Effectiveness IASTM Technique To Reduce The Plantar Heel Pain In Plantar Fasciitis :-A Case Report

Dr. Nidhi Agarwal
Assistant Professor
Rama University

Abstract- *Plantar fasciitis is a common condition causing heel and arch pain and has been related with degenerative changes in the plantar fascia resulting in tissue thickening. Instrument Assisted Soft Tissue Mobilization (IASTM) is an intervention that allows clinicians deep penetration to treat tissues. The mechanical forces caused by IASTM might cause localized tissue trauma leading to stimulation of the body's natural inflammation and healing processes.*

Case description:

The subject was a 38-year-old female housewife who presented with right foot pain. The clinical impression was formulated based on the combination of traditional physical therapy examination procedures findings of the plantar fascia demonstrating thickness and tendinosis like changes within the plantar fascia 3 cm distally from the calcaneus. Pain was worst at the morning time but after some time it reduces , but at long standing and when she stood after siting to standing she felt intense pain.

Outcomes:

The patient was seen for twelve treatment sessions over four weeks, at which time the goals of normal ankle dorsiflexion, no pain with palpation of the plantar fascia, and no reported pain during gait were achieved, and she hasn't pain after changing the posture from sitting to standing and pain is also reduce when she stood for long time. No intense pain present when she worked .

Discussion:

This case report represent that the effect of IASTM in plantar fasciitis was more fruitful after giving the cryotherapy. IASTM followed by two repetitions of 30 seconds static stretching and 20 minutes of icing IASTM followed by two repetitions of 30 seconds static stretching and 20 minutes of icing,as a method to objectively assess the pain in patients with plantar fascia . This was used to determine the optimal location for the application of IASTM during the conservative management of plantar fasciitis.

Keywords- Cryotherapy,Instrument Assisted Soft Tissue Manipulation, ROM of Knee joint, Plantar fasciitis

I. INTRODUCTION

Plantar fasciitis is the result of collagen degeneration of the plantar fascia at the origin, the calcaneal tuberosity of the heel as well as the surrounding perifascial structures.[1] plantar fascia is helpful to maintain the biomechanics of foot, helpful to main the arch of the foot . it act as a shock absorber. the diagnosis containing the segment "itis," this condition is notably characterized by an absence of inflammatory cells[2].[1]

The inflammation at the ankle joint cause plantar fasciitis by which person has difficulty in walking,and deposition of calcium and phosphorous which commonly called calcaneal spur is also a cause of plantar fasciitis.

Plantar fasciitis is a common condition causing medial heel and arch pain.[12-14] Plantar fasciitis is the most common foot condition seen in clinical practice, which affects about two million Americans annually. There is a life span incidence of plantar fasciitis of about 10%.[1] It has been reported that the prevalence of plantar fasciitis is between 11 to 15% of all foot symptoms, with a higher occurrence between the ages of 40 and 60.[1,15] Risk factors for the development of plantar fasciitis including obesity, prolonged standing, poor ankle biomechanics, a decreased medial arch height, leg length inequity, heel spurs, and sports activities such as running. Plantar fasciitis accounts for about 10% of all running related injuries.[1,15] With conservative management it has been reported that 80% of the cases will have symptom resolution within 12 months.[16]

It is believed that plantar fasciitis is the result of prolonged loading resulting in adaptive changes in the fascia.[1] It has been related to degenerative changes in the plantar fascia resulting in tissue thickening, which could include proliferation of fibroblasts and a perpetuating inflammatory cycle.[15] The localized healing responses results in the production of new connective tissue, which is laid down

in a disorganized fashion and will cause the formation of adhesions and thickening of the plantar fascia.[15]

