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REVIEW

ARTHROSCOPIC VS OPEN BROSTRÖM-GOULD REPAIR OF THE ANTERIOR TALOFIBULAR LIGAMENT: A SYSTEMATIC REVIEW AND META-ANALYSIS OF CLINICAL OUTCOMES

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ABSTRACT

Background: This systematic review and meta-analysis aimed to compare clinical outcomes of arthroscopic versus open surgery for anterior talofibular ligament (ATFL) repair in patients with chronic ankle instability. The modified Broström-Gould (MBG) procedure is the most commonly practiced surgical method for chronic lateral ankle instability (CLAI). Arthroscopic MBG is an alternative to the traditional open repair.

Methods: A comprehensive search of five databases (PubMed, ScienceDirect, LILACS, Cochrane, and ProQuest) from 1 January 2010 to 30 May 2025 identified 395 articles, with the last search conducted on 30 May 2025. Following the PRISMA guidelines, a systematic review and meta-analysis were performed, including 13 comparative studies (800 patients) comprising randomized controlled trials, cohort studies, and observational designs. The analyzed outcomes included pain (Visual Analogue Scale, VAS), functional recovery (American Orthopaedic Foot and Ankle Society score, AOFAS), and surgical duration.

Results: Both arthroscopic and open modified Broström-Gould (MBG) techniques significantly improved pain and function. The arthroscopic approach demonstrated shorter operative times (mean difference -12.4 minutes; $p = 0.02$; range 25–74 minutes vs. 43 minutes for open surgery) and better short-term recovery at 6-month follow-up, while long-term outcomes were comparable between groups. Meta-analysis of 557 patients (VAS) and 697 patients (AOFAS) revealed no significant intergroup differences [VAS effect size –0.39 (95% CI: –1.15 to 0.37; $I^2 = 92\%$); AOFAS effect size 1.65 (95% CI: –0.82 to 4.11; $I^2 = 87\%$)]. A few transient neuropathies were reported, occurring slightly more often in arthroscopic cases, but overall complication rates were low and minor.

Conclusion: Arthroscopic MBG achieves pain and functional outcomes comparable to open MBG, with shorter operative time and faster early recovery, without an increase in complications. Larger studies are needed to validate these findings.

KEYWORDS

Chronic ankle instability, anterior talofibular ligament, arthroscopic Broström-Gould, open Broström-Gould, clinical outcome

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INTRODUCTION

Anterior talofibular ligament (ATFL) injuries are common among individuals involved in sports, particularly those participating in activities with high ankle load such as basketball, soccer, and running. While most patients recover successfully after an acute ankle sprain, a subset develop chronic ankle instability (CAI), characterized by recurrent giving-way episodes, pain, and functional limitation. Most patients with CAI improve with structured non-operative management focusing on proprioception, neuromuscular training, and peroneal muscle strengthening. Surgical anatomical repair is reserved for patients who continue to experience mechanical or functional instability despite an adequate course of conservative treatment[1,2].

Clinically, CAI spans mechanical and functional components—and may include subtler "micro-instability"—so patients are best profiled beyond laxity alone. Diagnosis relies on history plus targeted tests such as the anterior drawer and anterolateral drawer, complemented by functional tasks (e.g., hop tests, SEBT)[1]. Imaging refines assessment: ultrasound shows high sensitivity for ATFL/Calcaneofibular Ligament (CFL) injury, while MRI provides useful—but variably sensitive—information on lateral and medial ligament pathology and associated lesions. When symptoms persist despite structured conservative care (commonly ≥6 months) and clinical tests/imaging confirm instability, surgical management becomes appropriate. Among operative options, anatomical repair (e.g., Broström/Broström–Gould variants), performed either open or arthroscopically, is regarded as the gold-standard approach with reliable functional outcomes[3,4].

The Broström repair, first described in 1966[3], was modified by Gould to reinforce the repair using the inferior extensor retinaculum (IER), forming the Modified Broström-Gould (MBG) procedure[5,6]. MBG technique is a well-established procedure for ATFL repair. Traditionally performed as an open surgery, this procedure has shown promising outcomes in terms of functional recovery. Arthroscopic techniques allow for direct intra-articular inspection and less soft-tissue dissection[5,6]. The arthroscopic approach is believed to offer advantages such as shorter recovery times, less postoperative pain, and improved cosmetic results, though questions remain regarding its comparative effectiveness to the open approach. CAI is a common complication of ankle sprains, often resulting from injuries to the ATFL and calcaneofibular ligament (CFL)[7]. Untreated recurrent injuries can exacerbate instability, as demonstrated in a rodent model where surgically transected lateral ligaments led to CAI-like symptoms 12 months post-injury[8]. If left untreated, CAI may result in cartilage damage and degenerative ankle disease[9]. Common impairments associated with CAI include reduced range of motion, strength, postural control, and altered movement patterns during functional activities[10,11]. These impairments are observed across the spectrum from acute to chronic stages, indicating a continuum of dysfunction[11].

