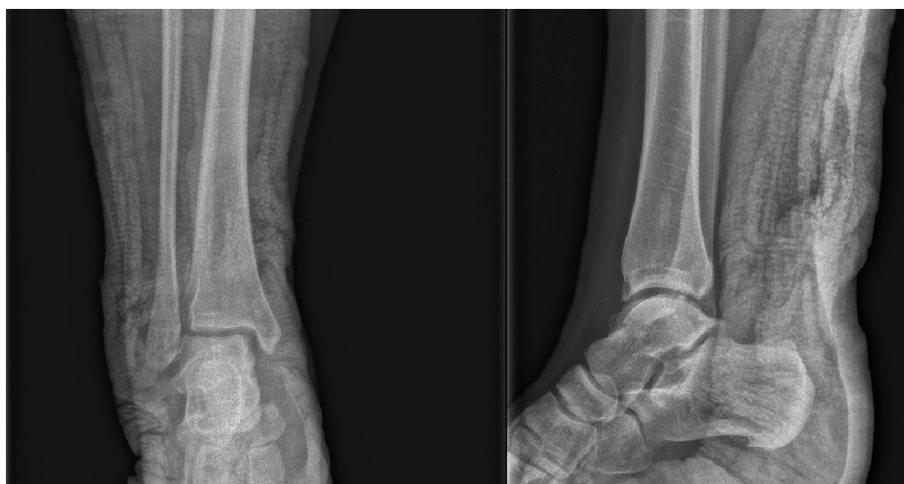
**Fig. 2.** Radiological confirmation (AP and lateral view) of the rare ankle dislocation with no accompanying fracture.

Instant typical closed reduction of the dislocation was performed under sedation. The foot was then reevaluated regarding neurovascular status with no alterations. The ankle was immobilized with the application of a posterior below-knee backslab. Post-reduction x-rays were patently satisfactory (Fig. 3). An urgent MRI scan was afterwards performed in order to assess the gravity of the injury. It was strikingly inferred that the reconstruction from her previous surgery was intact (Fig. 4). The patient was admitted to our clinic, and it was decided to be operated on for restoration of the ruptured distal tibiofibular syndesmosis.

The patient underwent surgery the following day with the employment of the Syndesmosis TightRope XP Implant System (Arthrex, Naples, Florida, USA). (Fig. 5). A CT scan was subsequently conducted to evaluate the postoperative stability of the joint with satisfactory outcomes (Fig. 5). She was discharged two days postoperatively with the application of a cast. Early postoperative course was uneventful, and the cast was removed six weeks after the operation. Strenuous physiotherapy was then initiated along with attentive partial weight-bearing, while full weight-bearing was permitted after additional 20 days with small-scale residual tenderness. The patient carried on with intensive range of motion exercises, and at the 6-month follow-up, she was pain-free, with no signs of ankle instability or laxity, and accomplished full range of motion, being able to return to her pre-injury routine. One year after the surgery, the patient has entirely recuperated and is very pleased with her ankle's functional capacity.

### Discussion

Ankle dislocation without concomitant malleolar fractures is a rare high-energy injury owing to the sturdiness of the auxiliary



**Fig. 3.** Felicitous closed reduction of the dislocation (AP and lateral view).

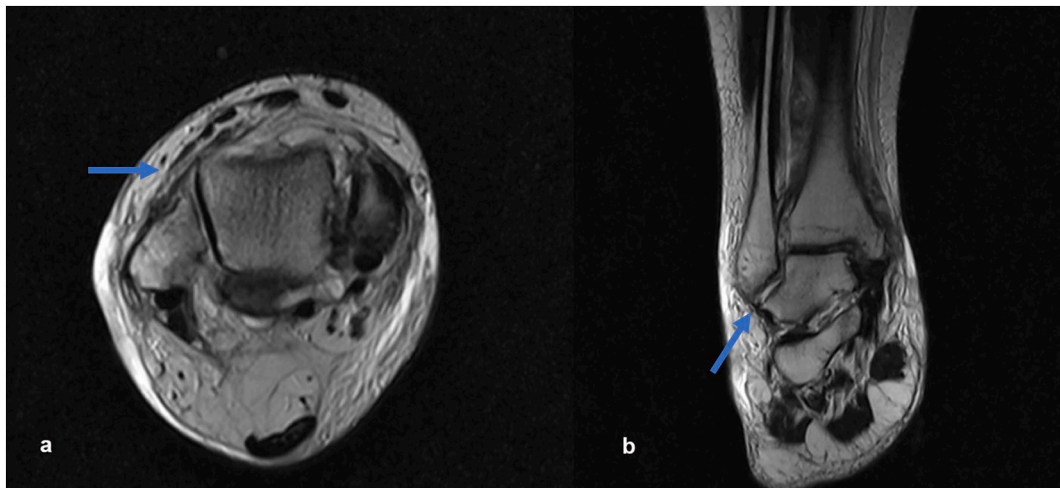


Fig. 4. MRI assessment (a. axial view, b. coronal view) depicting the durability of the modified Broström repair.