It has been reported that the use of instrument assisted soft tissue mobilization (IASTM) is beneficial.[17] IASTM is a modality that allows clinicians to achieve a localized and deep penetration of tissues, while reducing stress placed on the hands and fingers of clinicians.[18] Although the exact effects of IASTM remain elusive, mechanical forces caused by the IASTM might result in localized tissue trauma leading to stimulation of the body's natural inflammation and healing processes.[19] The proposed benefits of IASTM are at the molecular and cellular level.[19,20]It has also been proposed that IASTM may decrease pain through the stimulation of mechanoreceptors within the tissues resulting in the inhibition of nociceptor activity.[20] This decrease in localized pain may contribute to increased range of motion, reduction of tissue tension, increase in tissue extensibility and producing normalization of neuromuscular movement patterns.[20] IASTM followed by two repetitions of 30 seconds static stretching and 20 minutes of icing resulted in clinically meaning changes in active range of motion. The exact dosing of IASTM is not clear, however, recommended treatment time ranges from a few minutes up to 20 minutes.[23]

Clinical Presentation:

The patient (a women with 38 years of age)experienced a sudden onset of heel pain after awake first couple of steps. Her pain was typically worse with weightbearing .Differential diagnosis consisted of calcaneal contusion, calcaneal stress fracture, inflammation of fascia pain at the mid tarsal or subtalar joints, and plantar fasciitis or plantar fascia rupture. Due to the fact that her plain radiographs were showed the calcaneal spur. The fact that weightbearing/ loading activities continued to provoke her symptoms in the heel and medial arch led the authors to the discern that the plantar fascia was the underlying cause of the subject's symptoms. She reported an unremarkable medical history with a negative general health screen ; therefore, further examination of this subject was appropriate. Examination included pain assessment and joint mobility assessment followed by soft tissue assessment to further identify related tissues contributing to the subject's presentation.

II. EXAMINATION

She reported pain in the right foot during the first couple of steps. She appeared comfortable when seated. Findings of this, including AROM, arthrokinematic motion assessment, muscle length and strength assessment Visual inspection in standing revealed a forward head posture, an increased thoracic kyphosis, increased lumbar lordosis, minimal knee valgus on the right, pronation of the calcaneus R>L, pes planus valgus R>L, and minimal hallux valgus on the right. Poor postural positioning can be attributed to a variety of musculoskeletal dysfunctions, which include ankle/ foot pain, knee pain, hip pain, and lower back pain.[35-37]

Visit	**1 (Initial visit)**	**2**	**3**	**4 (Reexamination)**	**5**	**6**	**7**	**8 (Reexamination)**
NPRS heel	3	2	1	1	1	1	0	0
NPRS arch	6	4	4	3	2	1	1	0
LEFS	39			24		11		0
Ankle DF-knee straight (degrees)	5 (17 on the left)	11	15	16	16	15	15	18
Ankle DF knee flexed (degrees)	8 (22 on the left)	12	17	17	18	18	20	20
MTP Dorsiflexion with ankle plantar flexion	65			65				65
Knee flexion/ Extension	Normal compared to left			Normal compared to left				Normal compared to left
Hip flexion/ internal rotation / extension	Normal compared to left			Normal compared to left				Normal compared to left
Arthrokinematic	decreased posterio			Normal posterior glide				Normal posterior glide

assessment	r glide talus Increased medial glide calcaneus Increased plantar glide navicular			talus Increased medial glide calcaneus Increased plantar glide navicular				talus Increased medial glide calcaneus Increased plantar glide navicular
Neurovasuclar testing	(-) Tinel at tarsal tunnel (-) SLR (-) pulse palpation			(-) Tinel at tarsal tunnel (-) SLR (-) pulse palpation				(-) Tinel at tarsal tunnel (-) SLR (-) pulse palpation
Windlass test	(+)			(+)				(-)
Strength (MMT)	R Triceps surae complex graded 4/5 R Tibialis posterior 3+/5 R Gluteus medius/ minimus 4-/5 Flexor digitorum 4/5			R Triceps surae complex 4+/5 R Tibialis posterior 4/5 R Gluteus medius/ minimus 4/5 Flexor digitorum 5-/5				Triceps surae complex 5/5 Tibialis posterior 4+/5 Gluteus medius/ minimus 5-/5 Flexor digitorum 5/5

