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| **Evidence Table: IASTM & Graston Techniques** | |
| ***Title/Author/Year*** | ***Study Details*** |
| **Title: The efficacy of instrument assisted soft tissue mobilization: a systematic review**  **Author/Year: Cheatham et al (2016)**    *Cheatham SW, Lee M, Cain M, Baker R. The efficacy of instrument assisted soft tissue mobilization: a systematic review. J Can Chiropr Assoc. 2016;60:200-211.* | Abstract: The purpose of this systematic review is to appraise the current evidence assessing the efficacy of IASTM tools and techniques, such as the Graston technique, as an intervention to treat a variety of musculoskeletal pathologies or to improve joint range of motion by mobilizing scar tissue and myofascial adhesions. The 7 articles included in this study were RCT’s that compared IASTM treatment to a control group, and all studies reported using the Graston technique. To date there are no systematic reviews appraising current IASTM literature, so the goal of this literature is to provide a current update for clinicians.  Subjects: The 7 studies yielded a total of 220 subjects, with 144 males and 76 females. The average age of subjects was 28.6 +/- 4.17 years. All subjects were randomly assigned to either a control or experimental group, but allocation was only concealed in one study. Intervention groups were similar at baseline in all studies and subjects were blinded to their intervention in 6 of the 7 studies. Musculoskeletal pathology of subjects included lateral epicondylitis, carpal tunnel syndrome, myofascial trigger points, chronic ankle instability, and patellofemoral pain syndrome. Graston techniques were used as an intervention on subjects in all 7 studies. Subjects in the intervention group were treated with IASTM tools from companies including Graston, Tecnica Gavilan, Hawk Grips, Functional and Kinetic Treatment and rehab (FAKTR), and Adhesion Breakers and Fascial Abrasion Technique.  Outcome Measures: In all 7 studies, an outcome measure was reported for > 85% of the subjects.. Two of these studies used joint ROM as the primary outcome measure, with measurements pre-intervention and immediately post-intervention. Additional outcome measures used in the 7 studies include grip strength, muscle strength, VAS for pain, patient-reported tennis elbow evaluation, sensory and motor NCV evaluations of the median nerve, pressure sensitivity with algometer, passive SLR test, supine passive knee flexion test, foot and ankle ability measure, star excursion balance test, and patient satisfaction scale.  Interventions & Results:  *Control*: Interventions in the control groups included education about their pathology, computer ergonomics, stretching, strengthening, ice, foam rolling, balance exercises, or no treatment.  *Experimental*: Only 1 of the 7 studies followed the Graston technique protocol, which includes an examination, warm-up, IASTM treatment, stretching, strengthening, and ice. 4 of the 7 studies modified or excluded parts of the Graston protocol, making it difficult to compare results of the studies and determine efficacy in clinical practice. IASTM treatment times varied among the 7 studies, with two failing to report treatment times and three studies reporting different treatment times. IASTM intervention protocols in 2 of the studies included a warm-up consisting of a cardiovascular activity, closed chain movements, and LE static stretching. 2 of the 7 studies analyzed the effects of IASTM interventions on joint ROM of the shoulder and knee. 1 of these studies measured the effects of 40 seconds of Graston technique on glenohumeral ROM, while the 2nd study compared the effects of 2 minutes of IASTM Fascial Abrasion Technique (FAT) each to the quadriceps hamstrings on hip and knee ROM. Subjects in one study received IASTM 2x/week for 5 weeks. In a second study subjects received IASTM 2x/week for the first four weeks then 1x/week for 2 weeks. In a third study, subjects were treated with IASTM for a max of 5 minutes 2x/week for 3 weeks. In the 4th study, subjects received IASTM 2x/week for 8 minutes.  *Results*: Subjects who received 40 seconds of Graston technique intervention demonstrated a significant increase in acute shoulder ROM compared to the control group. Subjects who received FAT intervention compared to foam rolling showed equal improvement in ROM but after a 24 hour follow up subjects who received IASTM preserved the most joint motion. Patients with lateral epicondylitis, carpal tunnel syndrome, myofascial trigger points in the upper back, chronic ankle instability, and patellofemoral pain syndrome showed no difference in improvement between the IASTM and control groups.  Conclusion: While literature is still emerging, there is evidence IASTM can produce significant improvement in ROM lasting up to 24 hours.Current research does not support the efficacy of IASTM techniques for treating certain musculoskeletal pathologies and there is limited evidence supporting the use of IASTM for improving LE joint ROM temporarily. This limited evidence is likely due to varying methodologies, patient populations, and outcome measures used between studies. Additional research should be conducted to determine the optimal IASTM instrument type, duration of intervention, and outcome measures due to the lack of standardized IASTM protocols.Standardized IASTM protocols in future studies will allow experimental and control groups to be clearly compared to identify significant differences between the groups. |
