Review Article :

Conservative Management of Acute Lateral Ankle Sprain: A Review of Systematic reviews

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Abstract

Acute lateral ankle sprains (ALAS) are one the most observed musculoskeletal sports injuries. This review aimed to analyze the various systematic reviews from Jan 2010 to June 2022 to evaluate the best evidence-based conservative management of ALAS. Various popular search engines including PubMed, Scopus, Web of Science, and EMBASE were searched. Out of a total of 2357 citations, 26 studies were evaluated after duplicates were eliminated based on eligibility criteria. After the procedure, 20 systematic reviews with a mean AMSTAR quality score of 8.25/11 were included in this analysis review, which demonstrated PT functional therapy is better for managing ALAS even though not fully conclusive in certain parameters.

Keywords:

Ankle sprain, Physical therapy, Rehabilitation, Exercise.

Introduction

Acute lateral ankle sprain, popularly called ALAS is one of the commonest prevalent lower limb sports injuries characterized by an involuntary twisting movement that exceeds the usual limits of the joint, causing the either or combination of 3 lateral ligaments in the ankle joint, namely anterior talofibular ligament (ATFL), calcaneofibular (CFL) and posterior talofibular (PTFL) to strain or partially or completely rip.[1,2] This combination of injuries is the basis of the classification of the ALAS into three grades, namely Grade I, Grade II, and Grade III. While ATFL gets partially ruptured in grade I lateral ankle injuries, grade II ALAS results in ATFL being completely torn along with CFL getting sprained, whereas in grade III injuries all three lateral ankle ligaments get completely ruptured.[3,4]

Every year, the US alone has reported about 2 million cases of ALAS with

an incidence rate of 2 to 7 acute ankle sprains/1000 person-years.[5,6] One of the most prominent factors pertinent to ALAS is its strong association with a high incidence of recurrence leading to chronic ankle instability (CAI).

CAI is characterized by constant symptoms like pain, swelling, and/or yielding in the affected Ankle. The patients with CAI may also experience a recurrent Ankle sprain in the following year after the initial injury. CAI affects employment outcomes, sports, recreation, functional activities, and a significant decrease in the quality of life. Medical expenses and the loss incurred due to sickness absenteeism result in formidable economic and social burden.[6-8] Therefore, this phenomenon calls for effective and efficient management of ALAS quite early.

The management of ALAS can be either conservative or surgical depending on the grade of injury. The conservative management comprises of PRICE treatment protocol followed by a gradual regimen of functional exercises. Research evidence state that initial rest along with braces, elastic bandages, tapes, and semi-rigid ankle supports are the most often utilized for restricting ankle movement in the initial stages. This is supplemented by using cryotherapy which along with compression help reduce inflammation as well as facilitates lymphatic drainage reduction in metabolic load as well as raises threshold levels in free nerve endings.[9-13]

It has been also observed that early, protected resumption to movement can improve proprioception in the damaged area by stimulating the afferent somatosensory pathways in the foot and ankle.[14-18] The other important physical therapy interventions include functional exercises as well as mobilization techniques for gaining an early complete range of all ankle motions including dorsiflexion, plantar flexion, rotation, inversion, and eversion. This is facilitated by strengthening as well as proprioceptive training activities to prevent re-injury as well as to counteract the tissue's propensity to contract after damage.[19] The other exercise techniques including the isometric, isotonic, and isokinetic exercises too help to realign the newly developed collagen fibers to the mechanical stressors in the ligament along with improving the sensorimotor agility to prevent any loss of balance.[20]

Surgical treatments are recommended and often carried out in grade II–III sprains where anatomic repair, non-anatomic reconstruction, and anatomic reconstruction are performed depending on the severity of the injury. Tendon grafts help to restore general function and stability.[21] So the purpose of the present study is to identi-

fy the effect of various physiotherapeutic interventions on ALAS using articles published after Jan 2010 till June 2022 using the PICO method (P: Problem, I: Intervention, C: Comparison, O: Outcome).[22] Thus, the present review aimed to evaluate the effects of physiotherapeutic treatment as a mainstay of treatment under conservative management of lateral ankle sprain injuries in terms of significant differences in the outcome being observed between treating severe lateral ankle sprains surgically and conservatively.

