The Effectiveness of Active Release Therapy on Medial Tibial Stress Syndrome

Derrick Benner, Eric Dixon, Tim Plumley

Faculty Advisor: Dr. D. Robert Kuhn

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ABSTRACT

Objective
The aim of this study was to determine the effectiveness of Active Release Technique® (ART®) on subjects with a diagnosis of Medial Tibial Stress Syndrome (MTSS) as measured by pre and post-treatment quadruple visual analog scale (Quad VAS) questionnaires. It was hypothesized that utilization of Active Release Technique® (ART®) will break up fibrous adhesions created by overuse and micro trauma to the supporting musculature. Reduction of these adhesions will create diminished subjective pain via Quad VAS for the participants involved in the study.

Method
Six consenting subjects were recruited from the students and faculty at Logan College. Each of the subject’s treatment was measured with a pre- and post-treatment Quad VAS. Pre-treatment Quad VAS will be administered the same day as the first treatment. Three ART® treatments will be administered to the participants every other day during the week trial. Post-treatment Quad VAS is administered following three ART treatments. All ART® treatments and data collections will be performed by Logan Students.

Results
The results show a decrease in pain intensity by an average of 51.35% over the one-week duration of the study. All participants reported a decrease in pain while running via a Quad VAS questionnaire.

Conclusion
The present study has shown that ART® to the muscles of the lower leg is an effective means of treating MTSS. Due to the limited nature of this study, future investigation of this subject is warranted.

Key Words: Medial Tibial Stress Syndrome, MTSS, Shin Splints, Active Release Therapy
INTRODUCTION

Medial Tibial Stress Syndrome is a common condition that affects athletes and is believed to account for 13.2 to 17.3% of all running injuries. (1) Commonly called shin splints, but also known as tibial stress syndrome, media tibial syndrome, and shin splints syndrome [1]; Medial Tibial Stress Syndrome (MTSS) was described by the American Medical Association in 1966, as a pain or discomfort in the leg from repetitive running on hard surfaces or from forcible excessive use of the foot flexors. (2) In 1982, Mubarak defined MTSS as a periostitis at the posterior medial border of the distal tibia, caused by a tearing of muscle fibers from the bone insertion. (6) In 2004, Yates and White described MTSS as "pain along the posteromedial border of the tibia that occurs during exercise, excluding pain from ischemic origin or signs of stress fracture." They stated that on palpation with physical examination, a diffuse painful area over a length of at least 5 cm should be present. [2]

Historically, the Tibialis Posterior has been considered the source of pain. Saxena et al. dissected ten cadavers and found that the distal attachment of the tibialis posterior muscle was 7.5 cm proximal to the medial malleolus. He concluded from this that the tibialis posterior muscle caused MTSS. [3] However, recent studies have identified the soleus as the contributor to MTSS. Michael and Holder dissected 14 specimens and found fibers of the soleus muscle but not the posterior tibialis muscle on the posteromedial tibial border. [3]

Along with the Soleus and Tibialis Posterior, numerous other factors are thought to contribute to MTSS. These factors include varus hindfoot, excessive forefoot pronation, genu valgum, excessive femoral anteversion and external tibial torsion. [4] Even with multiple theories for MTSS a common viewpoint is found in MTSS as a symptomatic expression of normal periosteal modeling at the site of maximal tibial strain. When the tibia experiences chronic and repetitive strain, it is stimulated to deposit new bone on its periosteal surface to reduce potentially injurious strains at this site in the future. [5], [6]
Dr. Debbie Craig, author of Medial Tibial Stress Syndrome: Current Etiological Theories; concluded that “excessive pronation during gait appears to be associated with development of MTSS. The soleus eccentrically contracts to decelerate pronation, and concentrically to initiate supination of the foot during the transition from the midstance phase to push-off phase of the gait cycle. Excessive pronation requires the soleus to contract eccentrically for a longer period of time, which may impose greater tension on the origin of the medial soleus at its bone interface. The greater load on the soleus could also accelerate fatigue of the muscle, which would result in greater impact loading of the tibia. Thus, control of excessive pronation appears to be an important consideration for effective management of MTSS.”[7].