| **Title: The Effectiveness of Instrument-Assisted Soft Tissue Mobilization in Athletes, Participants without extremity or spinal conditions, and Individuals with Upper Extremity, Lower extremity, and Spinal Conditions: A systematic review**  **Author/Year: Nazari et al (2019)**  *Nazari G, Bobos P, MacDermid JC, Birmingham T. The Effectiveness of Instrument-Assisted Soft Tissue Mobilization in Athletes, Participants Without Extremity or Spinal Conditions, and Individuals with Upper Extremity, Lower Extremity, and Spinal Conditions: A Systematic Review. Arch Phys Med Rehabil. 2019;100:1726-1751.* | Abstract: The main purpose of the Nazari et al. systematic review was to synthesize data from multiple trials evaluating the effectiveness of IASTM on conditions in the lower extremity, upper extremity and lumbar spine that affected patient pain levels, function, range of motion, and strength. Additionally, the author's other goal was to assess each trails’ risk of bias and rate the quality of evidence found using the GRADE guidelines.  Subjects: 20 studies met the inclusion criteria (*had to be an RCT, contain participants with or without UE and LE and spinal conditions, use of any IASTM, comparison groups included either active treatment, placebo or sham, or no treatment at all).* Tools that were used in this trial included “Graston technique, sound assisted soft tissue mobilization, Hawk-Grip, Ergon, Fascial Abrasion technique, AStym, EDGE and AdvantEDGE.” The pathologies studied included rotator cuff, lateral epicondylitis, carpal tunnel, upper and lower back trigger points, chronic nonspecific low back pain, patellar tendinitis, athletes, insertional achilles tendinopathy, chronic ankle instability.  Outcome Measures: Measures that were founded in the included studies were (*PAIN)* VAS & Pain Rating Scale *(Function and Disability)* FAAM, Patellofemoral Joint evaluation Scale, Disabilities of Arm, Shoulder and Hand Scale, Patient rated Tennis Elbow Eval, Oswestry Disability Index (*ROM)* Goniometer/Digital inclinometer *(Grip Strength)* hand held dynamometer *(Pressure sensitivity )* Algometer or Dolorimeter *(Muscle performance)* Vertical Jump , Peak Power (watts), Peak velocity. Measures used in this study to assess Bias and quality were the Cochrane Risk of Bias Tool and the GRADE approach.  Interventions & Results:  *Control: T*he studies included in the systematic review either boasted a control group where no treatment was provided or there was a placebo or sham treatment. In some of the studies the control groups were provided with verbal and written education about their pathology. Sham or placebo treatments generally consisted of general exercises anywhere between 1-3 sets of 8-15 repetitions 1-3 times a week for 4-12 weeks.  *Experimental:* The primary intervention was the use of IASTM either alone or in conjunction with another treatment. The tools that were used in the trials consisted of the “Graston tools, sound-assisted soft tissue mobilization, HawkGrip, Ergon, Fascial Abrasion Technique, Tecnia Gavilan, Astym, EDGE, and AdvantEDGE.” 1 For the studies that looked at the effect of IASTM in conjunction with another treatment compared to a placebo, the combined approach included either a combination of stretches, strength and balance exercises, patient education, or aerobic warmup exercise on a stationary cycle or treadmill. The comparison groups contained similar interventions with the addition of foam rolling or soft tissue massage provided by the therapist or the patient themselves.  *Results:* Overall the results of this systematic review appear to highlight that there is very limited evidence, if any at all, that highlight clinically significant improvements in strength, pain, ROM, function when using IASTM which contrasts with the authors literary review of other systematic reviews such as Lambert et al. For those trials that were included that indicated IASTM had moderate to large effects, the authors highlighted the fact that they were “published in suspect predatory journals” at risk for bias. 1 There is a large quantity of RCT’s that review IASTM but the ones that met the inclusion criteria in this study were all considered to be of very low overall quality of evidence.  Conclusion: Overall the systematic review is well researched and achieved the authors original goals to assess effectiveness of IASTM and rate the quality of the included RCT’s using the Cochrane Risk of Bias tool and GRADE assessment. The majority of trials included indicated that there were no clinically significant differences with respect to IASTM’s effects on ROM, pain, strength and function yet some indicated moderate to highly significant results in favor of IASTM. However, the authors found that for these reports where IASTM was favored there was excessive bias, failure to report limitations, and funding sources making the conclusions of these trials suspect and the authors less confident in the stated conclusions. In contrast, because all the studies were deemed to be low quality evidence, the authors' conclusions that IASTM was not effective should therefore also be taken into consideration. Further research should be conducted in an attempt to find higher quality trials with lower bias to better assess the efficacy of IASTM.Because the authors concluded that IASTM was not any more effective than other treatments, specifically soft tissue massage, practitioners without access to these specialized and expensive tools may render treatment just as effectively as those practitioners with specialized instruments. |