Methodology

The PRISMA guidelines were followed while conducting the current systematic review23. All international databases including Google Scholar, Scopus Elsevier, Web of Science, and PubMed by using a combination of keywords like "acute lateral ankle sprain", "Physiotherapeutic management", "Surgical management" and "ankle rehabilitation". The inclusion criteria for articles taken into consideration were those which were systematic reviews and had an intervention either Physiotherapeutic or conservative, or surgical suitable for the management of ALAS. Exclusion criteria included those studies that had the management of chronic ankle instability or any other special category list. Moreover, those studies published before the year 2010 were also excluded. The PICO selection criteria used for assessment were Population where Patients with ankle sprains of any grade (of any age), Intervention were classified as Physiotherapeutic interventions such as strength training, mobilization, balance exercises or non-pharmacological methods such as PRICE, external supports, etc.), Comparison made with pharmacological interventions such as NSAID's on combinations, surgical interventions or combinations were used, Outcome measures for comparisons were assessed on basis of therapeutic success, for instance, pain, ROM, functional ankle scores, quality of life, etc.

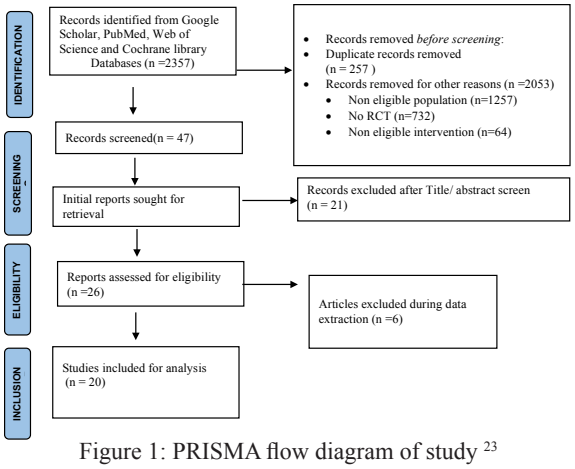


Figure 1: PRISMA flow diagram of study [23]

Results

A preliminary search yielded about 2357 citations. The 26 systematic reviews that remained were further screened using the selection criteria to identify suitable papers. Finally, [20] articles were deemed eligible to be included in the review. A

quality assessment of the systematic reviews of the 20 articles was done using the AMSTAR Scale for the impact of external support, RICE protocol, Physiotherapeutic intervention, and surgery on the ALAS.[24]

Table 1: Result of methodological quality assessment of the systematic reviews by using the AMSTAR scale

Author, Year	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	Score
Altomare et al.,2022	+	+	+	+	+	+	+	+	+	+	+	11
Pawik et al., 2022	+	+	+	+	+	+	+	+	+	+	+	11
Herrick et al., 2021	+	+	0	0	+	+	+	+	0	+	+	8
Jones et al.,2020	+	+	+	+	+	+	+	+	+	+	+	11
Ortega-Avila(2020	+	+	+	+	+	+	+	+	+	+	+	11
Louwerens al., 2019	+	+	0	+	0	0	+	+	+	+	+	8
Al Bimani et al.,2019	+	+	+	+	+	+	+	+	+	+	+	11
Vurruberg et al.,2018	+	+	0	+	+	+	+	+	0	+	+	9
Van den Bekerom et al., 2016	+	+	+	+	+	+	+	+	+	+	+	11
Feger et al.,2015	+	+	+	0	0	+	+	+	0	0	0	6
Kemler et al.,2015	+	+	0	+	0	0	0	+	0	+	+	6
Loudon et al.,2014	+	0	+	0	0	+	+	+		+	0	6
Park et al.,2013	+	+	+	+	0	+	+	+	+	+	+	10
Terada et al.,2013	+	0	+	+	0	+	+	+	0	0	0	6
Prado et al., 2014	+	+	0	+	0	0	0	+	0	+	+	6
Sultan et al., 2012	+	+	0	0	0	0	+	0	0	+	+	5
Lardenoye et al., 2012	+	+	0	0	0	0	0	0	0	+	+	4
Brantingham et al., 2012	+	+	+	+	+	+	+	+	0	+	+	10
Strujis and Kerkhofs, 2010	+	+	+	+	0	0	+	+	0	0	0	6
Van Rijn et al(2010)	+	0	+	0	0	+	+	+	+	0	+	7

External support

Review Literature suggests a total of 8 RCTs following the CONSORT criteria were used to compare the effect of external supports such as taping, brace, etc. used for conservative management of acute lateral ankle sprains.[25] The articles published in the last 12 years till June 2022 were taken into consideration. On evaluation, it was observed that even though flexible

braces were preferred more than rigid supports, however, no general agreement on the ideal bracing strategy for managing the ALAS was noted, for the want of more conclusive data Overall, flexible supports were preferred, but stronger data is still required to support these lacking.

