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Review

Open and arthroscopic lateral ligament repair for treatment of chronic ankle instability: A systematic review

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ABSTRACT

Background: Chronic ankle instability is defined by an instability lasting more than 6 months, in those cases where a comprehensive conservative treatment fails a surgical stabilization is required. Several surgical techniques have been proposed for the management of the chronic lateral instability of the ankle and even after 50 years, the Broström–Gould technique is still considered the gold standard for the treatment of this pathology. Recently, many authors have developed completely arthroscopic lateral ligament repair and the use of these procedures is rapidly increasing. The aim of this review is to provide an updated overview of open and new arthroscopic lateral ligament repair techniques in order to summarize and compare the effectiveness of these strategies.

Methods: A systematic literature review using PubMed/Medline databases was performed (July 1972–July 2015). Clinical results, satisfaction rate and complications of both patient populations were recorded and statistically analyzed.

Results: The total ankles treated with an open Broström ATFL repair in the 13 studies was 505 with a mean follow up of 73.4 months (range 9 months–27.9 years). Postoperative AOFAS score was reported in 11 studies, with a mean value of 90.1 (range, 60–100), patient's satisfaction rate was 91.7%. Surgery-related complications occurred in 40 (7.92%) out of 505 treated ankles. The total number of ankles treated within the 6 arthroscopic studies was 216 with a mean follow up of 37.2 months (range 6 months–14 years). Five studies reported a mean postoperative AOFAS score of 92.48 (range, 44–100) with a patient's satisfaction rate of 96.4%. Surgery-related complications were observed in 33 (15.27%) cases.

Conclusions: The results of this review show the excellent efficacy of open and arthroscopic surgical procedures in the treatment of the chronic ankle instability. The higher complication rate of arthroscopic procedures respect to the open ones represents the major issue: however, this does not seem to affect the patient's satisfaction. Because of statistical heterogeneity observed no definitive conclusions can be statistically drawn. Finally, to definitively validate the effectiveness of arthroscopic procedures prospective and comparative studies are needed.

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Contents

1. Introduction	000
2. Materials and methods	000
3. Inclusion criteria	000

Abbreviations: ATFL, anterior talofibular ligament; CFL, calcaneofibular ligament; MRI, Magnetic Resonance Imaging; IER, inferior extensor retinaculum; AOFAS, American Orthopedic Foot and Ankle Society.

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4. Exclusion criteria	000
5. Statistical analysis	000
6. Results	000
7. Open procedures	000
8. Arthroscopic procedures	000
9. Discussion	000
10. Conclusion	000
Acknowledgements	000
References	000

1. Introduction

Ankle sprains are the most common orthopedic injuries, where the lateral ligament complex is involved in 85% of cases [1,2]. An initial conservative management based on rest, ice, compression, elevation of the limb and functional rehabilitation is recommended in acute lateral ligament injuries. Usually, the conservative treatment for acute injuries is successful, even if a chronic ankle instability persists in 5–20% of cases, defined by an instability lasting more than 6 months [3,4]. In these cases, if instability is still present after a comprehensive nonoperative treatment, a surgical stabilization is required [5–7].

The diagnosis of chronic ankle instability is based on a careful assessment of the history of the triggering event and further recurrent episodes. Physical examination should evaluate the presence of any foot and ankle malalignment, for example the presence of a cavus foot and a varus heel, flat foot and the presence of a tight gastrocnemius muscle confirmed by a positive Silverskiöld test. Palpation should elicit pain and tenderness particularly around the lateral gutter. The two most important tests for the evaluation of the ankle instability are the anterior drawer test and the talar tilt test [8,9]. Both ankles should always be tested to identify asymmetry: this procedure is useful to identify the presence of a generalized ligamentous laxity.