Active Release Technique® (ART®) is a soft tissue system/movement-based technique. ART® is used to treat problems with muscles, tendons, ligaments, fascia and nerves. Using hand pressure, the practitioner works to remove or break up the fibrous adhesions, with the stretching motions generally in the direction of venous and lymphatic flow. Treatments aimed at reducing inflammation and muscular hypertonicity, such as Active Release Technique®, in conjunction with modifying biomechanical factors to minimize MTP joint hyperextension appears to resolve this condition rapidly [8].

METHODS
This study was approved by the Logan College Institutional Review Board.

Design
This study was designed as a pilot study. All subjects will be subjected to the same testing protocol. There is no control group, as data will be collected on all participants.
**Instrumentation**
This study employed the following instruments: Quadruple visual analog scale.

**Participants**
A sample of 6 volunteers, two female and four male and between the ages of 22 and 32, were recruited from the student body of Logan College of Chiropractic. These volunteers met the inclusion criteria by being between the ages of 18-35 and expressed medial tibial stress syndrome according to the evaluation performed. Based on the research by Hubbard, et. al. [4], in order to be considered for this study, participants had to demonstrate all of the following:

- Pain must be a product of exercise lasting for hours after exercise.
- The participant should not be experiencing any signs of numbness or compression in the lower leg.
- The pain must be in a general area, spanning an area larger than 5 cm on the posteriomedial border of the tibia.
- The participant should experience some diffuse discomfort upon digital palpation of the distal third of the tibia.
- The posteriomedial surface of the tibia may be uneven during palpation.

Exclusion criteria were based upon any and all modalities interfering with the outcome of the ART® treatment including other manual therapies, ice and/or compression therapy, perscription or over the counter medications for pain, knee or other lower extremity surgery, current litigation for health problem. Also, any previous injury that may affect the outcome of this study, such as: plantar fascitis, heel spur, ankle sprain with in six months, compartment syndrome, Achilles tendon rupture, Achilles tendonitis, lower leg fracture (other than stress), ACL sprain/tear, PCL sprain/tear, MCL sprain/tear.
Examiners
Eric Dixon, ART®, Logan Student, a senior intern at Logan College of Chiropractic, is full body ART certified after taking upper extremity, spine, and lower extremity courses at certified ART® seminars. He will administer the treatment of ART. Dr. Robert Kuhn, instructor of ART at Logan College of Chiropractic supervised this study.

Procedure
Upon filling out the participation checklist and consent form and the pre-treatment Quad VAS, the experimental procedure was started on the first day. Participants were asked to receive treatment three times in one week. Active Release Therapy treatments were administered on an every other day basis. The muscles receiving ART were the gastrocnemius, soleus, and tibialis anterior. The participants were first placed in a supine position with the legs elevated. The participants were instructed to dorsiflex the foot for maximal shortening of the muscle. A firm contact was taken on the area of the tibialis anterior of the involved leg. The participants were then instructed to plantar flex and internally rotate the treated leg causing the muscle to be at its maximal length. The participants received between 3-5 passes on each leg. The participants were then placed in the prone position for treatment of the gastrocnemius muscle. The participants were instructed to plantar flex the foot for a starting position. A firm contact with the thumb, reinforced with the contralateral hand, was placed over the involved muscle. The patient was then instructed to dorsiflex the foot. The participants received 3-5 passes on each leg. The participant was then instructed to stand next to the treatment table with the involved leg bent and resting on the table to maximize the relaxation of the gastrocnemius. This is crucial for the treatment of the soleus muscle. The participant was then instructed to plantar flex the foot. Once the participant had reached the starting position a firm contact was placed on the involved area and the participant was instructed to dorsiflex the foot. The participant received 3-5 passes
on each leg being treated. Participants were instructed to continue with their normal activities within their pain tolerance.