Four research studies by Louwerens et al., Dizon et al., Sultan et al., and Kemler et al. have tried to explore the problem well.[16-18,20]. While three studies have recommended the use of elastic bandages or flexible braces rather than stiff supports to facilitate healing and early work-related activity, the results were comparable in terms of ankle mobility and re-injury incidence. Thus, the Patient's choice and comfortability is one factor that might influence the selection of the brace for the problem without any solid scientific explanation.[17]

Rest Ice Compression Elevation (RICE)

RICE is a conservative treatment method that has not been rigorously investigated, and the efficacy of this combination is questionable. The individual elements of ice and compression have been the subject of numerous scientific investigations. An analysis of various systematic reviews concerning the efficacy of RICE treatment in ALAS suggests that there is little scientific support for their efficacy in reducing injury-associated symptoms. Studies by Kemler et al., Jones et al., Van den Bekerom et al., Ortega-Avila et al., and Herrick et al., were assessed to evaluate their effectiveness.[20,26-29]

Kemler et al. included 9 studies comprising 1,250 cases to compare RICE to available treatment options considered functional.

Nine studies involving 1,250 patients were included by Kemler et al. to compare RICE to other functional treatment modalities. No marked differences were noticed in the rates of joint instability, reinjury, or duration to regain the capacity to perform the activities to match the pre-injury level.[20] Likewise, 11 studies were included by van den Bekerom et al. where 868 patients were involved to analyze the RICE evidence. Though early post-traumatic immobility appears to be advantageous, however, enough proof cannot be generated to statistically back up the effectiveness of the RICE method.[27] Similarly, 20 trials including 2,236 patients were included by Ortega-Avila et al.[21] to show that conservative management (such as RICE, cryotherapy, exercise, and manual therapy) efficiently reduces pain and functional recovery, however evidence is inconclusive.[28]

Physical Therapy Interventions and Rehabilitation

A Series of studies conducted by Vuurberg et al., Van Rijn et al., Bratingham et al., Terada et al., Loudan et al., and Altomare et al. were used to evaluate the effectiveness of the PT interventions in the rehabilitation of ALAS. [30-34] It was concluded that while Non-steroidal opioids could effectively reduce pain and inflammation in short term, Physiotherapeutic interventions along with supervised manual therapy could relieve the symptoms effectively if applied quite early.

Eleven trials including 776 patients were considered by van Rijn et al. to evaluate the efficacy of supervised physiotherapy and rehabilitation training added to conventional treatment. The researchers concluded that trained rehabilitation under supervision could lead to a speedier return to sports and a shorter recovery period.[29] Similarly, to analyze the effectiveness of manipulative therapy for the management of ALAS, Brantingham et al. (examined 19 research involving 2,363 patients. Supervised exercises and manipulative therapy were found significantly useful for treating acute ankle sprains in the short term.[31] Likewise, another study by Terada et al. reviewed 9 studies comprising 196 cases to determine the efficacy of techniques to regain dorsiflexion following an acute, recurring, and chronic ankle sprain. The study claimed static stretching for the triceps surae could enhance ankle dorsiflexion effectively post ALAS.[32]

Similarly, the efficacy of manipulative therapy was evaluated for lateral ankle sprains by Loudon et al. where 8 studies including 244 patients were assessed for evidence and concluded that manual therapy significantly enhances ankle range of motion while facilitating movement post ALAS.[33] This was buttressed by the compilation of a study by Vuurberg et al., which assessed 12 studies with 427 patients and concluded that exercise sessions performed under supervision are sought in comparison to other passive techniques to accelerate the recovery of articular stability.9,34 Quite recently, Altomare et al. in their assessment concluded that in 8 out of 12 RCTs, conservative PT treatment in form of therapeutic exercise outperformed surgical management in terms of functional outcome.[35]

Exercise therapy is frequently a crucial element of the care given. Programs for exercise therapy primarily include proprioceptive and neuromuscular activities. Early use of exercise rehabilitation programs after acute LAS damage has been effective. The results also concluded that both the prevalence of recurrent injuries as well as functional ankle instability were

reduced over time with a speedier time to recovery and better results.

Surgery

Surgical management is only considered for patients who did not benefit from the rehabilitation. Comparing PT non-surgical treatment methods to surgical treatment, a review of a few studies provided certain information. For instance, in a study by Strujis and Kerkhoffs which examined 38 trials covering 9976 patients, it was observed that while the number of individuals who underwent surgery, clinical instability was reduced. However, the review wasn't enough to gauge the relative efficacy of operative over non-operative methods for treating acute lateral ankle injuries or vice-versa.[21]

The cases managed by surgical intervention drastically decreased after witnessing the recovery achieved through conservative means for the desired cases. It has been also observed that most patients who have surgery now have persistent immobility following LAS and have not improved with thorough exercise-based physiotherapy treatment.

