

Combination of Hip Strengthening and Manipulative Therapy for the Treatment of Plantar Fasciitis: A Case Report

Bruno Dos Santos, MSc,^a Leticia Amaral Corrêa, PT,^b Luciano Teixeira Santos, PT, MSc,^{a,b} Ney Armando Meziat Filho, PhD,^a Thiago Lemos, PhD,^a and Leandro Alberto Calazans Nogueira, PhD^{a,b}

ABSTRACT

Objective: The purpose of this case report is to describe the management of using a combination of hip strengthening and manipulative therapy (MT) for a patient with plantar fasciitis.

Clinical Features: A 44-year-old patient reported heel pain for approximately 1 year before treatment. The patient reported plantar heel pain and tenderness at the calcaneal tuberosity. The pain was most noticeable in the morning but was reduced after a 30-minute walk. A diagnosis of plantar fasciitis was made at the initial assessment.

Intervention and Outcomes: Initially, a clinical evaluation was performed to measure pain intensity (Numeric Pain Rating Scale), pressure-pain threshold (algometry), and perceived exertion (OMNI Resistance Exercise Scale). The patient then underwent 10 sessions of hip strengthening and MT over a period of 3 months. After the treatment, the intensity of pain and the pressure-pain threshold was reevaluated. The patient reported an improvement in pain intensity (baseline score = 6 vs final score = 1) and an increase in the pressure-pain threshold (initial score = 2.6 vs final score = 7.1). Perceived exertion was also improved after hip muscle strength training (initial score = 10 vs final score = 8).

Conclusion: The combination of hip strengthening and MT improved foot pain in a patient with a clinical diagnosis of plantar fasciitis. (J Chiropr Med 2016;15:310-313)

Key Indexing Terms: *Plantar Fasciitis; Manual Therapy; Hip; Muscle Strength; Musculoskeletal Pain*

INTRODUCTION

Plantar fasciitis (PF) is the most common foot condition treated by health care providers.¹ This painful condition can cause impairment of activity and disability.² In the United States, about 2 million people are treated annually for this complaint.^{3,4} Patients usually report pain after palpation of the proximal insertion of the plantar fascia and plantar medial heel, and the pain is most noticeable when patients begin walking after a period of inactivity.¹ Clinicians have used many approaches for treating pain and enhancing function.

Manipulative therapy (MT) has been used as a treatment option for PF in several previous studies,⁵⁻¹¹ and randomized

clinical trials have recommended MT for improving the pain and function in PF patients.^{7,8} The techniques for PF treatment include passive joint manipulation of the ankle and foot; myofascial maneuvers of the gastrocnemius, soleus muscles, and plantar fascia; neural mobilization of the tibial nerve; and stretching of the plantar fascia and triceps surae.¹ A recent study reported that strengthening the hip abductors and external rotators is effective for reducing pain in fasciitis.¹² The strengthening of hip muscles has been recommended for the treatment of various musculoskeletal disorders, with improvement reported in patients with knee,¹³ hip,¹⁴ and lower back pain.¹⁵ The purpose of this case report is to describe use of a combination of hip strengthening and MT in the management of a patient with PF.

CASE REPORT

A 44-year-old woman presented with pain in her right foot. The PF diagnosis was made from the patient history and a physical examination, which was consistent with published PF guidelines.¹ The woman had a body mass index of 31.2 kg/m² and was physically active (jogging), with no hormonal dysfunction or rheumatic disease. The patient reported plantar medial heel pain and tenderness at

^a Postgraduation Program, Rehabilitation Science of Centro Universitário Augusto Motta, Rio de Janeiro, Brazil.

^b Instituto Federal do Rio de Janeiro, Rio de Janeiro, Brazil.

Corresponding author: Leandro Alberto Calazans Nogueira, PhD, Instituto Federal do Rio de Janeiro, Campus Realengo, Rua Carlos Wenceslau, 343, Realengo. CEP 21715-000, Rio de Janeiro, RJ, Brasil. Tel.: +55 21 3463-4497. (e-mail: leandro.nogueira@ifrj.edu.br).

Paper submitted March 9, 2016; in revised form July 6, 2016; accepted August 4, 2016.

1556-3707

© 2016 National University of Health Sciences.

<http://dx.doi.org/10.1016/j.jcm.2016.08.001>

the calcaneal tuberosity. This pain was most noticeable in the morning but was reduced after a painful 30-minute walk. The patient, a housewife, also reported pain while performing tasks at home. This pain had lasted for at least 1 year before treatment, and she had not had any prior physical therapy.

The patient reported a pain intensity score of 6/10 using the Numeric Pain Rating Scale during both passive and active movements of plantar flexion and dorsiflexion. The algometry measurement (Wagner Force Ten—Model FDX) at the calcaneal tuberosity indicated a lower pressure-pain threshold in the affected foot (2.6 kg/cm²) compared with the healthy foot (7.1 kg/cm²). Moreover, the patient reported fatigue before completing 10 repetitions of hip abduction and flexion and assessed the difficulty to be a score of 10/10 on the OMNI Resistance Exercise Scale.¹⁶ Based on these findings, the patient was diagnosed with PF in her right foot by the physiotherapist.

