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Unique Practice Technique: Introducing the Tarsal Twist Manipulation

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ABSTRACT

Background: High-velocity low-amplitude thrust joint manipulations are interventions with a growing body of evidence supporting their use to manage spine pain; however, evidence is lacking to support joint manipulation to treat lower extremity pain. Cuboid manipulations, the most researched foot manipulation, have been included in the successful management of cuboid syndrome, posterior tibial tendinopathy, and iliotibial band pain. Yet, there are no clear reasons for how or why patients improve after a cuboid manipulation. The proposed mechanisms include biomechanical, neurophysiological, and/or placebo.

Technique Summary: This Unique Practice Technique presents a novel tarsal manipulation, the Tarsal Twist, that can improve outcomes through a combination of mechanisms and be provided to patients in the acute, subacute, or chronic phases of healing. The Tarsal Twist is performed with the patient supine. The clinician performs a high-velocity, low-amplitude thrust through the calcaneus and first metatarsal in the direction of forefoot inversion, calcaneal eversion, and forefoot abduction.

Outcome Measures: While anecdotal evidence from the authors suggests this tarsal manipulation is effective, additional research needs to be performed to identify the true efficacy; therefore, this novel tarsal manipulation should be used in conjunction with the standard of practice.

Conclusion: The Tarsal Twist provides clinicians with an additional option for treating patients with foot and ankle dysfunction and challenges the traditional cuboid manipulation technique.

Keywords: Extremity manipulation, Tarsal manipulation, Cuboid manipulation, Physical therapy, Chiropractic.

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INTRODUCTION

A high-velocity low-amplitude thrust joint manipulation is an intervention that has a growing body of evidence supporting its use for the management of neck and back pain [1-4]; however, evidence supporting joint manipulation as an intervention for lower extremity conditions is much less robust [5].

Foot pain is common [6,7], with the most encountered diagnoses being plantar fasciitis [8], foot and ankle sprains [9], and tendinopathies [10]. A less commonly encountered diagnosis is cuboid syndrome [11]. The preferred initial treatment for cuboid syndrome is manipulating cuboid bone [11,12]; otherwise, the available evidence on tarsal joint manipulations to treat foot dysfunction shows inconsistent evidence due to bias, research design flaws, and inadequate evidence sample size, and the evidence may not be generalizable [5]. However, cuboid manipulations have also been included in the successful management of other dysfunctions, including posterior tibialis tendinopathy [13] and iliotibial band pain [14], when cuboid mobility was found to be impaired.

CUBOID SYNDROME

A disruption of the mobility of the cuboid bone or subtle disruption of the calcaneocuboid joint congruency is believed to be a factor in cuboid syndrome [11]. Manipulation to the cuboid bone is believed to improve the mobility and congruency of the cuboid and its articulation with the calcaneus, thereby improving pain and function in patients suffering from the cuboid syndrome. Due to the rapid improvements in pain and function after a cuboid manipulation in many patients, the assumption is that the alignment and mobility of the cuboid are restored. However, ultrasound images reveal the asymmetry in the calcaneocuboid joint position remained even after the cuboid manipulation and resolution of symptoms [15], and there is not a valid and reliable assessment for cuboid mobility or positional fault [11]. Therefore, other mechanisms for improvements in cuboid syndrome after cuboid manipulation must be considered.

ASSESSMENT OF JOINT MANIPULATIONS

Despite evidence supporting the use of joint manipulation for optimizing patient outcomes, the mechanism for this intervention is poorly understood. Some patients see great benefit from joint manipulation, yet there is no apparent reason for how or why. While the biomechanical explanation, where impaired joint mobility or positions are corrected with joint manipulation, is widely accepted, the available evidence does not support this theory. The authors' opinion is that neurophysiological and placebo mechanisms provide the most plausible explanation for the effectiveness of joint manipulation [16, 17]. A comprehensive description of specific neurophysiologic and placebo (non-specific) mechanisms is beyond the scope of this paper, but there is evidence to support this notion.

Neurophysiologically, it has been shown that talocrural joint manipulation increases motor excitability of the tibialis anterior muscle [18], and distal tibiofibular joint manipulation increases soleus muscle activation [19]. This increase in lower extremity muscle activation may be exploited to improve exercise capacity, function, and sports performance. Spinal manipulation has been shown to increase running speed, grip strength, golf ball driving distance, and increased ball velocity while kicking a soccer ball [20-23]; however, the performance-related outcome of spinal manipulation can be debated [24].

The effectiveness of joint manipulation may be related to non-specific effects, such as placebo effects. These non-specific effects can have a powerful influence on patient outcomes [25]. One of the mechanisms involved in the placebo effect is patient expectations [26]. A patient expectation during joint manipulation is joint cavitation or "pop." Although cavitation is a defining feature of joint manipulation [27, 28], research suggests that the cavitation following a joint manipulation to the spine [29, 30] and cuboid [31] is not related to clinical outcomes. Nonetheless, clinicians [27] and researchers [19,32,33,34] tend to repeat the joint manipulation techniques if cavitation does not occur on the first attempt. Thus, evidence suggests that joint manipulation outcomes are related to patient expectations [25,35], and the authors believe the expectation of cavitation drives these non-specific effects.

