The Effect of Graston Technique and Class IV Laser Therapy on Myofascial Trigger Points in the Trapezius Muscle

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February 22, 2013

Abstract

Objective : The objective is to determine the combined effects of Graston Technique®(GT) instrument assisted soft tissue technique in conjunction with class 4 LASER therapy, on the perceived pain of palpable myofascial trigger points (TrPs).

Subjects: The study will include 20 volunteer participants with the presence of a palpable myofascial trigger point in the trapezius muscle who meet the inclusion criteria.

Methods: The participants were asked to complete a questionnaire to determine eligibility based on inclusion and exclusion criteria. Eligible participants were then screened using manual palpation to locate the presence of a taut band, followed with VAS measures and algometry readings. Each participant was required to sign a consent to treat form to continue participation. Participants were required to attend at least 3 treatment sessions consisting of Class IV laser therapy immediately followed with Graston soft tissue treatment. Data collection was conducted pre and post treatment, using VAS measures and algometry readings.

Results: With analysis of the initial screening to the post-treatment follow-up; results indicated a statistically significant increase in PPT as measured by algometry ($p = 0.03$) and a decrease in perceived pain as measured by VAS ($p < .0001$). All analysis was performed with proc glm in SAS 9.3 (Cary, NC).

Conclusions: The study's outcome provided data demonstrating a reduction in pain with Graston and Class IV Laser therapy combined. Combined Graston and Class IV Laser therapy may therefore be an effective treatment in the management of myofascial trigger points and warrants further study.

Key Words: *Graston Technique, Laser Therapy, Myofascial Trigger Point, Algometry, Visual Analog Scale*

INTRODUCTION

Myofascial trigger points (TrPs) are a commonly encountered complaint when treating musculoskeletal conditions. Trigger points were described by Janet Travell as "a hyperirritable spot in skeletal muscle that is associated with a hypersensitive palpable nodule in a taut band."(1) Trigger points are associated with a characteristic referral pattern, and can also present with a local twitch response, muscle weakness, and autonomic disturbance. Trigger points can further be classified as active or latent. Active trigger points are clinical pain generators, which refer pain on palpation that is recognizable to the patient. Latent trigger points have the same clinical symptoms as active trigger points, but are quiescent until disturbed through manual palpation. The difference being the pain is not recognizable to the patient.(2)

Many treatments have been used to address pain associated with TrPs, including the following: massage, cross friction massage, ischemic compression, ultrasound, laser therapy, acupuncture, dry needling, and spray and stretch. It is generally accepted that overuse and/or trauma are the driving cause of TrP formation. In reference to the intergrated TrP hypothesis this causes damage to cytoskeletal tissue, leading to ischemia and resulting in hypoxic tissue.(4) The purpose of this study is to determine the combined effects of Graston and Class IV laser on the perceived pain of myofascial trigger points. To date the authors are unaware of research involving the combined use of these therapies. There is evidence to suggest that with the use of Graston and Laser therapy, both hypoxic muscular tissue and aberrant connective tissue can be addressed.(4,5,6)

The Graston Technique enhances the clinician's ability to evaluate and treat patient with soft tissue disorders through specialized tools. Graston Technique utilizes stainless steel instruments which allow the clinician to treat the soft tissue more precisely, and with deeper penetration. It is suggested that the Graston Technique may reinitiate the inflammatory process, allowing for healing and scar tissue remodeling to occur after the initial process.(7) Class IV Lasers are utilize amplified light above 500 mW which is collimated to penetrate deeper into tissue. Laser therapy has been shown to increase cellular metabolism which aids in tissue healing.(5)

METHOD

Research Design: This observational study was conducted to demonstrate the combined effect of Graston and Class IV Laser on palpable myofascial trigger points of 20 volunteer subjects.

Materials: LiteCure Class IV Laser, Laser Safety Goggles, Scanner (Graston tool GT4), Graston Emollient, Laser Safety Light, VAS Scale, Algometer, Treatment Table

Method: Research participants were recruited from the student body at Logan College of Chiropractic. Twenty-four individuals responded and completed the pre-screen questionnaire. Of the twenty-four individuals screened, only twenty volunteers met inclusion criteria and were absent of exclusion criteria. At this time qualifying participants were asked to sign a consent to treat before continuing participation in the study. A pre-treatment screen was conducted to determine continued eligibility. It is at this point that the patient was gowned and the presence of a myofascial trigger point was confirmed on palpation. VAS measures and algometry readings were also obtained. Participants were then released after scheduling their first treatment.

Upon presentation for the first treatment, the participant was gowned and placed on the treatment table. The presence of the TrP was once again confirmed with manual palpation, and pre-treatment VAS measures and Algometry readings were obtained. The patient was then treated with 10 minutes of Class IV Laser therapy at 10W. This followed immediately by Graston Technique, utilizing the Scanner or GT-4 tool and implementing Graston treatment protocols.

Following Graston treatment post-treatment VAS measures and algometry readings were obtained. The patient was required to attend a total of three treatments following the same protocol. One week following the third visit, participants were screened once again for the presence of TrPs. Post-therapy follow-up VAS measures and algometry readings were also obtained.

