Short-term Immobilization versus Functional Treatment of Severe Ankle Sprains: A Critically Appraised Topic

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Purpose: Ankle sprains are one of the most common musculoskeletal injuries in sports and medical care. Ankle sprains are graded (1 to 3) based upon their severity and are currently treated one of three ways: (1) surgical treatment, (2) immobilization (conservative treatment) and (3) functional conservative treatment. The purpose of this paper is to summarize the best available evidence to answer the clinical question "Does short-term immobilization for a severe ankle sprain provide better functional outcomes compared to conventional functional treatment?" **Method:** A computerized search was conducted on a number of databases using specific inclusion and exclusion criteria. The Physiotherapy Evidence Database (PEDro) Scale was utilized to assess the effectiveness of the interventions utilized within the studies included in this critically appraised topic (CAT). **Results:** Four studies (two randomized control trial studies, and two systematic reviews) met the inclusion criteria for analysis. There is strong evidence (Level 2) supporting that short-term immobilization is indicated to be more effective in recovery and provides better functional outcomes compared to functional treatment for individuals suffering severe ankle sprains. **Conclusions:** There is Grade A evidence to support that short-term immobilization provides better functional outcomes compared to functional treatment in the management of severe (Grade 3) lateral ankle sprains.

CLINICAL SCENARIO

Acute ankle sprains are one of the most common musculoskeletal injuries in sports and medical care.[1,2] In the United States ankle sprains occur in an estimated 1 per 23,000 people per day.[1,2] Ankle sprains often result in pain and absenteeism from work and/or sports participation, and can also lead to physical disability.[1]

Supination and adduction (inversion) of the foot in a plantarflexed position is the most common mechanism of injury for a lateral ankle sprain, causing damage to the lateral ligaments of the ankle joint.[3,4] A majority (approximately 75%) of ankle sprains are caused by an inversion trauma with about 15 to 25% of ankle sprains originating from sports with basketball, (American) football, soccer and volleyball having the highest incidence rate.[2,3,4] For acute lateral

ankle sprains, functional treatment is the optimal non-surgical treatment in favor of immobilization.[4]

Ankle sprains are graded (1 to 3) based upon their severity.[1] Grade 1 (mild) consists of stretching of the lateral ankle ligaments of the ankle and are also self-limiting.[1] Grade 2 (moderate) and 3 (severe) however consist of partial or full tearing of the lateral ankle ligaments accompanied with moderate or severe swelling, bruising, joint tenderness, joint laxity or instability, loss of function, and/or an inability to bear-weight. However, those that suffer from severe types of ankle sprains (grades 2 and 3), tend to exhibit residual symptoms ranging from several weeks to months or years after returning to work or sport from the initial injury. Complaints of residual symptoms range from 6 to 78% for 8 months to 3 years after an ankle injury.[1]

Currently, there are three main treatment protocols for ankle sprains: (1) surgical treatment, (2) immobilization (conservative treatment) and (3) functional conservative treatment.[4] Immobilization is defined as any therapy that prevents movement of the ankle joint, typically through the use of a cast, or an orthopedic walking boot.[5] Functional treatment (nonsurgical and non-immobilizing) consists of early mobilization (Physical Therapy) that may or may not include the use of an external ankle support.[5] External supports may be in the form of compression bandage, lace-up brace, tape, semi-rigid brace, or stir-up splint.[2,4,5]

Unlike immobilization, external supports may prevent inversion and eversion but do allow some movement in plantarflexion and dorsiflexion. For this study external supports will be evaluated in comparison to immobilization.

FOCUSED CLINICAL QUESTION

Does short-term immobilization with a below-knee cast (max of 10 days) for a severe (Grade 3) ankle sprain provide better functional outcomes compared to conventional functional treatment?

SEARCH STRATEGY

A computerized search was completed in November of 2018. The search terms used were:

Terms Used to Guide Search Strategy

- Patient: severe ankle sprain
- Intervention: Immobilization
- Comparison: Functional Treatment
- Outcome: Pain, Function

The criteria for study selection were as follows:

Inclusion and Exclusion Criteria

***Inclusion Criteria*:**

- Studies with severe, ankle sprains
- Studies with immobilization
- Studies with functional treatment
- Studies limited to randomized control trial studies (RCT) and systematic reviews
- Studies investigating patient-reported pain (visual analog scale, numerical pain rating scale) or patient-reported function as outcome measures
- Limited to publications within the last 10 years (2008-2018)
- Limited to English language
- Limited to free full text

***Exclusion Criteria*:**

- Studies utilizing surgical intervention
- Studies that did not include pain and self-reported function as an outcome
- Studies that compared different functional treatments to each other
- Studies that only investigated chronic ankle pain and instability

Source of Evidence Searched

- Google Scholar
- MEDLINE
- PubMed
- PEDro

Evidence Quality Assessment

The Physiotherapy Evidence Database (PEDro) Scale was utilized to assess the effectiveness of the interventions utilized within the studies included in this critically appraised topic (CAT).