| **Title: Examination of Self-Myofascial Release vs. IASTM Techniques on Vertical and Horizontal Power in Recreational Athletes**  **Author/Year: Stroiney et al (2020)**  *Stroiney DA, Mokris RL, Hanna GR, Ranney JD. Examination of Self-Myofascial Release vs. Instrument-Assisted Soft-Tissue Mobilization Techniques on Vertical and Horizontal Power in Recreational Athletes. J Strength Cond Res. 2020;34:79-88.* | Abstract: The purpose of this randomized controlled trial is to determine the efficacy of IASTM and self-myofascial release (SMR) on improving athletic performance when used before competitive events. The study aims to determine if IASTM or SMR improve ROM, decrease incidence of injury before exercise, aid in post-exercise recovery and reduce pain. The study also focused on the differences between sexes when using manual therapy techniques prior to exercise.  Subjects: 49 recreational athletes, consisted of 21 women and 28 men. Subjects had an average age of 20.35 +/- 2.56, with an average body fat of 17.54% +/- 8.37. Subjects were recruited from undergraduate and graduate students at Gannon University. Inclusion criteria included regular physical activity that met the American College of Sports Medicine guidelines (5.13 +/- 1.16 days/week for an average of 88.34 +/- 24.6 minutes/session). Subjects completed a written consent form, medical history, and training history questionnaire prior to participation. Exclusion criteria included any health risk factors, or musculoskeletal injuries. Subjects were randomly assigned to a IASTM treatment or self-myofascial release (SMR) prior to the vertical jump and 40 yard sprint assessments. Subjects participated in baseline measurements to validate the results. The measurements included a vertical jump, 40 yard sprint, perceived pain using a VAS, and BodPod analysis.  Outcome Measures: Subjects in the control and experimental groups performed a vertical jump test and 40 yard sprint at baseline and after completion of the manual therapy to identify changes in performance. The vertical jump was assessed using the Vertec vertical jump apparatus and were allowed 3 trials, with the max height recorded. The 40 yard sprint performance was assessed on an indoor track with patients starting position with a low COG and forward lean. A stopwatch was used to measure one trial and was recorded to the hundredths of a second.  Interventions & Results:  *Control*: The control group participated in SMR techniques that included foam rolling, roller massages, or other rolls to facilitate myofascial release. These techniques were administered by the subject rather than a clinician. Subjects in this group warmed up for 5 minutes on a Monarch bike ergometer at 50 RPM, then completed SMR treatment using The Stick. Treatment consisted of 90 seconds of muscle rolling in each of the following bilaterally while in a seated position: posterior upper calf (triceps surae), posterior lower calf (triceps surae), posterior upper and lower calf (triceps surae), anterior middle of upper leg (quads), outside anterior upper leg at 45 degree angle (quads), anterior inside of upper leg at 45 degree angle (quads), posterior middle of upper leg (hamstrings), outside posterior upper leg at 45 degree angle (hamstrings), and inside of posterior upper leg at 45 degree angle (hamstrings). All interventions took place at the Gannon University Human Performance Laboratory. The same researcher was present for all subjects and demonstrated use of The Stick (myofascial massage roller) with proper placement.  *Experimental*: All interventions took place at the Gannon University Human Performance Laboratory. Subjects warmed up for 5 minutes on a Monarch bike ergometer at 50 RPM followed by IASTM treatment using Tecnica Gavilan PTB. 2 clinicians who were certified by Tecnica Gavilan and each had four years of experience using the technique, administered IASTM. Treatment was applied with the patient in a prone position for treatment to triceps surae and hamstrings and supine for quadriceps. IASTM was administered bilaterally on LE’s including quads, hamstrings, and triceps surae. On each muscle group IASTM was applied for 90 seconds in each of the following muscle positions: muscle relaxed, passively lengthened, and during muscle AROM. Ultrasound gel was used with this intervention, with a sweeping stroke from the origin to insertion of each muscle group.  *Results*: SMR nor IASTM had a treatment effect on subjects' 40-yard sprint performance, but subjects using SMR performed significantly better on the vertical jump test than subjects in the IASTM group. Additionally, men jumped significantly higher than women. A significant effet for sex was noted, with men demonstrting significantly faster 40 yard sprint times than women, although manual therapy techniques did not significantly impact performance in either sex.  Conclusion: There is limited evidence on the use of SMR or IASTM prior to exercise to improve athletic performance. The results from the study are inconclusive in determining whether or not differences exist between athletic performance when comparing the IASTM and SMR. The lack of improvement on the vertical jump test in the IASTM group may be due to the methodology because patients were positioned in prone or supine, which could have resulted in a relaxation response at the physiological and psychological levels. It is possible massage may decrease elastic storage, neural drive, and increase parasympathetic activity, causing this lack of improvement in vertical and horizontal power. The authors have concluded that while SMR before exercise improved vertical jump in recreational athletes and neither IASTM or SMR improved sprint performance, using The Stick prior to exercise may be beneficial to improving vertical power performance. Coaches/athletes should consider using SMR techniques during warm-up to increase blood flow to the muscle tissue, and there are no adverse effects noted with the application of SMR or IASTM. |