DIAGNOSING CUBOID SYNDROME

A cuboid manipulation technique is a preferred treatment for cuboid syndrome [11, 12], with less evidence supporting its use for other types of foot dysfunction. However, since evidence on cuboid manipulations is limited to case reports and expert opinion, there is a need for continued research on these techniques. In addition, the cuboid syndrome is difficult to diagnose due to the lack of valid and reliable assessments for this syndrome, or it is misdiagnosed as a lateral ankle sprain since it often develops in conjunction with a lateral ankle injury [11]. Even when the cuboid syndrome is suspected after a lateral ankle sprain, cuboid manipulations should be attempted only when edema and ecchymosis have significantly diminished and when the injured ankle ligaments have adequately healed to tolerate the stress of a joint manipulation [11]. The lack of high levels of evidence for cuboid manipulations and the inability to perform these techniques on an acute injury suggests the need to explore alternative treatment options for patients with the suspected cuboid syndrome.

PURPOSE

The purpose of this *Unique Practice Technique* is to present the novel tarsal manipulation and offer clinicians an alternative technique to cuboid manipulation techniques to manage cuboid syndrome and other lower quarter dysfunctions.

The success of joint manipulations may be due to a combination of biomechanical, neurophysiologic, and non-specific effects [16]. For example, a foot manipulation that accomplishes multiple cavitations may offer superior results due to biomechanically moving multiple joints, more mechanoreceptor stimulation for greater neurophysiologic effects, and multiple cavitations may enhance the placebo

effect when heard or felt by the patient.

Much more needs to be understood regarding the biomechanical, neurophysiologic, and non-specific effects of joint manipulation; however, the authors propose that the existing evidence for these effects, especially related to neurophysiologic and non-specific, is already compelling enough to demand the refinement of techniques to optimize these effects to improve patient outcomes. To this end, the authors present a novel tarsal manipulation, the *Tarsal Twist*, to achieve multiple cavitations.

INTERVENTION

Unlike the cuboid whip manipulation [31], which cannot be performed on acute foot and ankle injuries, this *Tarsal Twist* manipulation could be performed on patients in the acute phase of rehabilitation, as well as subacute and chronic phases. In addition, there is evidence that spinal HVLAT manipulation is most effective when performed in the acute phase [36, 37]; therefore, it may also be beneficial to perform extremity manipulation in the acute phase.

Tarsal Twist Manipulation

The patient is positioned supine, with involved lower extremity relaxed in hip flexion-abduction-external rotation and knee flexion so that the lateral foot is resting on the plinth. Adding a towel roll under the cuboid bone is an option and may offer an additional fulcrum (Figure 1A).

The clinician stands at the base of the plinth, facing the patient's foot. First, the clinician will place the thenar eminence of one hand on the medial aspect of the patient's calcaneus. The clinician will then place the first web space of their other hand at the medial proximal first metatarsal, then mold their fingers around the dorsum of the foot and their thumb around the plantar aspect of the foot (Figure 1B).

The clinician then manufactures a barrier by simultaneously everting calcaneus while inverting and abducting the forefoot. Once the barrier is achieved, the clinician will apply a high-velocity, low-amplitude thrust, with a direct line of drive from the clinician's sternum through both contact points on the forefoot into abduction and calcaneus into eversion.

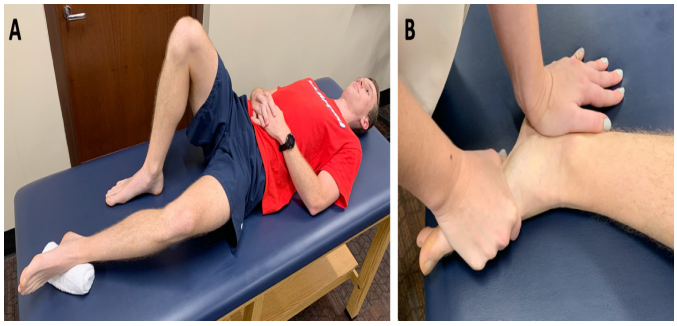

Figure 1: (A) Patient position, (B) clinician hand placement.

DISCUSSION

Foot pain and dysfunction is a common but challenging condition to manage. The challenge of managing patients with foot pain and dysfunction is likely due to the numerous common impairments throughout the entire lower extremity and determining which of these lower extremity impairments contribute to the patient's presentation. While properly dosed therapeutic exercise should be the foundation for rehabilitation, this *Tarsal Twist* manipulation, when coupled with other interventions, may offer benefits over exercise alone to address the impairments believed to be contributing to the patient's foot pain and dysfunction.

While anecdotal evidence from the authors suggests this tarsal manipulation is effective for many lower quarter dysfunctions, additional research needs to be performed to identify the actual efficacy. In the absence of high-quality clinical trials investigating this tarsal manipulation technique, clinicians should use this technique in conjunction with the standard of practice. Therefore, the authors propose that clinicians incorporate this technique into their framework, create their own evidence, and discover practice patterns that improve patient outcomes.

The authors also want to highlight that this tarsal manipulation is not recommended for all patients with foot pain or lower quarter dysfunction. This technique should be used when indicated based on the examination and evaluation of the clinician, and outcomes should be monitored to ensure clinicians are achieving beneficial results and have a rationale for the continued use of this technique.

CONCLUSION

Utilizing joint manipulation is not the exclusive domain of a particular health discipline; therefore, the authors encourage physical therapy, chiropractic, medical, and osteopathic professions to work collaboratively to refine thrust manipulation techniques and conduct the research necessary to either support or support or refute these techniques.

The authors hope that this *Unique Practice Technique* provides clinicians with an additional option for treating patients with lower quarter dysfunction and challenges the traditional joint manipulation techniques for the foot.

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