Six Sessions of Anterior-to-Posterior Ankle Joint Mobilizations Improve Patient-Reported Outcomes in Patients With Chronic Ankle Instability: A Critically Appraised Topic

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Clinical Scenario: Chronic ankle instability (CAI) is a complex musculoskeletal condition that results in sensorimotor and mechanical alterations. Manual therapies, such as ankle joint mobilizations, are known to improve clinician-oriented outcomes like dorsiflexion range of motion, but their impact on patient-reported outcomes remains less clear. **Focused Clinical Question:** Do anterior-to-posterior ankle joint mobilizations improve patient-reported outcomes in patients with chronic ankle instability? **Summary of Key Findings:** Three studies (2 randomized controlled trials and 1 prospective cohort) quantified the effect of at least 2 weeks of anterior-to-posterior ankle joint mobilizations on improving patient-reported outcomes immediately after the intervention and at a follow-up assessment. All 3 studies demonstrated significant improvements in at least 1 patient-reported outcome immediately after the intervention and at the follow-up assessment. **Clinical Bottom Line:** At least 2 weeks of ankle joint mobilization improves patient-reported outcomes in patients with chronic ankle instability, and these benefits are retained for at least a week following the termination of the intervention. **Strength of Recommendation:** Strength of recommendation is grade A due to consistent good-quality patient-oriented evidence.

Keywords: manual therapies, rehabilitation, ankle sprains

Clinical Scenario

Lateral ankle sprains are the most common injury sustained during physical activity and account for 22% of all sports injuries.¹ Furthermore, about 30% of those who incur a first-time lateral ankle sprain develop chronic ankle instability (CAI), a condition characterized by recurrent ankle sprains, episodes of ankles giving way, and decreased functional performance.² CAI is a complex ankle disorder that appears to have a multifactorial etiology due to sensorimotor and/or mechanical alterations.³ Those with CAI also have an increased risk of developing posttraumatic ankle osteoarthritis.⁴ CAI has been linked to several mechanical and functional insufficiencies, such as arthrokinematics limitations and mechanoreceptor problems, which will decrease their physical activity levels over their life span significantly altering an individual's health and function.² A variety of approaches are available for treating those with CAI.⁵ Recent research has highlighted the benefits of manual therapy techniques such as ankle joint mobilizations at improving a number of clinician-oriented outcomes such as dorsiflexion range of motion and postural control.⁶⁻⁹ However, the effects of ankle joint mobilizations on patient-reported outcomes in patients with CAI remain unclear.

Focused Clinical Question

Do anterior-to-posterior ankle joint mobilizations improve patient-reported outcomes in patients with CAI?

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Summary of Search, "Best Evidence" Appraised, and Key Findings

- The literature was searched for studies of level 2 evidence or higher, which investigated the effect of anterior-to-posterior ankle joint mobilization on patient-reported outcomes in patients with CAI.
- Three studies were included: 2 randomized controlled trials^{6,8} and 1 prospective cohort study.⁷ Two studies^{6,8} had high validity (PEDro) scores (10 and 7, respectively) and 1 had a poor validity score.⁷
- All studies delivered at least 2 weeks of anterior-to-posterior ankle joint mobilizations with differing volumes.⁶⁻⁸ Two studies compared the effects of the ankle joint mobilizations to a control and/or placebo group.^{6,8} Follow-up assessments of differing durations ranging from 1 week to 6 months were included.⁶⁻⁸
- All 3 investigations demonstrated significant improvements in at least one of the patient-reported outcomes, either immediately following the intervention or in the follow-up.⁶⁻⁸

Clinical Bottom Line

There is strong evidence supporting the use of at least 2 weeks of anterior-to-posterior ankle joint mobilizations to improve patient-reported outcomes in patients with CAI.

Strength of Recommendation

There is consistent high-quality patient-oriented evidence (grade A) that supports the use of anterior-to-posterior ankle joint mobilizations in improving patient-reported outcomes in patients with CAI.

Search Strategy

Terms Used to Guide Search Strategy

- **Patient/Client group:** CAI or ankle instability or functional ankle instability or mechanical ankle instability or unstable ankle*
- **Intervention:** joint mobilization* or Maitland's mobilization* or oscillatory or mobilizations
- **Comparison:** not applicable
- **Outcomes:** foot and ankle ability measure or FAAM or patient-reported outcome* or foot and ankle disability index or FADI or self-reported function or self-reported disability

Sources of Evidence Searched

- PubMed, MEDLINE, EBSCO, SPORTDiscus, and Google Scholar. References lists were also reviewed to identify additional articles.

Inclusion and Exclusion Criteria

Inclusion Criteria

- Studies that investigated the effects of at least 2 weeks of anterior-to-posterior ankle joint mobilizations on patients with CAI as this represents a reasonable minimal time to deliver ankle joint mobilizations to a patient in a clinical setting.
- Studies that measured changes in self-reported function and included a follow-up assessment.
- Level 2 evidence or higher.
- Limited to English language.