NPRS = Numeric Pain Rating Scale; LEFS = Lower Extremity Functional Scale; SLR = straight leg raise

III. DISCUSSION

In this case report , the management of a 38-year-old woman who was presenting with heel and arch pain limiting her work ability. Based on a cluster of evaluation findings, including AROM, arthrokinematic motion assessment, muscle length and strength assessment appeared that this subject presented with plantar fasciitis. The therapeutical benefit of IASTM is based on the tissue friction effect by the tool believed to increase local blood flow. Additionally, the use of the tool could cause localized tissue trauma resulting in an inflammatory cascade within the tissue.[20-22] This observation does not support any circulatory benefits of IASTM to the plantar fascia in this case. Because no cause and effect relationships can be inferred from this case report, future studies should use other method to evaluate the effect of IASTM on the circulation in the different layers of human tissues in larger sample sizes. Instrument Assisted Soft Tissue Mobilization (IASTM) is an intervention that allows clinicians deep penetration to treat tissues. The mechanical forces caused by IASTM might cause localized tissue trauma leading to stimulation of the body's natural inflammation and healing processes. The objective of this study was to determine the effectiveness of IASTM for decreasing pain and increasing function in participants with plantar heel pain.

IV. RESULT

In this case report I think that cryotherapy has also had an effect to reduce the pain because it reduces the nerve conduction velocity and reduces the inflammatory response also and IASTM also work on to reduce the inflammatory response. So subject saw the effect of the IASTM and she has found relief from the pain, due to which her joint ROM increases. Subject returned her daily work.

REFERENCES

[1] Martin RL Davenport TE Reischl SF et al. Heel pain-plantar fasciitis: revision 2014. *J Orthop Sports Phys Ther*. 2014;44(11):

[2] Doss A. Wording wisely: Including prevalence data and evidence based clinical outcomes of spinal and musculoskeletal degeneration in radiology reports. *J Med Imaging Radiat Oncol*. 2018;62(5):599-604

[3] Edwards I Jones M Carr J Braunack-Mayer A Jensen GM. Clinical reasoning strategies in physical therapy. *Phys Ther*. 2004;84(4):312-330; discussion 331-315.

[4] Sizer PS Jr. Mauri MV Learman K et al. Should evidence or sound clinical reasoning dictate patient care? *J Man ManipTher*. 2016;24(3):117-119.

[5] Rasmussen OS. Sonography of tendons. *Scand J Med Sci Sports*. 2000;10(6):360-364.

[6] Smith J Finnoff JT. Diagnostic and interventional musculoskeletal ultrasound: part 1. Fundamentals. *PM R*. 2009;1(1):64-75.

[7] Zellers JA Cortes DH Pohlig RT Silbernagel KG. Tendon morphology and mechanical properties assessed by ultrasound show change early in recovery and potential prognostic ability for 6-month outcomes. *Knee Surg Sports TraumatolArthrosc*. 2018.

[8] Yim ES Corrado G. Ultrasound in sports medicine: relevance of emerging techniques to clinical care of athletes. *Sports Med.* 2012;42(8):665-680.

[9] Blankstein A. Ultrasound in the diagnosis of clinical orthopedics: The orthopedic stethoscope. *World J Orthop.* 2011;2(2):13-24.

[10] Scheel AK Schmidt WA Hermann KG et al. Interobserver reliability of rheumatologists performing musculoskeletal ultrasonography: results from a EULAR "Train the trainers" course. *Ann Rheum Dis.* 2005;64(7):1043-1049

[11] del Cura JL. Ultrasound-guided therapeutic procedures in the musculoskeletal system. *CurrProblDiagnRadiol.* 2008;37(5):203-218.

[12] Cleland JA Abbott JH Kidd MO et al. Manual physical therapy and exercise versus electrophysical agents and exercise in the management of plantar heel pain: a multicenter randomized clinical trial. *J Orthop Sports Phys Ther*. 2009;39(8):573-585.

