Effectiveness of Early Therapeutic Exercise Versus Rest, Ice, Compression, and Elevation in Treatment of Acute Lateral Ankle Sprains: A Critically Appraised Topic

Jonathan Herrick MAT, LAT, ATC,

Karlee Alberty MAT, LAT, ATC,

Jennifer L. Volberding PhD, LAT, ATC

Clinical scenario: *Lateral* ankle sprains are one of the most common musculoskeletal injuries and are associated with a high rate of emergency room visits. Ankle sprains have been reported to be 7-10% of all admissions to emergency departments and occur at a rate of 2.15 ankle sprains per 1000 person/year in the United States. ***Clinical Question:*** Does the early inclusion of therapeutic exercises in the rehabilitation process of a lateral ankle sprain return patients to normal activities of daily living earlier than the rest, ice compression and elevation (RICE) only protocol? ***Summary of Key Findings:*** There were significant effects in favor of the therapeutic exercise (strengthening and range of motion) group after weeks one and two for ankle function compared to the RICE therapy group. However, there was not a significant clinical difference between the two groups after month one, three, and six.[1,3] In another study it was found that initial immobilization with a period of rest, ice, compression, and elevation (RICE) during the first 4-5 days is beneficial for the inflammatory phase of healing.[2] ***Clinical Bottom Line:*** There is moderate evidence to support using a more active treatment consisting of therapeutic exercises to increase ankle range of motion (ROM) and ankle strength in patients that suffer from grade I and II ankle sprains during the first few weeks after injury. ***Strength of Recommendation:*** There is grade B evidence that using therapeutic exercises during the first two weeks after an ankle sprain improves ankle range of motion and ankle strength compared to the RICE protocol, but not after the first two weeks. The recommendation of a grade B was given to the consistency of conclusions of the level one evidence included in this critically appraised topic (CAT).

Clinical Scenario

Ankle sprains are one of the most common musculoskeletal injuries and are associated with a high rate of visits to the emergency department.[1-3] Research has demonstrated that seven to ten percent of all admissions to the emergency department are ankle sprains, occurring at a rate of 2.15 ankle sprains per 1000 persons/year in the United States.[4] Statistical analyses indicate that lateral ankle sprains account for nearly 16% of sport injuries.[5]

Lateral ankle sprains range in severity from grades one to three. A grade one sprain is characterized by stretching of the ligaments, grade two by ligament rupture, and grade three by complete rupture of the ligaments.[2] Traditional treatment of lateral ankle sprains includes four to six weeks of functional support using ankle braces. Additionally, many use rest, ice, compression, and elevation (RICE) during the first week to allow healing to occur. However, there are indications that implementing therapeutic exercises, consisting of ankle range of motion (ROM) and ankle muscular strengthening early during the inflammatory phase after injury (days one to five) can return the physically active patient to normal activities of daily living earlier than patients utilizing the RICE protocol.[1]

Focused Clinical Question

Does the early inclusion of therapeutic exercises in the rehabilitation process of a lateral ankle sprain return patients to normal activities of daily living earlier than the RICE only protocol?

Search Strategy

A computerized search was completed in October 2020. The search terms used were:

- Patient/client group: patients who sustained a grade I or II lateral ankle sprain
- Intervention/assessment: early therapeutic exercise
- Comparison: rest, ice, compression, elevation
- Outcome: return to normal activities of daily living

Databases Searched

- TripResearch
- Google Scholar
- EBSCO Host
- Pubmed
- PEDro Database

Inclusion Criteria

- Studies implemented using live human subjects
- Available in the English language
- Studies published within past 10 years (2010-2020)
- Level 2 evidence or higher
- Studies focused on ankle range of motion and ankle muscular strength
- Studies addressing Grade 1 and 2 lateral ankle sprains
- Studies including a follow-up period after weeks 1, 2, and a long-term follow-up

Exclusion Criteria

- Studies that compared bracing to non-bracing.
- Studies that included severe ankle injuries such as fractures and grade III lateral ankle sprains.
- Studies focused on medial and high ankle sprains.
- Studies performed on animals.
- Studies conducted before 2010.
- Studies not written in the English language.