| **Title: IASTM and PNF techniques improve hamstring flexibility better than static stretching alone: a randomized clinical trial**  **Author/Year: Gunn et al (2019)**  *Gunn LJ, Stewart JC, Morgan B, et al. Instrument-assisted soft tissue mobilization and proprioceptive neuromuscular facilitation techniques improve hamstring flexibility better than static stretching alone: a randomized clinical trial. J Man Manip Ther. 2019;27:15-23.* | Abstract: The purpose of this randomized controlled trial is to determine the efficacy of IASTM, PNF, and static stretching techniques in improving hamstring active and passive ROM. It was hypothesized that IASTM and PNF techniques would result in greater hamstring ROM improvements than static stretching alone. Two prospective studies were conducted, with one study comparing the effects of IASTM and static stretching on hamstring flexibility and the second comparing PNF techniques to static stretching with a goal of increasing hamstring flexibility. The results of this study can be implemented in the clinic to increase hamstring length, with the goal of decreasing risk of injury and overuse syndromes, improving functional performance, and improving movement efficiency.  Subjects: 48 total subjects were recruited by word of mouth on a university campus. Subjects in the IASTM study were recruited in August 2012 and subjects in the PNF group were recruited in August 2016. 17 healthy adults, consisting of 11 males and 6 females were recruited for the IASTM study and 23 healthy adults, consisting of 7 males and 16 females were recruited for the PNF study. The average age of subjects in the PNF study was 32 +/- 14.2 years and the average age of the participants in the IASTM study was 24 +/- 2 years. Each subject received either PNF or IASTM to one LE and static stretching to the other LE. Inclusion criteria included subjects with a hip flexion ROM <80 degrees measured by a SLR. Exclusion criteria included recent history of trauma, open wounds, serious pathology, or anticoagulant medications. Each subject signed an informed consent protocol approved by the university Institutional Review Board.  Outcome Measures: The primary measure used to determine change in hamstring length was a passive straight leg raise for subjects in the IASTM study and active straight leg raise for subjects in the PNF study. These measurements were taken before and after treatment using an inclinometer. Each measurement was taken 3 times, with the second two measurements being average for use in data analysis.  Interventions & Results:  *Control*: All data was collected in the university's physical therapy lab. There was no true control group in this study, as the true “control” was the leg that received the static stretching intervention. Static stretching was completed in supine with a strap placed across the plantar surface of the foot with both hands pulling on the strap. Subjects were instructed to lift to 100% ROM and hold for 30 seconds. This was repeated 4 times with a 15 second rest.  *Experimental*: All data was collected in the university's physical therapy lab. The experimental limb in this study was the LE receiving either the PNF or IASTM intervention. Subjects were asked to refrain from stretching or participating in physical activity on the day of testing. Each subject received either PNF or IASTM on one leg and static stretching on the other, with the right LE being treated first. The intervention assigned on each leg was randomized using a blinded card draw and the examiners taking measurements were blinded to the interventions performed on each leg. In the IASTM study, the examiner applied IASTM to the posterior thigh with the beveled edge of the tool at a 45 degree angle using a scraping technique moving from distal to proximal and lateral to medial. This was performed while the subject held a static stretch for 30 seconds and was repeated 4 times with a 15 second rest period. The subjects in the PNF study were positioned in supine while the examiner passively stretched the leg (leg in full extension) for 30 seconds at 100% intensity, then instructed the patient to push their leg into the examiners shoulder for 10 seconds at 20% intensity. The subject then relaxed while maintaining the stretched position, and the examiner stretched to the new max ROM and was held for 30 seconds. This cycle of stretching and contraction was repeated 4 times.  *Results*: Hip flexion measures showed good reliability in both studies with an ICC of 0.97 and an MDIC of < 4.26. Both IASTM and PNF techniques result in significantly greater increases in hip flexion ROM than static stretching. At baseline, ROM between the two treatment legs was not significantly different, but following PNF or IASTM, subjects demonstrated significant increases in SLR measurements.  Conclusion: IASTM and/or PNF techniques should be implemented in the clinic in place of static stretching, as subjects receiving these interventions demonstrate increased hip flexion ROM and increased progress in a shorter period of time. Based on the calculated MDC’s for the IASTM and PNF studies, it is highly probable that the significant increase in ROM was real change in 91% of PNF subjects and 94% of IASTM subjects compared to 29% of subjects demonstrating change on the static stretching leg. The results are consistent with prior studies indicating greater PNF effectiveness than static stretching. Based on these conclusions, PNF or IASTM techniques should be used in the clinic to significantly increase hamstring flexibility in an effort to reduce the risk of injury and increased functional mobility. It would be beneficial to conduct a third study comparing the efficacy of PNF to IASTM techniques to determine the most effective intervention in improving hamstring length. |