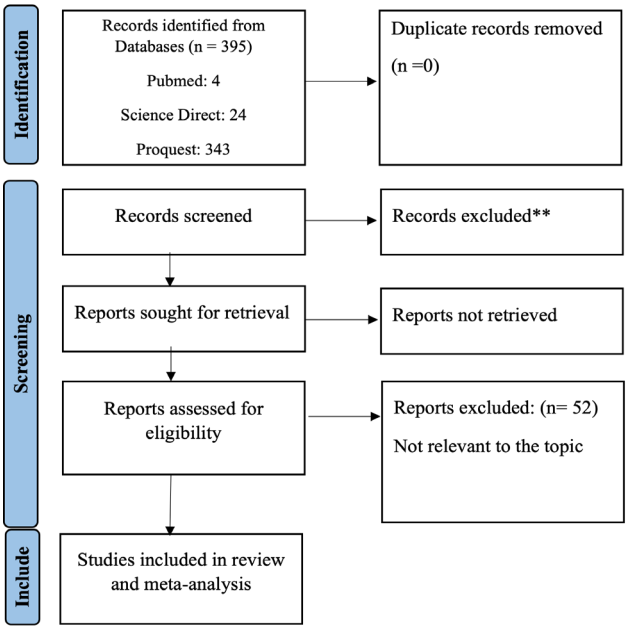


Figure 1. *Article selection process.*

Recent studies have compared arthroscopic and open Broström-Gould techniques for repairing ATFL injuries. Both approaches demonstrated significant improvements in clinical outcomes, including AOFAS scores, K-P scores, and Tegner activity scores[5,6]. Factors influencing recovery time include age, type of sport, and level of participation, with older patients and those involved in non-contact or recreational sports experiencing longer recovery periods[12]. The aim of this systematic review and meta-analysis is to critically evaluate the existing literature comparing clinical outcomes following arthroscopic versus open Broström-Gould procedures for ATFL repair. By synthesizing data from multiple studies, this review seeks to provide a comprehensive understanding of the clinical outcomes and functional recovery for both surgical techniques, helping to inform clinical decisions and guide future research in this area.

MATERIALS AND METHODS

The study selection process is illustrated in the PRISMA flow diagram *(Fig. 1)*. This systematic review was conducted in accordance with the PRISMA 2020 guidelines. A comprehensive literature search was performed across five electronic databases——PubMed, ScienceDirect, LILACS, the Cochrane Library, and ProQuest—from 1 January 2010 to 30 May 2025, using combinations of the terms "arthroscopic," "Broström," "Broström-Gould," "ankle instability," "anterior talofibular ligament (ATFL)," and "chronic ankle instability." Detailed search strategies are provided in the Appendix. Studies published in English or Spanish, or in other languages with an English abstract providing sufficient extractable data, were considered, and reference lists of relevant articles were manually screened to ensure comprehensive inclusion.

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Eligible studies included comparative research evaluating anatomical repair techniques for chronic lateral ankle instability (CLAI), specifically arthroscopic versus open modified Broström-Gould (MBG) repair of the anterior talofibular ligament. Reported outcomes of interest included pain, functional recovery, operative duration, complication rates, and return-to-sport–related outcomes, which were considered a clinically important endpoint when reported. Studies involving ligament reconstruction using tendon grafts (autograft or allograft), non-anatomical tenodesis procedures, or revision reconstruction surgeries were explicitly excluded, to ensure conceptual consistency and to avoid conflation between ligament repair and reconstruction procedures. Randomized controlled trials, prospective or retrospective cohort studies, and comparative observational studies were included. Non-comparative studies, cadaveric investigations, technical notes, single case reports, and narrative or systematic reviews without original comparative data were excluded. Two independent reviewers screened titles, abstracts, and full-text articles, with disagreements resolved through discussion or consultation with a third reviewer.