Exclusion Criteria

- Studies that did not use patients with CAI.
- Studies that did not deliver at least 2 weeks of ankle joint mobilizations or that did not include a follow-up assessment.
- Studies that did not measure self-reported function.
- Studies that were not available in English.

Results of Search

Three studies met our inclusion criteria and were categorized as presented in Table 1 (based on Levels of Evidence¹⁰).

Table 1 Summary of Study Designs of Articles Retrieved

Level of evidence	Study design	Reference
1b	Randomized controlled trial	Cruz-Díaz et al ⁶
2b	Prospective cohort study	Hoch et al ⁷
1b	Randomized controlled trial	McKeon and Wikstrom ⁸

Best Evidence

The studies selected for inclusion in this critically appraised topic are listed in Table 2. The included studies were identified as the most appropriate, given the inclusion and exclusion criteria and focused clinical question.

Implications for Practice, Education, and Future Research

The studies⁶⁻⁸ included in this CAT support the use of at least 2 weeks of ankle joint mobilization in patients with CAI for immediate improvements in patient-reported outcomes. Hoch et al⁷ found significant improvements in foot and ankle ability measure (FAAM) and foot and ankle ability measure-sport (FAAM-S) scores after 2 weeks of grade III Maitland's mobilizations that were associated with large effect sizes. McKeon and Wikstrom⁸ also found that 2 weeks of grade III Maitland's mobilizations significantly improved FAAM scores. The improvements were also associated with a moderate (FAAM) and large (FAAM-S) effect sizes. Cruz-Díaz et al⁶ used mobilization with movement and observed significant improvements in Cumberland Ankle Instability Tool (CAIT) scores relative to a control and placebo group at the end of a 3-week treatment period. The CAIT improvement associated with mobilization with movement was associated with a large effect size. It is important to note that patient-reported outcomes represent "perceived" improvements, and thus do not inform the practitioner about objective changes in motion or function. However, each of the 3 included studies noted improvements in objective measures of dorsiflexion range of motion and postural control in addition to the improvements in patient-reported outcomes reviewed here.⁶⁻⁸ It should also be noted that patient-reported outcomes typically ask patients to rate their function over a period of time (eg, a week). Hoch et al⁷ and McKeon and Wikstrom⁸ assessed treatment efficacy within 48 and 72 hours of the final treatment, respectively. This means that the benefits of the final treatment(s) may not have been fully realized by the participants.

More importantly, the immediate improvements observed were retained at the included follow-up assessments. Hoch et al⁷ noted moderate (FAAM) to large (FAAM-S) effect sizes relative to the baseline condition at 1-week postintervention. Furthermore, the authors indicated that the observed improvements exceeded previously established minimally clinically important differences for the respective measures. McKeon and Wikstrom⁸ also noted that the moderate to large effect sizes seen immediately after the intervention were retained and that the retained improvements exceed minimal detectable change scores calculated for the outcomes in question. Finally, Cruz-Díaz et al⁶ found their observed improvements were maintained for at least 6 months following the intervention, and this improvement was associated with a large effect size. Cumulatively, these results⁶⁻⁸ would suggest that at least 2 weeks of ankle joint mobilizations had a positive impact on patient-reported outcomes, regardless of the scale used to quantify self-reported function or the technique used. In addition, the cumulative results suggest that these moderate to large effects were retained. However, the duration of follow-up ranged from 1 week to 6 months within the included studies.

It should be noted that perceived improvements in patient-reported outcomes do not signify the continuum of disability associated with CAI has been broken (ie, CAI has been cured). Cruz-Díaz et al⁶ noted that some patients in the intervention group