In patients with ALAS, the long-term outcomes of surgical treatment are comparable to those of functional therapy. Surgery appears to be more effective at reducing the prevalence of recurrent LAS as it has been linked to an increased risk of osteoarthritis later on. Evidence is lacking in cases where patients underwent surgical interventions as they have been found to have longer recovery durations, greater ankle stiffness rates, decreased ankle mobility, and more health complications.[34] Studies also showed that having surgery did not help to lower risks, costs, or further consequences.[21]

Discussion

Although acute lateral ankle sprains (ALAS) are one of the most observed conditions in sports, there are existent dichotomies that exist as a consistent procedure for managing acute ankle sprains has not been established. Furthermore, it is even more challenging to suggest a standardized common approach for the therapy of acute ankle sprains.

According to this comprehensive review, it has been suggested that functional treatment is preferred over immobilization for the management of ALAS. The present study identified few substantiated studies from 2010 onwards till June 2022, that had aimed to investigate the effects of PT interventions on acute lateral ankle sprain management using a range of outcome measures. The articles taken into consideration are systematic reviews that have been critically evaluated to provide spe-

cific answers for treatment-specific ALAS injuries. Among the 20 studies taken for analysis, we investigated both non-surgical and surgical approaches for ALAS treatment, comprising conservative management such as RICE (rest, ice, compression, elevation) therapy, immobilization, external supports, PT rehabilitation, and manual therapy including, supervised exercises, manipulative therapy, mobilization techniques, proprioceptive, coordination, and strength training) as well as surgical techniques for management of grade II and Grade III ankle sprains.[30-34]

The most popular form of management for ALAS in the first 48 to 72 hours is RICE therapy, which combines rest, ice, compression, and elevation. While Rest lessens the need for metabolic tissue, which limits the flow of blood to the injured location, ice lowers the temperature, which slows down cell metabolism by causing vasoconstriction. Additionally, it combats the hemorrhaging and exudate production that causes edema. So, in the present study, five review studies were evaluated for their effectiveness which demonstrated that the RICE treatment is effective however no consensus was built in terms of dosimetry for the cryotherapy application.[10,19,27,29,30]

In terms of PT management and Rehabilitation, it is quite worthwhile to note over here numerous ankle sprain rehabilitation programs were assessed with various techniques and exercises that can be used independently or in conjunction with other therapies. The overall findings regarding this criteria can be summarized by the fact that combining an external ankle support device with a functional therapy that facilitates early joint movement is best suited to produce optimal results. The findings also suggest that though numerous functional treatment options are available and explored, conclusive evidence regarding the supremacy of supervised exercises over traditional treatment cannot be stated.[15-18]

Supervised PT rehabilitation starting as soon as possible within 2 weeks of injury that focuses on balance and coordination is more effective in the long term as compared to other immediate modalities such as acupuncture. There is clear-cut evidence that analgesics, myorelaxants, and anti-inflammatory medications including both active mobilization therapy and lymphatic drainage, were effective in regaining ankle dorsiflexion, which is critical for recovery. However, factors, including pain, muscle spasm, and swelling need to be effectively countered to prevent limitations in ankle ROM and thus PT multimodal approach is required to determine the elements affecting the ROM.[20,28]

Last but not the least, more research is necessary, in our opinion, before suggest-

ing surgery as the first line of treatment for patients with constant symptoms like chronic ankle joint instability that are unresponsive to other management options. Despite this, we believe surgery should be an option for patients with such symptoms when other treatments are ineffective.

Limitations

This review may have certain drawbacks, such as missing articles from faulty indexing or publication bias. Clinical practice guidelines were not included in the inclusion criteria, therefore it's possible that we did not include nested systematic reviews created during the development of clinical recommendations as well as only those articles in the English language were included.

Conclusion

Ankle sprains have been extensively studied in the literature; however, the findings are frequently ambiguous and challenging to compare and contrast. The effectiveness of nonsurgical PT functional therapy and management in treating acute ankle sprains is well supported by high-quality research. Exercise and manipulative therapy are recommended in the early phase of management to prevent ankle injury recurrence and regain dorsiflexion.

Key Points:

- Conservative Management in Physiotherapy for the treatment of Acute Lateral ankle sprain (Grade I & II) includes a wide range of treatments including PRICE (rest, ice, compression, elevation) therapy, immobilization, external supports, manual therapy, supervised exercises, manipulative therapy, mobilization techniques, strength, proprioceptive and coordination training.
- Physiotherapy functional therapy is effective for managing Acute lateral ankle sprain even though the evidence was not fully conclusive in certain parameters.
- Combining an external ankle support device with an active functional PT treatment facilitates early joint movement and is best suited to produce optimal results.
- Clear-cut evidence supports the use of analgesics, myorelaxants, anti-inflammatory medications, active mobilization therapy as well as lymphatic drainage to restore ankle dorsiflexion, which is critical for recovery from the sprain.

Conflict of interest

None

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Nil

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