The anterior drawer test is a combination of internal rotation and straightforward translation of the foot with tibia fixed and bent knee: this procedure results in an anterior sub-dislocation of the ankle joint [10]. During the anterior drawer test the ‘suction sign’ is often visible, a characteristic sign caused by the skin sucked inwards over the lateral gutter [11]. The talar tilt test is very indicative of instability, but this test is rarely reliable: if positive, the disruption of the calcaneofibular ligament is complete, although the absence of an abnormal test does not preclude the instability [8].

Standard anteroposterior and lateral weight-bearing radiographs of the ankle should always be performed in order to evaluate foot morphology, hind-foot alignment and ankle arthritis. The use of stress radiographs is controversial: many studies demonstrated their reliability and efficacy for the evaluation of the chronic instability, nevertheless major concerns remain on reproducibility of this diagnostic tool and regarding its normal values [8,12,13].

Magnetic Resonance Imaging (MRI) is a useful tool to evaluate additional pathologies such as osteochondral lesions, often associated with instability, but it is of limited utility in the ligament assessment. Although this tool is extremely specific (100% for anterior talofibular ligament (ATFL) and 83% for calcaneofibular ligament (CFL)), it has a relatively low sensitivity (56% for ATFL and 50% for CFL) [8,9].

Several surgical techniques have been proposed for the management of the chronic instability of the ankle. The first proposed procedures were the non anatomical ones, such as the Evans [14], the Chrisman–Snook [15], the Watson–Jones [16] and the Castaing [17] procedure, these aimed to stabilize the lateral

ankle by sacrificing the local tissue, usually a portion of the peroneal tendons. These procedures are characterized by extensive exposures of the operative field, are technically demanding and require prolonged immobilization. Moreover, the sacrifice of the peroneal tendons with a development of non anatomical forces across the ankle joint may cause a possible future ankle degeneration [18,19].

To avoid a muscle imbalance, in 1966 Broström proposed an anatomic procedure to repair ATFL using its remnants [20]. Gould modified this technique in 1980 with the reinforcement of inferior extensor retinaculum (IER) [21] and Karlsson proposed to reattach ATFL to the fibula at its anatomical origin through drill holes [22]. The main advantages of this anatomic technique are the simplicity of the procedure, the possibility to restore the physiological joint anatomy and kinematics, and the preservation of the subtalar joint mobility [20,23]. Even after 50 years, the Broström–Gould technique is still considered the “gold standard” for the treatment of chronic ankle instability [24].

A third group of procedures described in literature [25] allows the ligament reconstruction using autologous or synthetic grafts. Like non-anatomical procedures this reconstruction uses tendon grafts, but on the other side it preserves local tissues and peroneal tendons as provided by anatomical procedures. This procedure should be planned in selected cases such as recurrences after a Broström–Gould repair, generalized ligamentous laxity, high body mass index or high-demand athletes.

Recently, many authors have developed completely arthroscopic Broström-like procedures, aimed to restore the ankle stability; the use of these procedures is rapidly increasing. All these techniques, such as the open ones, repair the anterior talofibular ligament only, reattaching residual ATFL and capsule to the fibula trough suture anchor/s. Some of these procedures contemplate the use of a second anchor to reinforce the repair with IER in a Gould fashion.

In this study we reviewed the literature on Broström-like procedure for chronic ankle instability. The aim of this review is to provide an updated overview of open and arthroscopic lateral ligament repair techniques in order to summarize and compare the effectiveness of these strategies.

2. Materials and methods

A systematic literature review using PubMed/Medline databases was performed (July 1972–July 2015) separately and independently by the first 2 authors; a computerized search of databases according to the PRISMA statement was employed. The main keywords “Brostrom; Gould; Ankle; Instability; Repair; Open; Arthroscopic; Procedure” were used and combined. The search strategy for MEDLINE was as follows: (Brostrom ankle instability) or (Brostrom repair) or (open Brostrom) or (Brostrom Gould) or (Brostrom procedure) for the open Brostrom procedure; (arthroscopic ankle instability) or (arthroscopic Brostrom) for the arthroscopic procedure. Two investigators (M.G., M.Z.) performed a separate, manual study selection from this list in order to exclude

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