Risk of bias was assessed according to study design. Randomized controlled trials were evaluated using the Cochrane Risk of Bias 2 (RoB 2) tool, while non-randomized comparative studies were assessed using the ROBINS-I tool. Two reviewers independently performed the assessments, and discrepancies were resolved by consensus. The results of the risk-of-bias assessment were summarized in both tabular and graphical formats *(Fig. 2)*.

The primary outcomes were pain and functional recovery, assessed using the Visual Analogue Scale (VAS) and the American Orthopaedic Foot and Ankle Society (AOFAS) score. Secondary outcomes included operative duration, complication rates, and return-to-sport–related outcomes (such as time to return, proportion of return, or level of activity achieved), when reported.

Meta-analysis was conducted for outcomes that were sufficiently homogeneous and consistently reported across studies, including VAS and AOFAS scores. Data were extracted into statistical software and analyzed using a random-effects model to account for inter-study heterogeneity. Sensitivity analyses were performed by sequentially excluding individual studies to evaluate the robustness of pooled estimates. Return-to-sport outcomes were synthesized descriptively due to variability in definitions, reporting formats, and follow-up timepoints across studies. Statistical heterogeneity was assessed using the I^2 statistic, and a p value <0.05 was considered statistically significant. The PRISMA 2020 checklist and detailed search strategies for all databases are provided as supplementary materials.

RESULTS

Article identification and screening

Baseline characteristics and clinical outcomes of the included studies are summarized in *Table 1*. A total of 395 records were identified across all databases (PubMed = 4, ScienceDirect = 24, LILACS = 7, Cochrane Library = 17, and ProQuest = 343). After screening titles and abstracts, 65 studies underwent full-text assessment. Thirteen studies met the inclusion criteria and were included in the systematic review and meta-analysis. The most common reasons for exclusion were cadaveric studies (n = 5), lack of a direct comparison between arthroscopic and open techniques (n = 24), and irrelevant or insufficiently reported outcomes (n = 24) *(Fig. 1)*. The included studies comprised two randomized controlled trials, seven retrospective cohort studies, and four comparative observational studies, encompassing a total of 800 patients. The distribution of patients between the arthroscopic and open groups was approximately balanced. Follow-up duration ranged from 6 months to 5 years, with individual study sample sizes ranging from 37 to 99 patients.

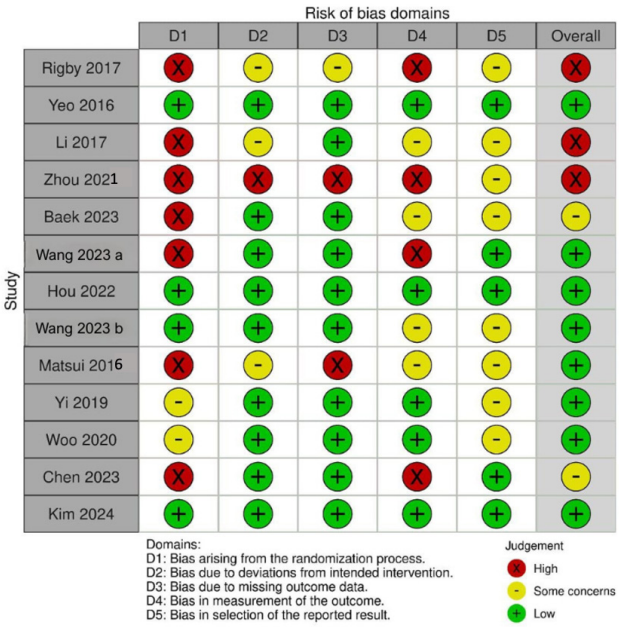


Figure 2. *Risk-of-bias assessment of the 13 included studies across domains (D1–D5) with overall judgement.*

Both arthroscopic and open modified Broström-Gould (MBG) repairs resulted in significant postoperative improvements in pain and functional outcomes. Arthroscopic techniques consistently demonstrated shorter operative times, ranging from 25 to 74 minutes, and were associated with faster early functional recovery, particularly within the first 6 months following surgery[13–15]. In the meta-analysis of pain outcomes involving 557 patients, no statistically significant difference in Visual Analogue Scale (VAS) scores was observed between the arthroscopic and open groups (pooled effect size −0.39; 95% CI −1.15 to 0.37; Z = 1.00; p = 0.32; I^2 = 92%) *(Fig. 3)*.