RESULTS OF SEARCH

Summary of Search, Best Evidence Appraised, and Key Findings

- The search of the literature retuned eight possible studies for inclusion
- Four studies[3,6-8] met the inclusion criteria and were examined (based on levels of evidence, Centre for Evidence-Based Medicine, 2018)[9]
- Two systematic reviews[3,8] and three RCT studies[5-7] were examined

- One randomized control trial (RCT) study was excluded[5]
- The studies in the Table 1 were identified as the best evidence and selected for inclusion in this CAT.
- Collectively, these studies compared the effectiveness of immobilization to functional treatment of severe ankle sprains.

Table 1:	**Summary Table of Included Studies**			
Study Author	Peterson et al.[3]	Lamb et al.[6]	Mohammadi et al.[7]	Seah et al.[8]
Study Title	Treatment of acute ankle ligament injuries: a systematic review	Mechanical supports for acute, severe ankle sprain: a pragmatic, multicenter, randomized controlled trial	Functional Treatment Comparing with Immobilization after Acute Ankle Sprain	Managing ankle sprains in primary care: what is best practice? A systematic review of the last 10 years of evidence
Participants	-	• 584 participants • 274 females, 310 males (Avg. Age: 30±10.8 years) • Recruited from 8 different emergency departments across the United Kingdom (UK) *Randomized Groups:* • 144, Compression bandage (Ave age: 31±11.2 years) • 142, Below Knee Cast (Ave	• 100 participants between the ages of 16 to 50 years • all males • Recruited in the emergency department of Yasjuj's Shahid Beheshiti Hospital *Randomized Groups:* • 50, Functional treatment (Ave age: 27.2±1.1 years) • 50 Immobilization treatment(Ave age: 29.2±1.3 years)	-

Table 1:	Summary Table of Included Studies			
		age: 30±10.5 years) • 149, Aircast splint (Ave age: 29±10.7 years) • 149, Bledsoe Boot (Ave age: 30±10.7 years)		

Table 1:	**Summary Table of Included Studies**			
Inclusion Criteria	• Publications within the previous 10 years of systematic review (Jan 2002 to Dec 2012) • Studies in the English Language • Studies with patient population > 16 years of age • Randomized controlled trials (RCTs), meta-analysis studies • Studies of lower evidence studies included in meta-analysis	• > 16 years of age • Sustained an acute lateral ankle sprain • inability to bear weight • At least 3 days post injury	• > 16 years of age • Ankle sprain less than 48 hours old • Have a history of ankle sprains	• Publications within the previous 10 years of systematic review (Jan 2000 to Dec 2010) • Studies with ankle sprains, acute and/or chronic (> 6 weeks) occurring within the primary care/community/general practice or urgent/emergency care settings • Studies in the English Language • Studies with patient population > 18 years of age • Articles with a level of evidence between 1 and 5: (1) systematic review or meta-analysis,(2) randomized controlled trial (RCT), (3) cohort studies , (4) case control studies and (5)

Table 1:	Summary Table of Included Studies			
				cross-sectional studies • Studies of lower evidence studies included in meta-analysis
Exclusion Criteria	• Studies that evaluated management of ankle fractures, syndesmosis lesions, or dislocations • Prospective randomized trials that are already included in meta-analysis • Cohort studies, case series, retrospective studies, case	• < 16 years of age • fractures • contraindications to immobilization (DVT) • Ankle sprain < 7 days old	• No Exclusion Criteria Indicated	• Studies that evaluated management of ankle fractures, or dislocations • Case reports, expert opinion, and anecdotal evidence

Table 1:	Summary Table of Included Studies			
	reports, expert opinion, and anecdotal evidence			
Outcome Measures	• No Outcome Measures Indicated	*Primary:* • Foot and Ankle Score (FAOS) • Generic Health-Related QoL short-form 12, (SF-12) *Secondary:* • Visual Analog Pain Scale (VAS) • Outcomes collected at 1, 3, and 9 months by postal	• Visual Analog Pain Scale (VAS) • range of motion (ROM) • arthritis • tenderness • return to work/activities of daily living • Outcomes collected at 48 hours, 2, 6, and 12 weeks	• Patient-oriented evidence included length of stay, recurrence and time of return to work or sport