| **Title: Efficacy of instrument-assisted soft tissue mobilization in comparison to gastrocnemius-soleus stretching for dorsiflexion range of motion: A randomized controlled trial**  **Author/Year: Rowlett et al (2019)**  *Rowlett CA, Hanney WJ, Pabian PS, McArthur JH, Rothschild CE, Kolber MJ. Efficacy of instrument-assisted soft tissue mobilization in comparison to gastrocnemius-soleus stretching for dorsiflexion range of motion: A randomized controlled trial. J Bodyw Mov Ther. 2019;23:233-240.* | Abstract: The purpose of this randomized controlled trial is to determine the efficacy of IASTM techniques compared to traditional stretching on dorsiflexion ROM when interventions are applied to the gastrocnemius-soleus complex. This study aimed to identify if IASTM or stretching interventions are effective in improving gastrocnemius and/or soleus flexibility, because adequate DF ROM is required for many functional activities and limited ROM may lead to a knee pathology, balance deficits, gait abnormalities, or increased risk of ankle injury.  Subjects: 60 healthy subjects were recruited via email, flyers, and word of mouth at the University of Central Florida and randomly allocated to one of three groups: IASTM, stretching, or the control group. Inclusion criteria included being between the age of 18 and 65, no acute knee, ankle, or foot pathology, and no positive responses on the PAR-Q or health history questionnaire. Exclusion criteria included conditions where IASTM or stretching are contraindicated (i.e bony block limiting joint motion, recent fracture with incomplete bony union, hematoma, etc) and positive responses to the PAR-Q due to the aerobic warm-up activity. All subjects signed a consent form.  Outcome Measures: The primary outcome measure utilized in this study was dorsiflexion ROM. This was measured in three positions: knee extended, knee flexed to 90 degrees, and weight bearing while performing a lunge. An inclinometer was used to measure DF ROM during the weight bearing lunge, and goniometer was used to measure knee-extended and knee-flexed DF ROM with the patient positioned in prone. 3 measurements were taken immediately following the warm-up in each position, then reassessed following the intervention.  Interventions & Results:  *Control*: The control group in this study received no intervention.  *Experimental*: This study evaluated 3 groups, with two experimental groups: stretching and IASTM. Both groups warmed-up with two minutes of step-taps on a 12 inch box to increase circulation. The stretching group interventions ranged from static stretching to PNF techniques, including agonist contraction, hold relax, and contract-relax. Subjects in the stretching stood against a wall with the knee extended to perform a static stretch, then with the knee flexed. Each position was held for 30 seconds and completed 3 times. Both researchers performing the IASTM techniques had the same level of experience and training. The researcher used The Edge Mobility Tool along the length of the entire gastrocnemius-soleus complex in a proximal to distal direction parallel to the muscle fibers for 2 minutes.  *Results*: Subjects in the IASTM and stretching groups demonstrated significant improvements in DF ROM when measured during a weight bearing lunge and with the knee flexed, but did not show improvements with the knee extended. When comparing the IASTM and stretching groups, there is no significant difference in DF ROM in any of the three positions. When comparing each of the four stretching techniques, all four stretches increased DF ROM.  Conclusion: Based on the results of this study, with subjects in the stretching and IASTM groups significantly increasing DF ROM when compared to the control group that did not participate in treatment, these interventions should be implemented in the clinic to prevent injury and improve functional mobility. It can also be assumed based on the ROM improvements with NWB knee flexion and during a WB lunge (i.e WB knee flexion), the resulting increase in DF ROM is due to increased soleus flexibility. This can be assumed because the gastroc is a two-joint muscle that crosses both the knee and ankle joints, and is maximally stretched with the knee extended. Based on these findings, further research needs to be conducted with a larger sample size to determine if IASTM or stretching are effective in promoting gastroc flexibility. |
| **Title: Comparison of Compressive Myofascial Release and the Graston Technique for Improving Ankle-Dorsiflexion Range of Motion**  **Author/Year: Sullivan et al (2018)**  *Stanek J, Sullivan T, Davis S. Comparison of Compressive Myofascial Release and the Graston Technique for Improving Ankle-Dorsiflexion Range of Motion. J Athl Train. 2018;53:160-167.* | Abstract: The purpose of Stanek et al. RCT was to directly compare the effects of IASTM, specifically the Graston technique and tools, and compressive myofascial release (CMR) which often used by therapists when performing manual therapy. However, the authors believed that there would be no significant differences between the two interventions after one session.  Subjects: Within this study there was initially a total of 82 individuals, 164 limbs, which was then limited to 44 participants and 53 limbs after applying the inclusion and exclusion criteria. Participants were included if they presented with less than 30 degrees of standing DF ROM, engaged in at least 30 minutes of exercise for 3 or more days in the last week as well as a positive Silfverskiold test used to assess gastroc contracture. The authors chose 30 degrees for their cut-off value based off previous research indicating those individuals with less than this were more predisposed to injury. Those individuals who either had a lower extremity injury, surgery, treatment for triceps surae or had vision or balance impairments were not invited to participate. Overall, there were 25 men, median of 20 years of age, and 19 women, median of 20 years of age with an average height of 172.3 cm between the 53 participants. There were no apparent drop outs as the study consisted of one session, and authors did not include a follow up session to determine long-term effects of the treatment.  