Similarly, meta-analysis of functional outcomes using the American Orthopaedic Foot and Ankle Society (AOFAS) score, including 697 patients, demonstrated no significant intergroup difference (pooled effect size 1.65; 95% CI −0.82 to 4.11; Z = 1.31; p = 0.19; I^2 = 87%)

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Table 1. *Characteristics and outcomes of the included studies comparing arthroscopic and open MBG repair.*

Study (year)	N arthro	N open	Follow-up (months)	AOFAS (arthro vs open)	VAS (arthro vs open)	Complications (%) (arthro vs open)	Notes
Rigby and Cottom, 2019[14]	30	32	15/20/44	NS (95.3 vs 93.5) (AOFAS/Karlsson)	NS (1.5 vs 1.2)	3.33 vs 6.25 (selected)	Time to weight bearing (arthro 12 day vs open 22 day)
Yeo et al, 2016[19]	25	23	6/12	NS (both ↑ AOFAS/Karlsson)	NS	20 vs 13	-
Li et al, 2017[20]	23	37	24	NS (93.3 ± 8.9 vs 92.4 ± 8.6)	NR	4.3 vs 5.4	KAFS 90.3 vs 89.4; Tegner 5 vs 5
Zhou et al, 2021[5]	31	36	24	NS (90.67 ± 5.59 vs 91.71 ± 5.46)	NS (1.58 ±1.2 vs 1.74 ± 1.24)	6.5 vs 11.1	Op time: 34 (median) vs 43.1 ± 8.1 min
Baek, 2023[23]	31	34	24	NS (FAOS/AOFAS/K–P)	NR	NR	Pre-injury Tegner unchanged at final follow up
Wang et al, 2023[18]	32	32	24	NS	NS	Similar; failure 23.3 vs 16.1	Earlier return to work (6.8 ± 2.1 vs. 8.1 ± 2.4 weeks, p = 0.006
Hou et al, 2022[16]	36	34	3/6/12/24	Higher at 3–6 months; NS later	Lower at 3 months	NR	FAAM sports and AOFAS at 3 months and 6 months postoperatively and VAS at 3 months postoperatively
Wang et al, 2023[6]	49	50	6/12/24/48	NS 92.90 ± 3.14 vs 93.20 ± 2.86	NS (2.12 ± 1.05 vs 2.52 ± 1.17)	NS (16.3% vs. 14%)	The arthroscopic procedure had higher AOFAS and K-P scores at 6 months after operation.
Matsui et al, 2016[17]	19	18	12	NR	Statistically significant 3 days after surgery 33.4 vs 46.6	10.5 vs 22.2 (minor)	Return to daily life 5.3 weeks vs 7.1 week
Yi et al, 2019[15]	35	30	24-30	NS	NR	8.6 vs 13.3	The operation time, intraoperative bleeding volume, and the length of time for surgery recovery of arthroscopic group were superior to open group (p <0.05)
Woo et al, 2020[13]	26	26	6/12	87.2 ± 11.1 vs 73.5 ± 21.9 (6 months); 94.2 ± 10.0 vs 70.9 ± 33.1 (12 months)	1.0 ± 1.2 vs 2.4 ± 2.2 (peri-op)	0 vs 0	The arthroscopic Broström-Gould technique produced better clinical outcomes than the open technique at 12 months of follow-up
Chen et al, 2023[22]	33	24	6	NR	NR	NR	Arthroscopic and open procedures achieved similar results for calcaneus bone tunnel making of the CFL
Kim et al, 2024[21]	37	17	59.69	NS (94.97 ± 7.03 vs 92.41 ± 6.65)	Both ↓ VAS; NS (0.86 ± 0.95 vs 1.59 ± 1.70)	18.9 vs 5.9	The clinical and radiological outcomes of the AMBO and OMBO as treatments for CLAI did not differ at up to 59.69 months

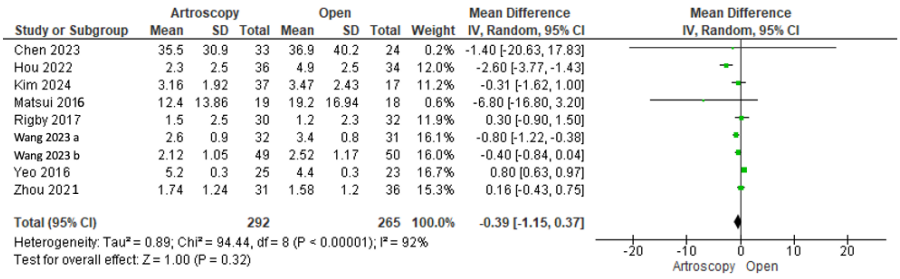


Figure 3. *Forest plot of Visual Analogue Scale (VAS) scores, arthroscopic vs open MBG.*