Evidence Quality Assessment

The three studies identified as the best evidence for inclusion in this critically appraised topic (CAT) are described in Table 2. They were selected because they were either a systematic review or a randomized controlled trial graded with a level of evidence of 2b or higher. The articles were selected because they compared two groups: a group that received therapeutic exercises right after the lateral ankle sprain occurred and a control group that received the RICE protocol. The articles selected also measured the difference between the two groups multiple times within the first month and one other time at 16 weeks after the initial injury. Two studies concluded that when including therapeutic exercises (strengthening and range of motion exercises) immediately after sustaining an injury to the lateral ankle, the patient regains ankle range of motion and ankle muscular strength earlier than the group that received the RICE protocol during the first week after the injury.[1,3] The second study considered the RICE therapy to be the treatment of choice for the first 4-5 days after injury.[2]

The first study selected used the Lower Extremity Functional Scale (LEFS) outcome. This study found significant effects that were in favor of the exercise group at both week one (baseline adjusted difference 5.28, 95% CI 0.31 to 10.26) and week two (4.92, 95% CI 0.27 to 9.57) for ankle range of motion and muscular strength.[1] The third study also used the Lower Extremity Functional Scale (LEFS) and found that the exercise group had significant effects at week one (5.28, 98.75% CI 0.31 to 10.26; P=0.008) and week two (4.92, 98.75% CI 0.27 to 9.57; P=0.0083).[3] Both studies used the Visual Analog Scale (VAS) as a secondary outcome measure to observe pain at rest, pain with activity, and swelling between the therapeutic exercise group and the RICE group. No significant difference was found between the two groups using the VAS for pain at rest, pain with activity, or swelling.

Results of Search

The initial search revealed 27,000+ studies using the previously identified search terms and databases. Most articles found during the web-based search were either 1) describing the causes and characteristics of an ankle sprain and its treatment; 2) comparing bracing to non-bracing after an ankle sprain; 3) using manual therapy instead of therapeutic exercises or 4) comparing immobilization to rest, ice, compression, and elevation/therapeutic exercises. One study was originally included due to the use of therapeutic exercise as the intervention and RICE as the control, however after further consideration was excluded since the article did not meet the requirements of this CAT and did not fit the criteria given that the functional outcome measures were not measured after weeks one and two. Other studies were removed due to the fact that the publication date was prior to 2010 and thus did not meet inclusionary criteria. One article written after 2010 was a narrative review but was not included since the level of evidence was not level two or higher and was not clinically relevant. The three studies[1-3] identified are categorized in Table 1 and were selected based on criteria identified in the levels of evidence as summarized by the Centre for Evidence Based Medicine in 2009.

Clinical Bottom Line

There is moderate evidence to support using a more active treatment consisting of therapeutic exercises to increase ankle range of motion and ankle muscular strength in patients that suffer from grade I and II ankle sprains during the first few weeks after injury. Additionally, it has also been shown to be beneficial to begin therapeutic exercises within the first week after injury compared to the RICE protocol during the first four to five days after the lateral ankle sprain. The benefit of early exercise has been determined to help the restoration of ankle ROM and ankle muscular strength.

Implications for Practice, Education, and Future Research

Moderate evidence exists favoring the use of therapeutic exercise (strengthening and range of motion) in the treatment of acute grade I and II lateral ankle sprains during weeks one and two. The therapeutic exercise group showed significant improvement in short term function during the first two weeks after the injury compared to the RICE therapy group. However, the two groups did not differ at any other time point for pain at rest, pain during activity, or swelling.[1,3] Another study concluded that long term immobilization could have a detrimental effect on muscles, ligaments, and joint surfaces since functional stress is necessary for the remodeling of connective tissue. Therefore, the recommendation of the initial treatment during the inflammatory phase should be directed towards avoiding or diminishing excess swelling and ongoing injury thereby optimizing the healing process. Additionally, RICE therapy is considered to be the treatment of choice during the first four to five days to reduce pain and swelling.[2]

It should be noted that these articles lack the scientific evidence that would provide a clear clinical plan for clinicians to follow when treating and predicting recovery with a physically active patient who suffered an acute grade I and II lateral ankle sprain. Further research is needed to develop specific exercises and time spent deploying ice in the acute care of lateral ankle

sprains. Future research should also monitor symptoms each week for the first month when comparing a functional exercise group to a RICE therapy group.

Strength of Recommendation

The evidence warrants a grade of B for using therapeutic exercises during the first two weeks after an ankle sprain improves ankle range of motion and ankle muscular strength compared to the RICE protocol. However, it should be noted no significant differences exist between the therapies at months one, three, or six. The recommendation of a grade B was assigned due to the consistency of conclusions of the level one evidence included in this CAT.