Outcome Measures: The authors primary measure of DF ROM occurred while the patient was in standing as well as kneeling. In standing patients were required to take a step forward with their non-test leg to mimic walking then were required to bend their non-test leg as far as possible without allowing their test leg’s heel to rise in an effort to achieve maximum DF. Additionally, participants were asked to take up a kneeling lunge stance at which point they lunged forward onto their test limb to achieve maximum DF ROM. For both these measures a digital inclinometer attached to the individual’s fibula took the reading as this was determined to be more valid and reliable than having a clinician perform the measure with a goniometer. The authors also decided to take DF ROM measure in weight bearing closed chain activities as they found it to be more valid than open chain measurements which can lead to greater compensatory movement patterns. In addition to the inclinometers the Silfverskiold test, which is designed to identify potential contractures or soft tissue adhesions in the gastroc, was used when participants demonstrated less than 30 degrees of DF from the previous measurements. The authors used this exam as a way to assess the involvement of posterior chain musculature (such as the triceps surae) in limiting DF ROM. For this measure the clinician uses one hand to stabilize and lock the subtalar joint into neutral and the other to stabilize the talonavicular joints and forefoot allowing movement to occur only at the talocrural joint. “if DF was greater than zero degrees with the knee flexed but less than zero degrees with the knee extended the test indicated a soft tissue restriction.” 2 Because the techniques work to alleviate soft tissue restrictions, only participants with a Silfverskiold test indicating a soft tissue restriction were included.  Interventions & Results:  *Control:* The control group consisted of 18 randomized limbs of participants who were instructed to perform 5 minutes of cycling then remain lying prone with feet hanging off the table for 5 minutes after which their measurements were taken again. Authors decided against using a placebo or sham intervention in this case to focus more closely on the effects of the GT and CMR interventions.  *Experimental:* there were then two intervention groups. The GT group consisted of 17 limbs of participants who were instructed to perform 5 minutes of cycling then receive at minimum 5 minutes of soft tissue massage with the GT5, GT4 or GT3 tools. The CMR group consisted of 18 limbs of participants who were also instructed to perform 5 minutes of cycling then receive a minimum of 3 minutes of soft tissue massage from the clinician who utilized their knuckles and thumbs to apply pressure and release soft tissue adhesions. There was only one session conducted for all participants to study the short-term effects of the GT and CMR interventions and no post-treatment education was given to the participants.  *Results:* When looking at the treatment effects for improvement of DF ROM measured in standing, the CMR group should show more statically significant results when compared to the control and the GT group with p=.001 as well as a larger effect size (Cohen d = 1.23). The CMR group’s initial mean measurement was 27.7 degrees and its posttreatment measurement was 32.62 degrees while the GT group’s initial mean measurement was 29.13 degrees and its posttreatment measurement was 30.88 degrees. Based on these measurements the CMR group resulted in a larger degree of change when compared to the GT group.CMR group again showed more statistically significant results when compared to control and GT group measurements of kneeling DF ROM with p = .005. Again there was a larger degree of change in the CMR group when compared to the GT group by 4.43 degrees versus 3.05 degrees respectively.  Conclusion: Based on this short-term evaluation of the effects of CMR and GT on individuals reduced DF ROM due to soft tissue restrictions, the CMR group showed greater improvements in ankle DF ROM. Because of the nature of their trial, the authors concluded that “a single CMR treatment was more beneficial than a single GT treatment” which prompted them to support the use of CMR for future patients. The issue with this study is that it only looks at the short-term effects of relatively healthy individuals at only one joint. I believe the principle behind reducing soft tissue adhesions, thereby reducing ROM restrictions, has been proven correct but whether or not the CMR or GT technique is more effective over a longer period of time and at different joints remains to be seen. |
| **Title: Immediate effects of Graston Technique on hamstring muscle extensibility and pain intensity in patients with nonspecific low back pain**  **Author/Year: Moon et al (2017)**  *Moon JH, Jung J-H, Won YS, Cho H-Y. Immediate effects of Graston Technique on hamstring muscle extensibility and pain intensity in patients with nonspecific low back pain. J Phys Ther Sci. 2017;29(2):224-227. doi:10.1589/jpts.29.224* | Abstract: The author’s purpose was to study how the Graston Technique affected hamstring extensibility and pain intensity in patients with NSLBP. As graston claimed to be able to affect extensibility by “generating mechanical micro-traumatic damage to the treated area thus creating an inflammatory response to accelerate the healing process and restore flexible normal tissue.” Hamstring extensibility is related to LBP as it can limit flexion of the hip joint or cause lumbar hyperextension resulting in subsequent back pain.  Subjects: There were a total of 24 subjects that were between the ages of 29 and 39, male and female and were included if they “(1) had a history of NSLBP for at least 2 months,( 2) a finger ot ground distance > 0cm (3) a passive SLR angle of 70 degrees or less (4) no neurological signs (5) VAS of more than 3.”  Outcome Measures: Sit and Reach test (SRT), passive toe touch test, Straight leg raise (SLR) were functional measures used to assess hamstring extensibility. The Visual analogue scale (VAS) was used to assess the pain associated with LBP.  