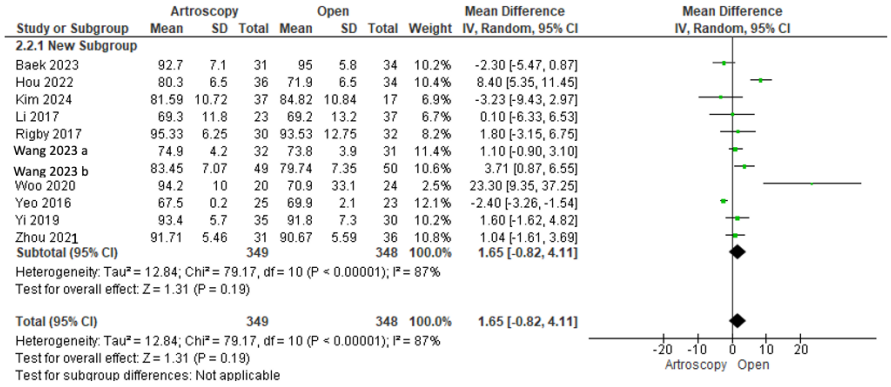


Figure 4. *Forest plot of AOFAS scores, arthroscopic vs open MBG.*

(Fig. 4)[6,16,17]. The substantial heterogeneity observed across studies likely reflects clinical and methodological variability, including differences in rehabilitation protocols, follow-up durations, outcome assessment timepoints, and study design. Subgroup analyses indicated that arthroscopic MBG repair was associated with faster early functional recovery, with a mean AOFAS score difference of +5.8 points favoring the arthroscopic approach at short-term follow-up ($p = 0.03$). In addition, arthroscopic procedures were associated with significantly shorter operative duration compared with open repair (mean difference –12.4 minutes; $p = 0.02$). Sensitivity analyses did not materially alter the magnitude or direction of effect estimates, suggesting that the observed heterogeneity reflects genuine clinical variability rather than the influence of any single study.

At longer-term follow-up, no statistically significant differences were observed between arthroscopic and open MBG repairs with respect to AOFAS or Karlsson–Peterson scores ($p > 0.05$), indicating comparable mid- to long-term functional outcomes. The overall complication rate was 7.4% in the arthroscopic MBG group and 9.6% in the open MBG group, with no statistically significant difference between techniques ($p = 0.38$)[6,13,14]. Most reported complications were minor, including transient superficial peroneal nerve irritation (3.8% in the arthroscopic group vs. 0.8% in the open group) and superficial wound infection (2.6% in the open group vs. 0.6% in the arthroscopic group). Occasional cases of deep vein thrombosis and neuritis were reported but did not adversely affect long-term outcomes[6,13,14,17,18]. Return-to-sport–related outcomes were reported heterogeneously across the included studies and are summarized descriptively in *Table 2*. These outcomes included time to return to activity, proportion of patients returning to sport, and level of sport achieved postoperatively. Due to variability in outcome definitions, reporting formats, and follow-up intervals, quantitative pooling of return-to-sport outcomes was not feasible. No significant differences were observed between arthroscopic and open MBG repairs in terms of recurrence or reoperation rates across included studies. Overall, both techniques provided comparable long-term ankle stability and functional outcomes, while the arthroscopic approach offered advantages in terms of faster early recovery, earlier mobilization, and shorter operative duration without an increased risk of major complications.