Table 1 Summary of Study Designs of Articles Retrieved

Level of Evidence	Study Design	Number Located	Reference
1a	Systematic Review	1	Peterson[2]
1b	Randomized Controlled Trial	2	Rijn RMV[1] Bleakley et al[3]

Evidence Table

Table 2 Characteristics of Included Studies

	Rijn, 2010[1]	Peterson, 2013[2]	Bleakley, 2010[3]
Title	Early therapeutic exercise in the first week after grade 1 or 2 ankle sprain improves subjective ankle function compared to standard RICE treatment	Treatment of acute ankle ligament injuries: a systematic review	Effect of accelerated rehabilitation on function after ankle sprain: randomised controlled trial
Participants	10 physically active adults, aged 16-65 years, with a grade I or II lateral ankle sprain	21 randomized controlled trials involving 2,184 participants	101 physically active adults, aged 16-65 years, with a grade I or II lateral ankle sprain
Inclusion/Exclusion Criteria	Inclusion: acute grade I or II ankle sprain attending an emergency department or sports injury clinic.	Not Reported	Inclusion: acute grade I or II ankle sprain attending an emergency department or sports injury clinic.

	Exclusion: complete rupture of the ankle ligament, a bony ankle injury, multiple injuries, a contraindication to cryotherapy, non-English speaking, were under the influence of drugs or alcohol or had an insufficient address for follow-up.		Exclusion: complete rupture of the ankle ligament, a bony ankle injury, multiple injuries, a contraindication to cryotherapy, non-English speaking, were under the influence of drugs or alcohol or had an insufficient address for follow-up.
Comparison	Protection: rest, ice, compression, and elevation	Rest, Ice, Compression, Elevation	Protection: rest, ice, compression, and elevation
Outcomes	Lower Extremity Functional Scale (LEFS), Pain at rest and activity Visual Analog Scale (VAS), swelling (figure of eight method), and physical activity (activity monitor).	Did not include outcomes in the systematic review	Lower Extremity Functional Scale (LEFS), pain at rest and with activity using the Visual Analog Scale (VAS), swelling (figure of eight method), and physical activity (activity monitor).
Results	Significant improvements were found after both week one and two for ankle function which was in favor of the early exercise group.	Functional treatment appears to be the favorable strategy for treating acute ankle sprains. However, initial treatment during the inflammatory phase should be directed towards avoiding or diminishing excess swelling and ongoing injury, thus optimizing the healing process. RICE therapy is considered to be the treatment of choice	Accelerated functional treatment incorporating therapeutic exercises during the first week after ankle sprain, produces significant improvements to short term ankle function compared with standard treatment of RICE.

		for the first four to five days to reduce pain and swelling.	
Level of Evidence	1b	1a	1b
Validity Score	PEDro score 9/11	PEDro score 9/11	PEDro score 9/11
Support for the answer	Yes	No	Yes

References:

1. van Rijn RM Early therapeutic exercise in the first week after grade 1 or 2 ankle sprain improves subjective ankle function compared to standard RICE treatment. *Br J Sports Med.* 2010;15:141-142.

2. Petersen W, Rembitzki IV, Koppenburg AG, Ellerman A, Liebau C, Bruggemann GP, Best R. Treatment of acute ankle ligament injuries: a systematic review. *Arch of Orthop Trauma Surg.* 2013;133(8):1129-1141.

3. Bleakley Chris M, O'Connor Sean R, Tully Mark A, Rocke Laurence G, MacAuley Domhnall C, Bradbury Ian et al. Effect of accelerated rehabilitation on function after ankle sprain: randomised controlled trial. *Br J Sports Med*. 2010;340:c1964.

4. O'Connor SR, Bleakley CM, Tully MA, Mcdonough SM. Predicting Functional Recovery after Acute Ankle Sprain. *PLoS ONE.* 2013;8(8):1-5.

5. Mohammadi H, Ghafarian Shiraz H, Saniee F, Delaviz H. Functional treatment comparing with immobilization after acute ankle ligament sprain. *Zahedan J Res Med Sci*. 2013; 15(2): 28-31.

6. Doherty C, Bleakley C, Delahunt E, Holden S. Treatment and prevention of acute and recurrent ankle sprain: an overview of systematic reviews with meta-analysis. *Br J Sports Med.* 2016;51(2):113-125.

7. Kaminski TW, Hertel J, Amendola N, et al. National Athletic Trainers' Association Position Statement: Conservative Management and Prevention of Ankle Sprains in Athletes. *J Athl Train*. 2013;48(4):528-545.