A total of three Active Release Therapy treatments were performed. Following the final treatment, patients were released and instructed to return on May 31st, 2011 to fill out the post-treatment Quad VAS. Data collection took place and the results are as follows.

**RESULTS**
Six participants in this pilot study met the inclusion criteria. The participants completed the pre-treatment, three (3) ART® treatments, and post-treatment Quad VAS. It is hypothesized that utilization of Active Release Technique will break up fibrous adhesions created by overuse and micro trauma to the supporting musculature. Reduction of these adhesions will create diminished subjective pain via Quad VAS for the participants involved in the study. The following table (Table 1) shows the Quad VAS scores and the percentage the pain decreased over the course of the study.

**Table 1**

<table>
<thead>
<tr>
<th>Patient</th>
<th>Pre-Treatment Pain Intensity</th>
<th>Post-Treatment Pain Intensity</th>
<th>Percent Decrease in Pain Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient 1</td>
<td>36.67</td>
<td>23.3</td>
<td>36.46%</td>
</tr>
<tr>
<td>Patient 2</td>
<td>20</td>
<td>6.67</td>
<td>66.65%</td>
</tr>
<tr>
<td>Patient 3</td>
<td>40</td>
<td>30</td>
<td>25%</td>
</tr>
<tr>
<td>Patient 4</td>
<td>33.3</td>
<td>16.67</td>
<td>49.94%</td>
</tr>
<tr>
<td>Patient 5</td>
<td>40</td>
<td>0</td>
<td>100%</td>
</tr>
<tr>
<td>Patient 6</td>
<td>33.3</td>
<td>23.3</td>
<td>30.03%</td>
</tr>
</tbody>
</table>

The average decrease in pain was 51.35%, but is skewed by the outlier of 100% decrease in pain. If that statistical outlier is removed, the mean decrease in pain is 41.02%, which is a better representation of distribution of the remaining data.
DISCUSSION

The primary purpose of this pilot study was to determine the effectiveness of Active Release Treatment on Medial Tibial Stress Syndrome. To our knowledge, this is the first study of its kind. It was hypothesized that by administering ART® treatment to the soleus, gastrocnemius, and tibialis anterior, it would decrease the amount of pain experienced by the subjects while running. This decrease in pain would be a result of the breaking up of muscle adhesions in the aforementioned muscles and decreasing microtraumas in those muscle fibers [8].

Our results, on average, showed a significant decrease in pain amongst all individuals that participated in the study. Participants in this study completed a Quad VAS questionnaire prior to and post treatment. The scores from these questionnaires show a positive relationship between decreasing pain in persons with MTSS and ART®. Of the 6 participants in this study, a range of 25-100% was reported for a decrease in pain intensity. The results of these questionnaires seems reputable due to the research backing that visual analog scales are more responsive to clinical change [9].

There were some limitations to this study. All results shown are subjective and no diagnostic testing was implemented. Due to the nature of this study, bone scan or magnetic resonance imaging were not readily available. Treatment and data collection occurred in a short time span. While the results are promising, long term monitoring is necessary to determine the recurrence of MTSS. Numerous other etiologies that have been discussed, yet not addressed in this study, include navicular drop, over pronation, leg length discrepancy, shoe type, and running surface [10]. These factors should be addressed in future studies to confirm the validity of the ART® treatment and its effectiveness on MTSS.
CONCLUSION
Upon completion of the ART treatments, subjects reported a noticeable decline in pain intensity. This study supports that ART® is effective in treating Medial Tibial Stress Syndrome. However, the study was limited in sample size and was performed on an otherwise healthy and active student population. As a pilot study this was taken into consideration. However, these promising results warrant further investigation. There is much potential for further research on this topic, perhaps utilizing a more objective approach and diagnostic imaging.
References

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