[13] Johal KS Milner SA. Plantar fasciitis and the calcaneal spur: Fact or fiction? *Foot ankle Surg : official journal of the European Society of Foot and Ankle Surgeons.* 2012;18(1):39-41.

[14] Karagounis P Tsironi M Prionas G Tsiganos G Baltopoulos P. Treatment of plantar fasciitis in recreational athletes: two different therapeutic protocols. *Foot Ankle Spec.* 2011;4(4):226-234.

[15] Buchbinder R. Clinical practice. Plantar fasciitis. *N Engl J Med*. 2004;350(21):2159-2166.

[16] Toomey EP. Plantar heel pain. *Foot Ankle Clin.* 2009;14(2):229-245.

[17] Looney B Srokose T Fernandez-de-las-Penas C Cleland JA. Graston instrument soft tissue mobilization and home stretching for the management of plantar heel pain: a case series. *J Manipulative PhysiolTher*. 2011;34(2):138-142.

[18] 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(3):200-211.

[19] Slaven EJ Mathers J. Management of chronic ankle pain using joint mobilization and ASTYM(R) treatment: a case report. *J Man ManipTher.* 2011;19(2):108-112.

[20] Loghmani MT Warden SJ. Instrument-assisted cross fiber massage increases tissue perfusion and alters microvascular morphology in the vicinity of healing knee ligaments. *BMC Complement Altern Med.* 2013;13:240.

[21] Laudner K Compton BD McLoda TA Walters CM. Acute effects of instrument assisted soft tissue mobilization for improving posterior shoulder range of motion in collegiate baseball players. *Int J Sports Phys Ther.* 2014;9(1):1-7.

[22] Schillinger A Koenig D Haefele C et al. Effect of manual lymph drainage on the course of serum levels of muscle enzymes after treadmill exercise. *Am J Phys Med Rehabil.* 2006;85(6):516-520.

[23] Hammer WI Pfefer MT. Treatment of a case of subacute lumbar compartment syndrome using the Graston technique. *J Manipulative PhysiolTher.* 2005;28(3):199-204.

[24] Macdermid JC Walton DM Cote P et al. Use of outcome measures in managing neck pain: an international multidisciplinary survey. *Open Orthop J.* 2013;7:506-520.

[25] Birnie KA Hundert AS Lalloo C Nguyen C Stinson JN. Recommendations for selection of self-report pain intensity measures in children and adolescents: a systematic review and quality assessment of measurement properties. *Pain.* 2019;160(1):5-18

[26] Chang HC Lai YH Lin KC Lee TY Lin HR. Evaluation of pain intensity assessment tools among elderly patients with cancer in Taiwan. *Cancer Nurs.* 2017;40(4):269-275.

[27] Binkley JM Stratford PW Lott SA Riddle DL. The Lower Extremity Functional Scale (LEFS): scale development, measurement properties, and clinical application. North American Orthopaedic Rehabilitation Research Network. *Phys Ther.* 1999;79(4):371-383.

[28] Pickhardt PJ Pooler BD Lauder T del Rio AM Bruce RJ Binkley N. Opportunistic screening for osteoporosis using abdominal computed tomography scans obtained for other indications. *Ann Intern Med.* 2013;158(8):588-595

[29] Wainner RS Whitman JM Cleland JA Flynn TW. Regional interdependence: a musculoskeletal examination model whose time has come. *J Orthop Sports Phys Ther.* 2007;37(11):658-660.]

[30] Barton CJ Levinger P Webster KE Menz HB. Walking kinematics in individuals with patellofemoral pain syndrome: a case-control study. *Gait Posture.* 2011;33(2):286-291.

[31] McPoil TG Vicenzino B Cornwall MW. Effect of foot orthoses contour on pain perception in individuals with patellofemoral pain. *J Am Podiatr Med Assoc.* 2011;101(1):7-16.

[32] Kunugi S Masunari A Koumura T Fujimoto A Yoshida N Miyakawa S. Altered lower limb kinematics and muscle activities in soccer players with chronic ankle instability. *Phys Ther Sport.* 2018;34:28-35.

