

Review

Modified Broström technique for repair of the lateral ankle ligament complex: Narrative review

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Abstract

Objective: To evaluate the effectiveness of anatomic repair of the lateral ankle ligament complex, with emphasis on the anterior talofibular ligament (ATFL) and calcaneofibular ligament (CFL), using the modified Broström technique, specifically the Gould modification and contemporary variants (e.g., capsular reinforcement, inferior extensor retinaculum, and suture-tape augmentation).

Methods: Narrative review conducted in PubMed/MEDLINE, SciELO, LILACS, Web of Science, and Scopus databases, using search terms related to ankle instability, Broström technique, and ligament reconstruction. Studies published in Portuguese, English, and Spanish were included, without date restrictions, presenting data on clinical and functional outcomes.

Results: Included studies showed significant improvement in functional scores, especially in the AOFAS score, after anatomic repair. The findings indicate high success rates for the technique, with reduced recurrence of instability, improved strength and joint mobility, and high patient satisfaction. Comparison with other surgical techniques suggests that the modified Broström technique has equivalent or superior clinical outcomes with lower morbidity.

Conclusion: The modified Broström technique is effective for anatomic repair of the lateral ankle ligament complex, promoting functional recovery and joint stability in patients with chronic lateral instability. Despite the methodological limitations of the available studies, the findings support the clinical relevance of the procedure and its role as the first-line surgical option in appropriately selected cases.

Level of evidence V; Expert opinion.

Keywords: Joint instability; Lateral ligament, ankle; Suture techniques; Orthopedic procedures.

Introduction

Ankle ligament injuries are among the most common musculoskeletal conditions in clinical and sports practice, particularly inversion sprains that predominantly affect the anterior talofibular ligament (ATFL)^(1,2). The estimated risk of progression to chronic instability after a sprain varies widely, approximately 20% and 40% in individual studies and 7% to > 70% across systematic reviews and population-based cohorts, reflecting differences in definitions of chronic instability, inclusion criteria, evaluation method (self-report vs. clinical assessment), and duration of follow-up^(3,4). The high incidence, coupled with the high recurrence rates, highlights the clinical relevance of this condition⁽⁵⁾.

From an anatomic and biomechanical perspective, the ATFL is the primary structure responsible for lateral ankle stability and the first ligament injured in inversion sprains^(6,7). Impaired healing after recurrent injuries can progress to chronic ankle instability (CAI), characterized by persistent pain, recurrent joint failure, and increased risk of early joint degeneration. In this setting, anatomic repair using the modified Broström technique is the preferred surgical option, as it restores lateral ligament tension and function while preserving local structures^(8,9).

Different surgical techniques have been proposed over recent decades, with the modified Broström technique emerging as one of the most widely used approaches in

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CAI treatment⁽¹⁰⁻¹²⁾. This technique relies on anatomic reinforcement and reinsertion of the injured ligaments, especially the ATFL, restoring stability without allograft or autograft, thereby reducing the morbidity associated with more invasive procedures⁽¹³⁾.

Recent studies demonstrate favorable outcomes with the Broström technique and its variations, including functional improvement, return to sport, and low complication rates⁽¹⁴⁻¹⁷⁾. However, uncertainties remain regarding its effectiveness across diverse populations and clinical settings, its long-term effect on preventing joint degeneration, and its impact on pain control⁽¹⁸⁻²⁰⁾.

The objective of this study is to evaluate the effectiveness of the modified Broström technique for ATFL reconstruction in patients with CAI. The relevance is to generate evidence to inform the selection of the most appropriate surgical technique and support evidence-based practice. In addition, it is justified by its societal relevance, as CAI is associated with significant functional limitations, work absenteeism, and an economic burden on public health systems^(21,22).

Methods

This is a narrative review of the literature, focusing on the effectiveness of the modified Broström technique for ATFL reconstruction. Narrative review is a research method that enables the critical and interpretative synthesis of available knowledge without the rigid search and selection protocols of systematic reviews. Its main objective is to contextualize, discuss, and integrate published findings, enabling a better understanding of the advances, limitations, and perspectives on the subject. The selection focused on studies that describe the anatomic repair of the lateral ligament complex – especially the modified Broström technique and its variants – avoiding confusion with reconstruction techniques that use tendon grafts. This distinction is critical, as the repair is not limited to AFLT but also involves the calcaneofibular ligament (CFL) and capsular structures, reflecting the broader concept of ankle lateral complex repair.

The study was established through the guiding question: What is the effectiveness of the modified Broström technique for AFTL reconstruction in patients with CAI? The objective was to gather and critically analyze existing scientific evidence to identify findings on clinical, functional, and structural outcomes and to highlight potential gaps for future research.

The data collection was conducted between July and August 2025 in national and international scientific databases, including PubMed/MEDLINE, SciELO, LILACS, Web of Science, and Scopus. Search terms were used in Portuguese and English, isolated and combined with Boolean operators (“AND”, “OR”), namely: “ligamento talofibular anterior”, “reconstrução ligamentar”, “instabilidade crônica do tornozelo”, “técnica de Broström”, “Broström modified technique”, and “ankle instability surgery”.