Interventions & Results:  Participants were randomly allocated to either a graston technique (GT) group where one of the tools was used on the hamstrings or the static stretching (SS) group with stretches targeting the hamstrings. Those in the GT group received STM using the GT-1 tool while in prone where the therapist would then rub “each subject 30 times for 60 seconds from gluteal line to popliteal fossa.” The SS group performed a knee extension in supine to stretch the hamstrings which was initially maintained for 5 seconds, followed by knee extension increased 3 times with 5 second holds. In total the last stretch was maintained for 45 seconds. Looking at the results it appears there was no significant difference in VAS assessments but there was a significant difference in SRT scores for the GT group.  Conclusion: It appears that both groups improved their hamstring extensibility yet the GT group showed a more significant increase when looking at the SRT scores. In the authors literature review they found that holding a stretch for 60 seconds was deemed to be most effective so that is the time frame they used for the static stretching technique. However, this still was not comparable to the effect graston had on hamstring extensibility. However, there was a small number of subjects, this only looked at short-term effects and did not necessarily use measures that were highly reliable or valid. Overall the authors concluded that GT is a more effective intervention than static stretching of the hamstrings in those with NSLBP. |
| **Title: The effect of Graston technique on the pain and range of motion in patients with chronic low back pain.**  **Author/Year: Lee et al (2016)**  *Lee J-H, Lee D-K, Oh J-S. The effect of Graston technique on the pain and range of motion in patients with chronic low back pain. J Phys Ther Sci. 2016;28(6):1852-1855. doi:10.1589/jpts.28.1852* | Abstract: The purpose behind this study was to look at the effect on ROM and pain after using the graston technique on individuals with chronic low back pain. The authors hypothesized that the graston technique would improve both ROM and decrease pain more so than general exercise.  Subjects: There were a total of 30 subjects that met the inclusion criteria which consisted of onset of LBP 12 weeks, CLBP (>90 days at a time of enrolment). They were excluded if they previously had back surgery, a spinal fracture, tumor or malignancy within six months or “exaggerated complaints due to automobile or accident insurance.” Subjects were between the ages of 24 and 41 with 17 females and 13 males.  Outcome Measures: To assess lumbar ROM an android phone was placed at the T12-L1 interspace to assess flexion/extension and lateral bending. A hip inclinometer was used to assess hip flexion ROM. The phone was used again and was attached to the anterior aspect of the thigh closer to the superior pole of the patella. The visual analogue scale (VAS) was used to assess pain levels in subjects.  Interventions & Results: For 4 weeks one group received the Graston Technique on the posterior fascia, sacrum, hip lateral rotators, and hamstrings along with general exercise. The IASTM was applied for 20 seconds parallel to muscle fibers initially then perpendicular to fibers for the following 20 seconds (total 40 seconds). The control group consisted of general exercise which included stretching, and stationary cycling for 10-15 minutes. Results of the 4 week intervention showed a significant decrease in VAS scores in the Graston group and increase in all lumbar ROM and hip flexion ROM in both groups.  Conclusion: Based off the results of this study, the authors were able to conclude that the use of Graston technique was effective at reducing pain and improving ROM which supported their literature review. However the authors admitted that limitations of this study included how short the study was (as opposed to a 6-8 week intervention), as well as the study neglecting to record muscle activity (neglecting to study Graston’s affect on strength/function). Another limitation noticed was that it appears the authors only used one bout of 40 seconds IASTM on the GT group which one might think would be too short of a time to have any lasting effect on pain and ROM yet the results appear to support these treatment parameters. Authors additionally noted that both groups showed improved ROM but it was only the GT group that showed significant decrease in VAS scores. |

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| **Title: Massage and Performance Recovery: A Meta-Analytical Review.**  **Author/Year: Poppendieck et al (2016)**    *Poppendieck W, Wegmann M, Ferrauti A, Kellmann M, Pfeiffer M, Meyer T. Massage and Performance Recovery: A Meta-Analytical Review. Sports Med. 2016;46(2):183-204. doi:10.1007/s40279-015-0420-x* | Abstract: The goal of the meta-analysis was to review data on how massage affects performance recovery of athletes. Authors stated in their background that “post-exercise massage is one of the most frequently applied interventions to enhance recovery of athletes but the evidence to support the efficacy of performance recovery is scarce.” The authors define massage as “mechanical manipulation of body tissues with rhythmic pressure and stroking for the purpose of promoting health and well being.” They go on to identify different techniques such as “effleurage (sliding movements), petrissage (tissue kneading or pressing), friction (pressure application, Tapotement (rapid striking), and vibrations.”  