RESULTS

Data from 20 subjects were gathered with outcomes of VAS and PPT during a screening visit, along with the 3 follow-up visits (both pre and post measures), and a final follow-up. Table1 and Figures 1-4 show changes in VAS/PPT . Briefly, there were no significant difference between the screening and first follow-up measurement for both outcomes, and there were significant changes between the screening and final follow-up measure. Additionally there are significant differences between the pre and post measurements for each follow-up visit (see table1 and figures 3 and 4)

All analysis was performed with proc glm in SAS 9.3 (Cary, NC).

Table 1: Changes in VAS and PPT over Follow-up

Outcome	Measure	Estimate and 95% CI	p-value
VAS	Visit1 Pre vs Screening	0.10 (-0.52, 0.72)	0.75
	Final FU vs Screening	-1.45 (-2.07, -0.83)	<.0001
	Visit1: Post-Pre	-2.10 (-2.72, -1.48)	<.0001
	Visit2: Post-Pre	-2.30 (-2.92, -1.68)	<.0001
	Visit3: Post-Pre	-1.55 (-2.17, -0.93)	<.0001
PPT	Visit1 Pre vs Screening	-0.21 (-1.01, 0.59)	0.61
	Final FU vs Screening	0.88 (0.09, 1.68)	0.03
	Visit1: Post-Pre	1.86 (1.06, 2.65)	<.0001
	Visit2: Post-Pre	1.20 (0.40, 2.00)	0.0004
	Visit3: Post-Pre	1.94 (1.14, 2.73)	<.0001

DISCUSSION

Musculoskeletal disorders are the number one cause of disability in the United States accounting for more than half of all chronic conditions in developed countries.(8) Trigger points have been implicated as the cause of musculoskeletal pain, or as being associated with a variety of musculoskeletal conditions.(9) As mentioned briefly in the introduction, the exact etiology of trigger points is unknown. What is agreed upon is that overuse and trauma lead to the development of TrPs.

It has been suggested that with static work such as overhead cleaning, an area may become ischemic, which results in micro-circulation disturbances.(10) These micro-circulatory disturbances are the result of sustained muscular contractions, that obstruct capillary blood flow and prevent delivery of oxygen and glucose to muscle tissues. This disturbance ends with tissue hypoxia which alters mitochondrial metabolism and results in the formation of TrPs. TrPs remain after releasing the contraction due to decreased ATP supply to the area. During contraction myosin forms a cross bridge with actin to shorten the muscle resulting in contraction. ATP is required to break the myosin-actin cross bridge after contraction. WIth decreased ATP not all cross bridges are able to break.(11,12)

Class IV Laser and Graston present with a treatment option to potentially break the TrP contraction cycle. By introducing high powered collimated light to an area of decreased circulation, alternative energy is provided to the mitochondria. In turn, the mitochondria can produce ATP to break the myosin-actin cross bridges.(10) This decreased ability of the mitochondria is discussed by DiMauro and Moraes, 1993. Ragged red fibres (RR) are considered

to be markers for mitochondrial dysfunction, as a morphological sign of disturbed mitochondrial metabolism. RR-fibres are only found in type-I fibres and appear to be related to insufficient blood supply in humans.(10,13) While Class IV Laser may assist in increasing local circulation, Graston will be primarily perform this task. With the Graston Technique there is controlled microtrauma that causes microvascular trauma and initiates the body's healing process. It is our hypothesis that the combined therapy will address the cause of the TrP and break the spasm cycle.

CONCLUSION

The study's outcome provided data demonstrating a reduction in pain with Graston and Class IV Laser therapy combined. Combined Graston and Class IV Laser therapy, may therefore be an effective treatment in the management of myofascial trigger points and warrants further study.

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Appendix A – Consent Form

I _____ have been asked by Joel Hessler, and Kyle Hammerschmidt to participate voluntarily in this research study called "Graston and Class IV LASER on Myofascial Trigger Points", sponsored by the Research Department at Logan College of Chiropractic. The purpose of this study is to observe the effect of Graston® and LiteCure® Class IV LASER on the perceived pain and the duration of perceived pain when treating palpable myofascial trigger points. This will require participation in pre- and post- algometry and visual analog pain scale measures.

I understand that my participation in this study is voluntary and that my participation may require me to:

a) Wear a gown to protect my privacy and allow the research investigators access to treatment areas
b) Receive LASER therapy through LiteCure® Class IV LASER
c) Receive soft tissue therapy through Graston® stainless steel instruments
d) Participate in the study for 3 weeks or 7 visits totaling a maximum of 2 hours and 10 minutes.

I have been informed that my participation in the study may not produce a direct benefit to me through the experiment.

My name and identification associated to my name or my file of vital information will not be revealed to anyone not directly associated with the study (i.e. testers or supervisors). All of my personal information will remain confidential.

I am aware of and understand that LASER treatment has the ability to burn tissue or cause ocular damage.

I understand that with Graston® treatment I may experience post treatment muscle soreness, petechia, and/or bruising.

In the event that I feel I have suffered an injury as a result of my participation in this study. I will be instructed to contact the Chairman of Logan College of Chiropractic institutional Review Board, Dr. Gutweiler at 636-227-2100 ext. 310. Dr. Gutweiler will then refer me to the appropriate individuals to review the matter with me.

I have read the above statements regarding the purpose of the research project. I have been able to ask questions and express any concerns with any of the above mentioned procedures dealing with the study.

Accordingly, I believe I understand the purpose of this study as well as the potential risks and benefits involved. I hereby give my free and informed consent to participate in this study.

Signature of Subject:_____ Date and Time:_____

Printed Name of Subject:_____

Signature of Witness:_____