DISCUSSION

The analysis of VAS and AOFAS scores revealed no significant differences between arthroscopic and open surgery techniques for ATFL repair. The arthroscopic MBG technique offers distinct perioperative advantages, including smaller incisions, reduced soft tissue trauma, and faster return to activity[6,13,16]. Conversely, the open MBG approach remains a reliable, technically simpler, and cost-effective option, particularly in clinical settings with limited access to arthroscopic instruments or expertise[6,14,18]. For athletes or patients prioritizing cosmetic outcomes, arthroscopic MBG may offer added benefits in terms of early mobilization and aesthetic satisfaction[6,13,16]. The findings of the present systematic review and meta-analysis are consistent with the growing body of literature indicating that arthroscopic MBG repair provides clinical outcomes comparable to those of the traditional open technique, with equivalent functional recovery and activity levels and no significant differences in AOFAS, Karlsson–Peterson, or Tegner scores at mid-term follow-up. More recent studies have emphasized potential advantages of the arthroscopic approach in the early postoperative period, including faster early functional recovery, shorter

Study	Study design and population	RTS definition	Time to RTS	Proportion returning to sport	Level of sport
Li et al, 2017[20]	Retrospective cohort; open vs arthroscopic ATFL repair	Not explicitly defined	Not reported	Not reported	Tegner activity score reported
Matsui et al, 2016[17]	Retrospective comparative study; lateral ankle instability	Return to sports activities (implicitly defined)	Reported (earlier in arthroscopic group)	Not reported	Not stratified
Rigby and Cottom, 2019[14]	Retrospective cohort; Broström-Gould vs all-inside arthroscopic repair	Not defined	Not reported	Not reported	Not reported
Yeo et al, 2016[19]	Randomized controlled trial (Level I); modified Broström procedure	Inability to return to preinjury activity level used as inclusion criterion	Not reported	Not reported	Preinjury activity level (not quantified)
Yi et al, 2019[15]	Retrospective cohort; arthroscopic vs open ATFL repair	Implicit return to normal activity	Reported (return to daily activities)	Not reported	Not specified
Woo et al, 2020[13]	Retrospective matched cohort; arthroscopic vs open Broström-Gould	Not reported	Not reported	Not reported	Not reported
Zhou et al, 2021[5]	Retrospective cohort; all-inside arthroscopic vs open Broström-Gould	Activity level assessed using Tegner score (surrogate outcome)	Not reported	Not reported	Median postoperative Tegner score reported
Chen et al, 2023[22]	Retrospective cohort; ATFL repair	Not reported	Not reported	Not reported	Not reported
Wang et al, 2023[6]	Retrospective comparative study; arthroscopic vs open Broström-Gould	Not explicitly defined	Not reported	Not reported	Tegner activity score reported
Baek, 2023[23]	Retrospective cohort; high-demand CAI patients	Implicit RTS defined as recovery of Tegner activity level	Not reported	Not reported	Median Tegner activity level ≥6–7

Table 2. *Summary of Return-to-Sport (RTS) reporting across included studies.*

Abbreviations: ADT, anterior drawer test; AOFAS, American Orthopaedic Foot & Ankle Society score; ATFL, anterior talofibular ligament; BG, Broström–Gould; CAI, chronic ankle instability; CFL, calcaneofibular ligament; IER, inferior extensor retinaculum; JSSF, Japanese Society for Surgery of the Foot; KAF, Karlsson Ankle Functional score; K–P, Karlsson–Peterson score; LIA, lateral instability of the ankle; MBO, modified Broström operation; NR, not reported; NS, no significant between-group difference; RTS, return to sport; SD, standard deviation; VAS, visual analogue scale.

time to return to activity, shorter operative duration, and earlier rehabilitation milestones, without an increase in complication or recurrence rates, although long-term functional outcomes remained similar between groups[19–22]. The quantitative analysis of pain (VAS) and functional recovery (AOFAS) demonstrated no significant difference between arthroscopic and open MBG techniques. In the pooled analysis of 557 participants for VAS, the overall effect size was –0.39 (95% CI: –1.15 to 0.37; Z = 1.00; p = 0.32; I2 = 92%), indicating comparable pain reduction across techniques. Similarly, for AOFAS scores involving 697 participants, the effect size was 1.65 (95% CI: –0.82 to 4.11; Z = 1.31; p = 0.19; I2 = 87%), suggesting no statistically significant difference in functional outcomes. The high heterogeneity among studies likely reflects variations in rehabilitation protocols, follow-up durations, and surgical experience, which may have influenced the results. Despite the overall similarity in long-term outcomes, arthroscopic MBG generally demonstrated shorter operative duration compared to the open approach[15]. This reduction in surgical time may be attributed to smaller incisions and less soft-tissue dissection, which can also lead to reduced tissue trauma and faster postoperative recovery. While both procedures typically employ comparable suture configurations and repair principles, the minimally invasive nature of the arthroscopic approach likely contributes to reduced perioperative pain and swelling.