Subjects: There were 22 studies were included in the analysis that met the inclusion criteria which were (1) inclusion of any type of western massage vibration/water jet massage (2) massage intervention performed for recovery purposes (3) physical performance measure was used before and after intervention (4) a passive recovery protocol was the control group (5) study had to be published in an international peer-reviewed scientific journal. OVerall there were 270 subjects across the studies  Outcome Measures:  Measures used to assess performance in the studies included *(Endurance)* intermittent cycling sprint, max number of leg extension at 50% 1RM, *(Jump)* 1 leg long jump, vertical jump height (*Speed)*  spring 200 m swim, 10x30m in time sprint *(Strength)* quadriceps/hamstring peak torque, thumb adductor iso strength, elbow flexor MVIC. To assess the quality of each study the Cochrane Risk of Bias tool was used.  Interventions & Results:  The studies included in the metanalysis had a variety of interventions which consisted of an initial period of exercise (cycling, LE strength exercises, basketball, walking, strength training and drills, swimming, running, boxing) followed either by a period of rest between massage or massage directly after the exercise. The massage interventions themselves were also varied consisting of anywhere between 10 minutes to 60 minutes of manual therapy. Following the massage there was a post-test performance measurement (which was reviewed in the outcome measures section). It was found that the average performance improvement in the studies was 3.3% and the effect size was .19 across all studies which the authors described as “on average, only negligible effects on performance recovery can be expected from massage.”  Conclusion: Research surrounding massage techniques focuses on its ability to “relieve muscle tension, reduce muscle pain, swelling and spasm, improve flexibility and range of motion, increase muscle blood flow and enhance clearance of substances such as blood lactate or creatine kinase.” Authors concluded however that because there were a limited number of studies included all with varying protocols that “only cautious conclusions can be drawn.” For example it seems that “massage is most effective for short recovery periods of up to 10 min” and that “massage was more effective for recovery form intensive mixed type exercise than for recovery after endurance.” They also found that a treatment time of “5-12 min appears to be sufficient to maximize effects.” This is helpful to know as therapists only have so much time in the clinic to devote to each patient and want to make sure their interventions are effective as well as efficient. |
| **Title: Effects of IASTM on Musculoskeletal Properties**  **Author/Year: Ikeda et al (2019)**  *Ikeda N, Otsuka S, Kawanishi Y, Kawakami Y. Effects of Instrument-assisted Soft Tissue Mobilization on Musculoskeletal Properties. Med Sci Sports Exerc. 2019;51(10):2166-2172. doi:10.1249/MSS.0000000000002035* | Abstract: The purpose of this randomized controlled trial was to determine if improved joint ROM following IASTM treatment is accompanied by changes in mechanical and/or neural properties. To analyze the effects of IASTM on these mechanical and neural property changes, researchers administered IASTM to the plantarflexors and Achilles tendons. Some studies have concluded IASTM techniques improve joint ROM but it is unclear if these increases in ROM are due to reduction muscle and tendon stiffness or if it is related to neural properties, like stretch reflex, pain perception, or stretch tolerance. Researchers hypothesized IASTM would improve joint ROM by reducing muscle stiffness and increasing stretch tolerance of the CNS.  Subjects: Subjects included 14 healthy volunteers, with 11 men and 3 women. Their average age was 24 +/- 4 years. Subjects had no motor function deficits, no talus posterior glide restrictions (i.e no bony block), and no history of orthopedic injury to their LE’s.  Outcome Measures: The DF ROM, peak passive torque (stretch tolerance), triceps surae muscle stiffness, and the joint stiffness of each subject were measured before and immediately after interventions. The control group included the same subjects from the experimental group, but measurements were taken at least 3 days apart. For the control measurement, two measurements were taken 5 minutes apart. The VAS for pain was used to assess subjective pain. EMG data was recorded while the subject moved into passive DF to assess max voluntary contraction. DF ROM and ankle joint stiffness were measured using an isokinetic dynamometer. Muscle stiffness was measured using shear wave elastography.  Interventions & Results:  *Control*: The control group in this study represented the subject’s leg that was not treated with IASTM.  *Experimental*: Subjects in the IASTM group were treated using a Fascia Slick Technic instrument on the skin over the posterior part of the lower leg for 5 minutes, targeting the gastroc, soleus, tibialis posterior muscles, and achilles tendon. The knee and ankle were passive flexed and extended to target different tissues. Treatment was provided by a chiropractor, massage therapist, or Judo therapist with the patient in prone or supine.  *Results*: DF range of motion improved following IASTM treatment, but did not improve in the control leg. No changes in peak passive torque occurred in the experimental or control leg. Ankle joint stiffness decreased significantly in the leg receiving IASTM but did not change in the control leg. Additionally, there were no changes in muscle stiffness in either leg.  Conclusion: While this study has a very small sample size, IASTM may decrease ankle joint stiffness and improve DF range of motion. Further research should be conducted to compare alternative interventions for increasing DF ROM, such as static stretching. Based on these results, it can be assumed that the increase in DF ROM following IASTM interventions is the result of decreased joint stiffness, not a change in stretch tolerance or muscle stiffness. Joint range of motion increases in this case are not due to changes in mechanical and neural properties and the hypothesis is null. |