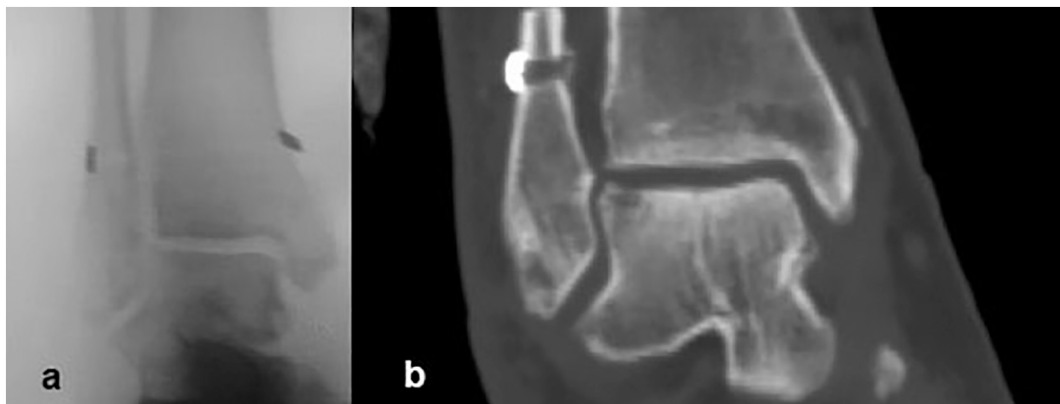


Fig. 5. (a) Intraoperative fluoroscopy imaging; (b) Postoperative CT evaluation.

ligaments and the capsular reinforcements of the mortise capsule [3,4]. It is observed chiefly after road accidents (40 %) and especially motorcycle accidents (33 %). The second commonest etiology is sports trauma (35 %), such as volleyball (13 %) and basketball (8 %) [6,7]. Ankle dislocation delineation is determined by talus displacement in relation to the ankle mortise. There are five types reported by Fahey and Murphy: anterior, posterior, medial, lateral and combined [6,7]. In most of the cases (46 %), the direction of the dislocation is posteromedial [6]. The vast majority of closed ankle dislocations can be coped with closed reduction and immobilization for six weeks, followed by a progressive return to normal activities with good-to-prodigious clinical results [7]. Concerning open ankle dislocations, which account for roughly 50 % of the cases, acute repair of the torn ligaments consolidates the joint punctually and invigorates recovery [6,7]. The most reported complication following treatment is decreased ankle range of motion (18 %), while instability is outstandingly infrequent (2,6 %) [6]. Predisposing factors contributing to ankle dislocation are internal malleolus hypoplasia, ligamentous laxity, feebleness of peroneal muscles and multiple preceding ankle sprains [3,4,6]. In our case, no such predisposing factor for ankle dislocation is discerned. The rationale behind this peculiar dislocation was a high-energy trauma in conjunction with immense lateral ankle durability after a successful modified Broström operation.

Lateral ankle ligament sprains are injuries responded to in both high-level athletes and the general population. Up to 40 % of these injuries can induce chronic lateral ankle instability that demands surgical intervention [8]. Athletes with no notable improvement after 3–6 months of ankle bracing and functional rehabilitation may attain optimum results after open anatomic repair surgery, resulting in restoration of ankle stability, pain abatement and ameliorated functional capacity [6,8]. Modified Broström technique has evolved into the most suitable surgical option for the treatment of chronic lateral ankle instability. Despite good overall clinical outcomes when employing this procedure, recent biomechanical data have disputed the robustness and resistibility of this technique [8,9]. Arthroscopic repair of the anterior talofibular ligament is becoming increasingly accepted as a viable surgical option for lateral ankle instability. Present-day data connote that arthroscopic treatment delivers analogous clinical results with dwindled wound complication rates, contrasted to conventional open repairs [10]. Modified Broström repair with suture tape augmentation for chronic lateral ankle instability can engender ample clinical outcomes and is associated with fewer complications, reduced postoperative

immobilization and earlier return to everyday activities compared to the modified Broström technique alone [9,11]. What's more, instability recurrence figures were higher, and patients were more susceptible to revision surgeries after sole Broström repair [11]. Finally, a recent systematic review and meta-analysis by Yang Q et al. scrutinized the efficacy of modified Broström-Gould repair for chronic lateral ankle instability contrasted to other types of surgery like arthroscopic suture-tape internal bracing, the Chrisman-Snook procedure and others [12]. It was deduced that no significant discrepancies were observed between modified Broström procedure and other operations concerning postoperative complications and ankle stability assessment, suggesting that the outcomes of modified Broström surgery for the treatment of chronic lateral instability are broadly satisfactory. Notwithstanding, it was also concluded that other operations demonstrated better FAOS pain scores compared to modified Broström repair, indicating that the other operations may feature some clinical advantages over traditional modified Broström procedure [12]. In our case, we postulate a contentious inference, considering the amount of energy applied to the ankle during the injury and the repercussion of posteromedial ankle dislocation without accompanying fracture. This is a case of unanticipated or unwonted presentation of two rare entities.

## Conclusion

We presented the case of an unanticipated posteromedial ankle dislocation without concomitant fracture, an infrequent condition, notably after lateral ankle reconstruction with the modified Broström technique. Out of this case, we can gingerly deduce that modified Broström repair remains a viable surgical option regarding the treatment of chronic lateral ankle instability as it offers a vigorous reconstruction of the lateral ankle, resulting in satisfactory clinical outcomes.

## Funding

No funding was received for conducting this study.

## Ethics approval

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008 (5).

## Consent to participate

Informed consent was obtained from all individual participants included in the study.

## Consent for publication

Written consent was obtained for the publication of the data presented in this work.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Availability of data and materials

All raw data are available to access should they be requested.

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