Table 1:	Summary Table of Included Studies			
Main Findings (Results)	• Kerkhoffs et al. compared studies about functional treatment and immobilization and showed statistically significant differences in favor of functional treatment over immobilization. • The CAST trial showed that a short period of immobilization in a below-knee cast or treatment with a semi-rigid orthosis results in faster recovery than if the patient is only given tubular compression bandage	• Questionnaires were received from 83% of participants at month 1, 82% at month 3 and 76% at month 9. • Most participants that were randomized into the below-cast group (83%) or Bledsoe boot group (77%) were no longer wearing their supports at 1 month compared to the compression bandage (30%) and Aircast splint (51%). • A short period of immobilization with the below-knee cast or Bledsoe boot are the most effective for promoting rapid recovery of function	• VAS showed that after 2 weeks pain in group I was lower (33.41±4.11) than group II (57.31±11.21) • Functional treatment during entire treatment period was more effective in maintaining ROM • 52 % of participants in group I returned to work after two weeks, while no participants of group II returned to work. • After two months 96% and 92% of participants in group I and II returned to work.	• In 2 different systemic reviews by Kerkhoffs et al. they concluded that 1) lace-up supports were a more effective functional treatment than elastic bandaging of acute lateral ankle ligament ruptures and 2) functional treatment was found to be more effective over immobilization. • Lamb et al. conducted a single-blinded RCT, concluded that a short period of immobilization in a below-knee cast or Aircast brace resulted in faster recovery over then tubular compression bandage. • A short period of immobilization in a below-knee cast or Aircast brace results in

Table 1:	Summary Table of Included Studies			
		compared to the compression bandage.		a quicker recovery than compression bandage for severe lateral ankle sprains.
Evidence Quality Score	PEDro: n/a	PEDro: 7/10	PEDro: n/a	PEDro: n/a
Support for the answer	Yes	Yes	No	Yes

CLINICAL EVIDENCE

There is strong evidence that supports that short-term immobilization with a below-knee cast for a maximum of 10 days is shown to be more effective in recovery and provides better functional outcomes compared to functional treatment for individuals that suffer from severe ankle sprains. However, it is recommended that an ankle brace be utilized when participating in sporting events to help prevent reoccurrences of ankle sprains.

STRENGTH OF RECOMMENDATION

There is Grade A evidence to support that short-term immobilization provides better functional outcomes compared to functional treatment. The recommendation of Level A was assigned due to at least one large, high quality multi-center trial study[6] included within this CAT.[9]

IMPLICATIONS FOR PRACTICE, EDUCATION, AND FUTURE RESEARCH

Two of the four articles[6,7] of this CAT are RCT's which compared immobilization to functional treatment for individuals suffering severe ankle sprains. One of these RCTs determined that immobilization provides better functional outcomes compared to functional treatment while the other did not. Both RTCs[6,7] utilized the Visual Analogue Scale for pain (VAS) as their patient-oriented outcome. However, only Lamb et al.[6] included patient-oriented outcome scales other than the VAS.

The other two articles included in this CAT are systematic reviews[3,8] which evaluated the different types of management and treatment of ankle sprains. Both of these systematic reviews determined that immobilization provides better functional outcomes compared to functional treatment.
Based on the indicated studies[3,6-8] short-term immobilization with below-knee cast (max of 10 days) is indicated to provide better functional outcomes compared to conventional functional treatment in individuals with severe (Grade 3), acute ankle sprains. However, there are studies indicating a semi-ridged brace is effective in restoring overall ankle function compared to other functional treatments if immobilization with casting or immobilization boot are not available.[7]

Future research should be conducted to further examine the function of the ankle and symptoms focusing more on patient-oriented outcomes in immobilization versus functional treatment, emphasizing what type of functional treatment is to be evaluated. Future research should also further examine the range of motion of the ankle joint pre, during, and post treatment, as well as the re-rupture rate of the lateral ankle ligaments post recovery.

However, this CAT should be taken with caution as current literature lacks the utilization of proper evaluation equipment for range-of-motion and other outcomes specified within the literature (i.e., stability, arthritis, strength). Rating of pain should also be taken into consideration as people experience pain differently and have different pain levels, thresholds, and tolerances. Population age may contribute to recovery as younger individuals tend to recover faster than older individuals, thus this variable should also be taken into consideration. Much of the current literature also lacks in identifying how often external interventions were utilized such as physical therapy, analgesics, etc.

This CAT should be reviewed in two years (2022) to determine whether there is additional best evidence that might alter the clinical evidence for this clinical question.

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