Table 2 Characteristics of Included Studies

Article	Cruz-Díaz et al ⁶	Hoch et al ⁷	McKeon and Wikstrom ⁸
Study design	RCT	Prospective cohort study	RCT
Participants	Ninety patients with a history of CAI were randomly assigned to either the intervention group (17 M and 13 F; age: 26.83 [4.62] y; height: 1.71 [0.09] m; weight: 68.97 [10.10] kg), the placebo group (17 M and 14 F; age: 29.55 [9.44] y; height: 1.72 [0.07] m; weight: 69.02 [9.59] kg), or the control group (17 M and 12 F; age: 26.48 [4.03] y; height: 1.70 [0.08] m; weight: 68.57 [10.51] kg).	Twelve subjects with CAI (6 M and 6 F; age: 27.4 [4.3] y; height: 175.4 [9.78] cm; weight: 78.4 [11.00] kg) volunteered to participate in the study. No control group.	Forty patients with a history of CAI were randomly assigned to either the joint mobilization group (9 M and 11 F; total number of sprains 4.4 [3.4]; age: 23.6 [6.7] y; height: 171.8 [9.6] cm; weight: 77.5 [018.7] kg) or the control group (8 M and 12 F; total number of sprains 5.1 [3.9]; age: 22.9 [4.5] y; height: 170.5 [6.1] cm; weight: 76.1 [13.9] kg).
Intervention investigated	Descriptions: active treatment was weight-bearing mobilization with movement. Placebo/"sham" treatment aimed to stabilize the talocrural joint. The control group received no treatment. Duration: 3 wk Sessions per week: 2 Volume per session: 2 sets of 10 repetitions separated by 2 min of rest	Description: active treatment was grade III Maitland anterior-to-posterior talocrural joint mobilization. Duration: 2 wk Sessions per week: 3 Volume per session: 2 min	Description: active treatment was grade III Maitland anterior-to-posterior talocrural joint mobilization. The control group received no treatment. Duration: 2 wk Sessions per week: 3 Volume per session: 2 bouts of 2 min separated by 1 min of rest
Outcome measures	CAIT quantified at preintervention, postintervention, and at a 6-mo follow-up.	FAAM and FAAM-S quantified at baseline, preintervention, postintervention, and at a 1-wk follow-up.	FAAM and FAAM-S quantified at preintervention, postintervention, and at a 1-mo follow-up.
Main findings	The intervention group (preintervention: 21.23 [1.25], postintervention: 27.87 [1.17], and at a 6-mo follow-up: 26.47 [1.48]) had significant improvements ($P < .001$) relative to the placebo group (preintervention: 21.81 [1.80], postintervention: 22.17 [1.85], and at a 6-mo follow-up: 22.02 [2.08]) and the control group (preintervention: 22.31 [2.27], postintervention: 22.42 [2.31], and at a 6-mo follow-up: 22.42 [2.55]).	The intervention resulted in significant improvements ($P < .05$) in FAAM-ADL scores at postintervention: 87.30% (11.07%) and 1-wk follow-up: 86.8% (11.06%) relative to baseline: 77.99% (13.11%) and preintervention: 78.27% (12.62%) assessments. Similarly, FAAM-S scores improved ($P < .05$) from the baseline: 56.25% (14.72%) and preintervention: 58.59% (11.08%) assessments to the postintervention: 73.69% (17.65%) and 1-wk follow-up: 74.21% (18.94%).	Relative to the control group, FAAM-ADL scores (preintervention: 80.65% [10.51%], postintervention: 85.24% [9.02%]) but not FAAM-S scores (preintervention: 62.97% [12.26%], postintervention: 73.90% [13.68%]) improved ($P < .05$) immediately after the intervention. However, at the 1-mo follow-up, FAAM-S (74.84% [18.23%]) but not FAAM scores (86.59% [11.91%]) were significantly improved relative to the control group ($P < .05$).
Level of evidence	1b	2b	1b
Validity score	11/11 on PEDro scale	4/11 on PEDro scale	7/11 on PEDro scale
Conclusion	Joint mobilization improves self-reported instability and these improvements are maintained for at least 6 mo.	Joint mobilization improves self-reported function and these improvements are maintained for at least 1 wk.	Joint mobilization improves measures of self-reported function and these improvements can be observed 1 mo after the intervention.

Abbreviations: ADL, activities of daily living; CAI, chronic ankle instability; CAIT, Cumberland Ankle Instability Tool; F, female; FAAM, foot and ankle ability measure; FAAM-S, foot and ankle ability measure-sport; L, left; M, male; R, right; RCT, randomized controlled trial.

scored >27 on the CAIT postintervention. Based on recent recommendations, a score of this magnitude suggests that these individuals no longer have CAI. Conversely, Hoch et al⁷ and McKeon and Wikstrom⁸ indicated that despite significant improvements, the mean postintervention scores did not exceed the a priori level of functional deficits required to be included in the study. In other words, the patients with CAI would still be classified as having CAI. Furthermore, the authors suggested that ankle joint mobilizations should be investigated in combination with other rehabilitation strategies known to improve patient-reported

outcomes, such as dynamic balance training.^{1,2} Wikstrom and McKeon¹¹ completed a secondary analysis of the randomized controlled trial data and found that some but not all patients with CAI had large and clinically meaningful results. In addition, specific patient characteristics and baseline assessments were able to predict which patients were most likely to have such meaningful improvements following 2 weeks of anterior-to-posterior ankle joint mobilizations.

Each of the original investigations had limitations that should be considered. For example, Cruz-Díaz et al⁶ used a questionnaire

that is typically diagnostic in nature (CAIT) but is the only patient-reported outcome that has been validated in Spanish at the time of their investigation. Hoch et al⁷ did not have control or placebo comparisons and had a brief follow-up period (1 wk). McKeon and Wikstrom⁸ also did not have a placebo group, and their assessors were not blinded to group assignment.

Given the results, it is recommended that multiple ankle joint mobilizations treatment sessions spread over at least 2 weeks are incorporated into a comprehensive rehabilitation program for at least a subset of patients with CAI. At this time, there is not enough data to determine if Maitland's grade III mobilizations are more or less effective than a mobilization with movement technique. This critically appraised topic should be repeated in 3 years to include more recent investigations that address existing limitations and increase the total sample size.

Acknowledgment

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