Original articles, reviews, clinical trials, and case reports published in English, Portuguese, or Spanish from 2000 to 2025 that directly addressed AFTL reconstruction using

the modified Broström technique were included. Studies that: (i) included techniques unrelated to Broström; (ii) did not present clinical or functional results; (iii) were editorials, letters to the editor, or publications without peer review were excluded.

The study selection was performed in two stages: screening of titles and abstracts, followed by full-text review of potentially relevant articles. Data analysis was qualitative, with a critical description of the methods used, the outcomes evaluated, and the main outcomes reported. Data were organized as postoperative joint stability, time to return to activities, complications, recurrence rate, and patient satisfaction.

The findings were synthesized descriptively to compile outcomes and to integrate them into a critical discussion of the clinical applicability of the modified Broström technique. A meta-analysis was not performed due to heterogeneity in study designs, populations studied, and outcome measures.

Results and Discussion

The search identified 132 records, and after applying the inclusion and exclusion criteria, 22 studies were selected in this narrative review. Among the selected articles, there was a predominance of international publications, especially from Europe, North America, and Asia, reflecting global interest in improving surgical techniques for CAI^(1,2,8).

As for the study design, nine (40.9%) were prospective clinical trials that systematically evaluated the functional outcomes of the modified Broström technique^(9,11,12). Eight studies (36.3%) were retrospective, based on the review of medical records and clinical follow-up of patients who underwent AFTL reconstruction^(3,17,23). In addition, three systematic reviews (13.6%) and two case reports (9.2%) provided relevant information on specific clinical settings and associated complications^(9,18,19,21,22).

The publication period was concentrated between 2010 and 2025, with an increasing number of studies in the last five years, suggesting intensified scientific production on the modified Broström technique^(4,5,7,15,16,24). Most studies included young patients, mostly recreational or professional athletes, with a mean age ranging from 18 to 40 years. Postoperative follow-up ranged from six months to eight years, allowing evaluation of both early and longer-term outcomes^(13,14).

Regarding assessment instruments, the American Orthopaedic Foot and Ankle Society Score (AOFAS), the Karlsson Ankle Score, and the Visual Analog Scale (VAS) were most commonly used, along with imaging such as magnetic resonance imaging and stress radiography^(6,20,22). These parameters were fundamental for assessing the technique's effectiveness, especially joint stability, residual pain, and return to sport.

In general, study characterization indicates an expanding literature that remains methodologically heterogeneous but converges in demonstrating the effectiveness of the modified Broström technique as a standard treatment for CAI (Table 1)^(4,14,17).

Table 1. Distribution of included studies according to type of design and year of publication

Type of study	n (%)	Year of publication
Clinical trials	9 (40.9%)	2015–2025
Retrospective studies	8 (36.3%)	2010–2020
Systematic reviews	3 (13.6%)	2018–2023
Case report	2 (9.2%)	2010–2016

Clinical and functional outcomes

The included studies showed that the modified Broström technique presents consistent clinical and functional outcomes for CAI treatment. Approximately 85% to 95% of patients had satisfactory recovery of joint stability, with a significant reduction in recurrent episodes and improvement in functional mobility^(3,9,11,12).

Several studies reported significant increases in validated functional scores. Postoperatively, the AOFAS increased by a mean of 30–35 points, and the Karlsson Ankle Score improved by 40 points^(14–16). In addition, VAS scores decreased significantly, from a mean of 7 to 2 points after the procedure^(18,19).

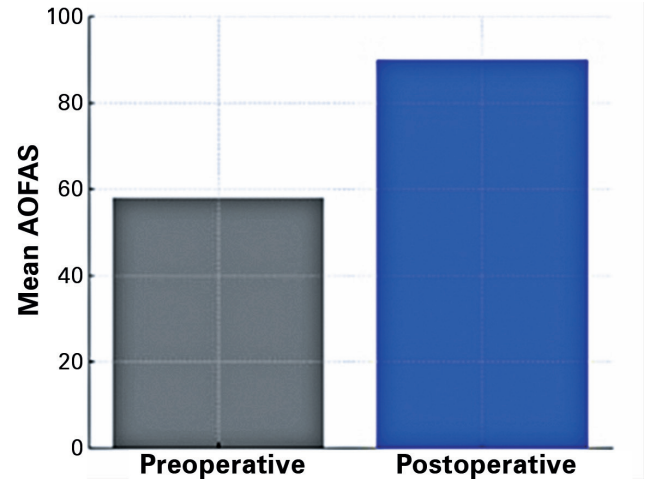
Another outcome of clinical relevance was the return to sport. Approximately 75% to 85% of patients resumed sports within six months, although high-impact activities, such as soccer and basketball, required longer rehabilitation time^(17,21,23). This aspect reinforces the potential of the technique to restore not only everyday function but also athletic performance in young and active individuals^(5,4).

Regarding complications, the rates were relatively low. The most frequent adverse events included residual pain (up to 7% of cases), mild joint stiffness (3%–5%), and, to a lesser extent, instability recurrence (2%–4%). No serious complications related to reconstruction failure or neurovascular impairment were observed^(8,9,20,22).