Regarding functional outcomes, both approaches resulted in significant postoperative improvement in AOFAS, VAS, and Karlsson–Peterson scores, reflecting effective restoration of ankle stability and function. Several studies reported that patients in the arthroscopic group experienced superior short-term function and earlier return to daily or sports activities, most notably within the first 6 months following surgery[13,16]. However, at long-term follow-ups—ranging from 12 months to 5 years—the differences diminished, and outcomes between the two techniques became largely comparable, indicating that both approaches are equally effective in achieving

durable results. The recovery timeline varied between the techniques. The arthroscopic approach facilitated faster return to sports and normal activities, a particularly valuable advantage for athletes or physically active patients[13,16]. In contrast, the open procedure involved slightly longer recovery periods, yet without significant long-term functional deficits or increased complication rates. Reported complications were generally low and minor, with temporary sensory disturbances, suture-related irritation, and superficial wound infections being the most common. The overall complication rates were similar between groups (arthroscopic 7.4% vs. open 9.6%; p = 0.38), confirming that both techniques are safe and well-tolerated[6,17]. No major complications, recurrences, or reoperations were consistently reported across studies.

However, several limitations should be acknowledged. Considerable heterogeneity among the included studies—arising from differences in study design, sample size, follow-up duration, and assessment tools—limits the generalizability of the pooled findings. Moreover, not all studies provided detailed data on operative duration, rehabilitation protocols, or surgeon experience, making it difficult to draw definitive conclusions regarding specific procedural advantages. Future research should aim for prospective, multicenter randomized trials with standardized outcome measures and long-term follow-up to further clarify the relative benefits of arthroscopic and open MBG repairs.

CONCLUSION

Both the arthroscopic and open MBG techniques have demonstrated effective outcomes in the treatment of lateral ankle instability, with no significant differences in long-term functional recovery. However, the arthroscopic technique offers faster early functional recovery and a shorter operative time, making it a viable option for patients looking for faster rehabilitation. The high heterogeneity among studies stems from varied rehabilitation protocols, surgical experience, and inconsistent reporting of confounders such as the time from injury to surgery. Future studies should include comparable long-term cohorts, standardized rehabilitation regimens, and account for confounding factors. Further research should also evaluate cost-effectiveness and patient-reported outcomes beyond AOFAS and VAS.