[33] McHenry BD Exten EL Cross JA et al. Sagittal subtalar and talocrural joint assessment during ambulation with controlled ankle movement (CAM) boots. *Foot Ankle Int.* 2017;38(11):1260-1266.

[34] Rabin A Portnoy S Kozol Z. The association of ankle dorsiflexion range of motion with hip and knee kinematics during the lateral step-down test. *J Orthop Sports Phys Ther*. 2016;46(11):1002-1009. [PubMed] [Google Scholar]

[35] Wyndow N Collins NJ Vicenzino B Tucker K Crossley KM. Foot and ankle characteristics and dynamic knee valgus in individuals with patellofemoral osteoarthritis. *J Foot Ankle Res.* 2018;11:65.

[36] Al-Bayati Z Coskun Benlidayi I Gokcen N. Posture of the foot: Don't keep it out of sight, out of mind in knee osteoarthritis. *Gait Posture.* 2018;66:130-134.

[37] Moyne-Bressand S Dhieux C Decherchi P Dousset E. Effectiveness of foot biomechanical orthoses to relieve patients' knee pain: Changes in neural strategy after 9 weeks of treatment. *J Foot Ankle Surg.* 2017;56(6):1194-1204.

[38] Youdas JW Bogard CL Suman VJ. Reliability of goniometric measurements and visual estimates of ankle joint active range of motion obtained in a clinical setting. *Arch Phys Med Rehabil.* 1993;74(10):1113-1118.

[39] Ness BM Sudhagoni RG Tao H et al. The reliability of a novel heel-rise test versus goniometry to assess plantarflexion range of motion. *Int J Sports Phys Ther*. 2018;13(1):19-27.

[40] Blasimann A Eichelberger P Lutz N Radlinger L Baur H. Intra- and interday reliability of the dynamic navicular rise, a new measure for dynamic foot function: A descriptive, cross-sectional laboratory study. *Foot.* 2018;37:48-53.

[41] Cheng JW Tsai WC Yu TY Huang KY. Reproducibility of sonographic measurement of thickness and echogenicity of the plantar fascia. *J Clin Ultrasound*. 2012;40(1):14-19.

[42] Guermazi A Roemer FW Robinson P Tol JL Regatte RR Crema MD. Imaging of muscle injuries in sports medicine: Sports imaging series. *Radiology.* 2017;282(3):646-663.

[43] Alshami AM Babri AS Souvlis T Coppieters MW. Biomechanical evaluation of two clinical tests for plantar heel pain: the dorsiflexion-eversion test for tarsal tunnel syndrome and the windlass test for plantar fasciitis. *Foot Ankle Int.* 2007;28(4):499-505.

[44] De Garceau D Dean D Requejo SM Thordarson DB. The association between diagnosis of plantar fasciitis and Windlass test results. *Foot Ankle Int.* 2003;24(3):251-255.

[45] Bandy WD Irion JM Briggler M. The effect of time and frequency of static stretching on flexibility of the hamstring muscles. *Phys Ther.* 1997;77(10):1090-1096.

[46] Lim W. Optimal intensity of PNF stretching: maintaining the efficacy of stretching while ensuring its safety. *J Phys Ther Sci*. 2018;30(8):1108-1111.

[47] Hartman L. *Handbook of Osteopathic Technique*. Third ed. Cheltenham: Stamley Thornes Ltd; 1997.

[48] Simpson MR Howard TM. Tendinopathies of the foot and ankle. *Am Fam Physician.* 2009;80(10):1107-1114.

[49] Nishikawa KC Lindstedt SL LaStayo PC. Basic science and clinical use of eccentric contractions: History and uncertainties. *J Sport Health Sci.* 2018;7(3):265-274.

[50] Amiri Arimi S Ghamkhar L Kahlaee AH. The Relevance of Proprioception to Chronic Neck Pain: A Correlational Analysis of Flexor Muscle Size and Endurance, Clinical Neck Pain Characteristics, and Proprioception. *Pain Med*. 2018;19(10):2077-2088.