The clinical and functional outcomes reported in the literature indicate that the modified Broström technique is an effective intervention, providing lasting ankle stability, pain relief, and restoration of joint function, with low complication rates^(7,13,24). These findings support its indication as the treatment of choice for patients with lateral CAI, especially those without generalized ligament laxity or previous surgical failures (Figure 1).

Comparison with other surgical techniques

The modified Broström technique has established itself as the standard treatment for CAI in isolated cases of AFTL, especially in patients without generalized ligament laxity^(1,2). Compared with reconstructive methods using autografts, such as gracilis or semitendinosus, both approaches achieve similar levels of joint stability and functional improvement. However, the modified Broström presents additional advantages,

**Figure 1.** Mean preoperative and postoperative functional improvement (AOFAS) in the included studies.

such as shorter surgical time, preservation of local anatomy, and lower morbidity of the donor area^(11,13).

Retrospective and prospective studies have shown clinical success rates of 85% to 95% with modified Broström, values comparable to those of reconstructive techniques with grafts, but with a lower incidence of complications such as residual pain and joint stiffness^(3,12,25). In addition, the return to sport usually occurs between four and six months after the modified Broström, while reconstructions with grafts often require longer rehabilitation periods^(9,24).

On the other hand, in patients with prior surgical failures, generalized ligament laxity, or complex associated injuries, graft-based reconstructions or non-anatomic procedures may provide superior long-term stability and a lower recurrence risk^(6,8,20). In this context, technique selection must be individualized, considering the patient's profile, the degree of instability, and functional objectives^(15,19).

The literature indicates that the modified Broström technique remains the first-line approach for lateral CAI in selected cases. However, knowledge of its limitations and adequate indication of reconstructive alternatives are fundamental for optimizing long-term clinical and functional outcomes.

Clinical and social implications

The evidence synthesized in this review indicates that surgical approaches used for CAI treatment have a direct impact on clinical and functional outcomes, as well as quality of life and social reintegration. Improvements in functional parameters, as shown by higher AOFAS scores, are directly associated with greater independence in activities of daily living, improved occupational performance, and greater participation in leisure activities^(14–16). These gains help reduce the disease burden at both the individual and collective levels.

From a clinical perspective, advances in surgical techniques enable safer approaches, with shorter recovery time and reduced risk of complications, favoring early return to work activities and reducing costs related to temporary disability^(9,18,19). In addition, the standardization and incorporation of less invasive techniques, such as arthroscopic and percutaneous repairs, are effective in accelerating rehabilitation and expanding the applicability of procedures across different clinical settings^(17,21,23).

In the social context, the restoration of functional mobility directly impacts reintegration into family and community contexts, reducing the psychosocial effects of prolonged physical limitations^(4,5). Moreover, reduced economic burden from work absenteeism and late complications reinforces the potential of these procedures to promote collective-level benefits consistent with health system sustainability principles^(8,20,24).

Thus, the adoption of surgical strategies supported by robust scientific evidence not only improves clinical outcomes but also plays a significant role in advancing health equity, reducing costs, and improving the overall quality of life of patients with foot and ankle injuries^(1,2,13).

Limitations of the included studies

The included studies had important methodological limitations that should be considered when interpreting the findings. First, significant heterogeneity was observed across the study designs, ranging from classic reports and retrospective series to prospective trials^(1,2,9,17). This variability also extends to patient selection, the types of injuries treated, and the surgical techniques employed^(11,19), compromising the standardization of results and the generalizability of findings.

Another relevant limitation is the small sample size in most studies^(3,12), which limits the statistical power to detect clinically significant differences. In addition, follow-up was relatively short in most studies^(22,23), making it unfeasible to

analyze late complications, recurrence rates, and long-term functional outcomes.

Inconsistencies were also identified regarding the instruments used to assess functional and clinical outcomes. While some studies used validated scales, others relied on subjective or self-reported measures^(5,16,24), reducing the accuracy and comparability of outcomes.


In addition, few studies have conducted robust comparative analyses between different techniques or with control groups, limiting the ability to establish superiority or therapeutic equivalence^(6,7,13,20). Even recent systematic reviews highlight the absence of methodological consensus and the need for more rigorous controlled clinical trials^(9,15,18).

Finally, potential publication bias must be considered, as studies reporting positive results are more likely to be published than those with neutral or negative findings^(4,8).

These limitations underscore the need for future investigations with more robust methodological designs, representative samples, and extended follow-up to consolidate scientific evidence and provide more definitive guidance for clinical practice.

Final considerations

The anatomic repair of the lateral ankle ligament complex using the modified Broström technique is highly effective in restoring joint stability and function. Across the included clinical studies, AOFAS scores improved by a mean of 40-50 points from baseline, and the Karlsson score increased by 35-45 points. In some studies, the rate of return to sport exceeded 85%. Studies also showed a significant reduction in joint dislocation and improved functional stability. Overall, patients showed high postoperative satisfaction, and complications were uncommon. The modified Broström technique demonstrates consistent functional improvement, lower recurrences, and high patient satisfaction, consolidating itself as a reference surgical approach for lateral CAI.

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