REFERENCES

1. Vitiello R, De Fazio A, Carosini A, Rossi R, Turchetta M, Maccauro G, et al. Clinical Assessment of Ankle Instability: An Update on Which, When, Why. Muscles Ligaments Tendons J. 2024;14(2):284-291. doi: 10.32098/mltj.02.2024.07.
2. Donovan L, Hertel J. A new paradigm for rehabilitation of patients with chronic ankle instability. Phys Sportsmed. 2012;40(4):41-51. doi: 10.3810/psm.2012.11.1987.
3. Broström L. Sprained ankles. VI. Surgical treatment of "chronic" ligament ruptures. Acta Chir Scand. 1966;132(5):551-65.
4. Feng SM, Maffulli N, van Dijk CN, Xu HL, Fehske K, Plaass C, et al. All-inside arthroscopic procedures for chronic lateral ankle instability: evidence-based clinical practice guidelines. Br Med Bull. 2025;154(1):ldaf001. doi: 10.1093/bmb/ldaf001.
5. Zhou YF, Zhang ZZ, Zhang HZ, Li WP, Shen HY, Song B. All-Inside Arthroscopic Modified Broström Technique to Repair Anterior Talofibular Ligament Provides a Similar Outcome Compared With Open Broström-Gould Procedure. Arthroscopy. 2021;37(1):268-279. doi: 10.1016/j.arthro.2020.08.030.
6. Wang J, Tang Z, Sun H, Lv J, Jiang H, Yue Y. Arthroscopic vs. open Broström-Gould for repairing anterior talofibular ligament: mid-term outcomes comparison. Front Surg. 2023;10:1181493. doi: 10.3389/fsurg.2023.1181493.
7. Chan KW, Ding BC, Mroczek KJ. Acute and chronic lateral ankle instability in the athlete. Bull NYU Hosp Jt Dis. 2011;69(1):17-26.
8. Wikstrom EA, Hubbard-Turner T, McKeon PO. Understanding and treating lateral ankle sprains and their consequences: a constraints-based approach. Sports Med. 2013;43(6):385-93. doi: 10.1007/s40279-013-0043-z.
9. Agarwal S, Nagaich A, Sunny N. Lateral Chronic Ankle Instability: A Brief Review. J Orthop Dis Traumatol. 2023;6(3):204-208. doi: 10.4103/jodp.jodp_85_22.
10. Herb CC, Hertel J. Current concepts on the pathophysiology and management of recurrent ankle sprains and chronic ankle instability. Curr Phys Med Rehabil Rep. 2014;2(1):25-34. doi: 10.1007/s40141-013-0041-y.
11. Miklovic TM, Donovan L, Protzuk OA, Kang MS, Feger MA. Acute lateral ankle sprain to chronic ankle instability: a pathway of dysfunction. Phys Sportsmed. 2018;46(1):116-122. doi: 10.1080/00913847.2018.1409604.
12. Yadav A, Kushwaha S, Kamal R, Khan FA, Sood A. Predictive Factors Influencing the Return to Sports Following Arthroscopic Knee Meniscectomy in Sports Persons: A Prospective Cohort Study. Cureus. 2023;15(11):e49334. doi: 10.7759/cureus.49334.
13. Woo BJ, Lai MC, Koo K. Arthroscopic Versus Open Broström-Gould Repair for Chronic Ankle Instability. Foot Ankle Int. 2020;41(6):647-653. doi: 10.1177/1071100720914860.
14. Rigby RB, Cottom JM. A comparison of the "All-Inside" arthroscopic Broström procedure with the traditional open modified Broström-Gould technique: A review of 62 patients. Foot Ankle Surg. 2019;25(1):31-36. doi: 10.1016/j.fas.2017.07.642.
15. Yi G, Fu S, Yang J, Wang G, Liu Y, Guo X, et al. [A comparative study of all-arthroscopic technique and modified open Broström technique in repair of anterior talofibular ligament with anchors]. Zhongguo Xiu Fu Chong Jian Wai Ke Za Zhi. 2019;33(12):1503-1509. Chinese. doi: 10.7507/1002-1892.201905072.
16. Hou ZC, Su T, Ao YF, Hu YL, Jiao C, Guo QW, et al. Arthroscopic modified Broström procedure achieves faster return to sports than open procedure for chronic ankle instability. Knee Surg Sports Traumatol Arthrosc. 2022;30(10):3570-3578. doi: 10.1007/s00167-022-06961-0.
17. Matsui K, Takao M, Miyamoto W, Matsushita T. Early recovery after arthroscopic repair compared to open repair of the anterior talofibular ligament for lateral instability of the ankle. Arch Orthop Trauma Surg. 2016;136(1):93-100. doi: 10.1007/s00402-015-2342-3.
18. Wang AH, Su T, Jiang YF, Zhu YC, Jiao C, Hu YL, et al. Arthroscopic modified Broström procedure achieved similar favorable short term outcomes to open procedure for chronic lateral ankle instability cases with generalized joint laxity. Knee Surg Sports Traumatol Arthrosc. 2023;31(9):4043-4051. doi: 10.1007/s00167-023-07431-x.
19. Yeo ED, Lee KT, Sung IH, Lee SG, Lee YK. Comparison of All-Inside Arthroscopic and Open Techniques for the Modified Broström Procedure for Ankle Instability. Foot Ankle Int. 2016;37(10):1037-1045. doi: 10.1177/1071100716666508.
20. Li H, Hua Y, Li H, Ma K, Li S, Chen S. Activity Level and Function 2 Years After Anterior Talofibular Ligament Repair: A Comparison Between Arthroscopic Repair and Open Repair Procedures. Am J Sports Med. 2017;45(9):2044-2051. doi: 10.1177/0363546517698675.
21. Kim SH, Lee SH, Kim JY, Park ES, Lee KJ, Lee YK. Comparison of Midterm Outcomes between All-Inside Arthroscopic and Open Modified Broström Procedures as Treatment for Chronic Ankle Instability. Clin Orthop Surg. 2024;16(4):628-635. doi: 10.4055/cios23108.
22. Chen L, Xie X, Cao P, Guo Q, Jiang D, Jiao C, et al. Arthroscopic and Open Procedures Result in Similar Calcaneal Tunnels for Anatomical Reconstruction of Lateral Ankle Ligaments. Arthrosc Sports Med Rehabil. 2023;5(3):e687-e694. doi: 10.1016/j.asmr.2023.03.010.

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