Ten treatment sessions were performed, each lasting for approximately 40 minutes per week. A physiotherapist with 6 years of musculoskeletal experience and manual therapy skills performed the treatment. The manual intervention consisted of¹ passive joint manipulation of the ankle and foot (using both the Maitland mobilization techniques¹⁷ and Mulligan mobilization techniques¹⁸); myofascial maneuvers of the gastrocnemius, soleus muscles, and plantar fascia³; neural mobilization of the tibial nerve; and⁴ stretching of the plantar fascia and triceps surae. Strengthening the hip muscles (flexors, abductors, adductors, and extensors) included exercises with increasing resistance. The training consisted of 3 sets of 10 repetitions, with a 30-second rest between each set. To strengthen the flexors, the patient was placed in a supine position with the right knee extended and the left knee flexed, and the patient performed straight leg raiser. To strengthen the abductors, the patient was in the left lateral decubitus position with the left knee bent and performed abduction of the right hip with the knee straightened. To strengthen the adductors and hip extensors, the patient kept an orthostatic position and performed adduction and hip extension. All sessions were undertaken at the outpatient physiotherapy department of the Gaffrée and Guinle University Hospital. The patient signed an informed consent form allowing the publication of this report.

After the completion of the treatment program, the patient reported a score of 1/10 on the Numeric Pain Rating Scale, which represented an 83% reduction in pain intensity compared with the baseline score. The patient reported persistence of pain in the morning; however, it was more manageable and less frequent (from daily pain to pain on 4 days per week). After the treatment, walking became the principal movement that triggered pain, which was reduced in a sitting or lying position. The patient no longer reported pain while performing tasks at home. There was a 63% increase in the pressure-pain threshold after the therapeutic intervention. In addition, improvement in muscle strength,

Table 1. Comparison of Pain Symptoms and Lower Limb Function in the Initial and Final Evaluations of a Patient With Heel Pain Who Received Physical Therapy

	Initial Score	Final Score	Improvement (%)
Pain intensity score	6	1	83
Pressure-pain threshold, kg/cm ²			
Affected foot	2.6	7.1	63
Healthy foot	7.1	7.1	0
Pain frequency, d/wk	7	4	N/A
OMNI-RES score	10	8	20

N/A, not applicable; OMNI-RES, OMNI Resistance Exercise Scale.

with a score of 8/10 on the OMNI Resistance Exercise Scale, was reported by the patient while performing flexion, extension, adduction, and abduction movements of the hip using 3-kg ankle weights for 3 sets of 10 repetitions. These measures are summarized in Table 1.

DISCUSSION

Although previous studies have investigated the effects of MT^{5-9,11} and hip strengthening¹² separately for the treatment of PF, the combination of these 2 approaches had not been previously evaluated. This case report describes a meaningful improvement in heel pain after a treatment that combined manual therapy with hip strengthening exercises. We also report improvement in muscle strength and in the pressure-pain threshold. The clinical features of this case report (age, obesity, functional activities, and pain intensity) are consistent with risk factors associated with PF, as reported in the literature.¹⁹

The relief in heel pain in this study has also been reported in previous studies that used MT techniques. Ajimsha et al⁵ observed a 72% reduction in pain after treatment using myofascial techniques in the gastrocnemius and the plantar region. Saban et al⁶ used a combination of gastrocnemius myofascial release, neural mobilization, and self-stretching exercises, reporting a reduction of 38% on a visual analog pain scale. Renan-Ordine et al⁷ have also reported a reduction in plantar pain resulting from a combination of manual therapy and self-stretching. Finally, Looney et al²⁰ observed a 53% improvement in pain intensity in patients who used an instrument for soft tissue mobilization and also stretched at home. In summary, these previous studies all reported plantar pain relief using a combination of manual therapy and other approaches. However, in this case report we observed a greater improvement in pain where MT was combined with hip muscle strengthening exercises.

The treatment used in this study was 1 weekly session over 10 weeks. This is the first case report to observe pain relief for this specific session regimen. Prescribed treatments have generally required a greater number of sessions per week, with previous studies reporting treatment regimens of 3 weekly

sessions over a period of 3 weeks⁵ or 4 weekly sessions over 4 weeks.⁷ The ability to offer different treatment options is important to suit different patient requirements and to fit around patients who have limited time available for treatment.

Hip strengthening is a simple and quick treatment, which should be incorporated into clinical treatment routines using MT to maximize the results of the intervention and improve outcomes in the patient. The pain relief observed in this case may be associated with increased strength of the hip muscles of the patient. Moreover, the deactivation of the iliopsoas muscle can affect the impact on the ankle joint and force production of the triceps surae, as observed in a biomechanical study that evaluated the impact of muscle deactivation on the musculoskeletal system during gait motion.²¹ Wainner et al²² described the concept of regional interdependence, where seemingly unrelated impairments in a remote anatomical region may contribute to, or be associated with, the primary complaint of the patient.

Daily pain in the morning was the major complaint of the patient in the initial assessment in this case. The patient reported plantar pain during the initial steps after a period of inactivity, which is often reported in patients diagnosed with PF,¹ and reduction of this pain is an important outcome in a patient-centered approach. A visual analog scale is used to measure pain, and it has been suggested that a change of 19 mm is the minimum measurement to indicate a clinical improvement in pain during these first steps.²³ In our report, at the final assessment the patient reported that walking had become the most noticeable trigger for pain, rather than the initial steps in the morning. A comprehensive functional assessment at the beginning of the treatment and at all follow-up time points may improve the management of the activity limitation and participation restriction in patients with PF. Other measures, such as decreased extremity function⁸ and quality of life,⁷ should be investigated in future studies.

Limitations

The results from this patient cannot be generalized to other patients, even though the characteristics of the patient (age, sex, obesity, and clinical course) may be similar to the characteristics of other PF patients. Furthermore, the measurement of outcomes (eg, pain intensity) used in the present study has been widely used in other PF studies. Moreover, we cannot establish a causal relationship to the treatment without including a control group including a number of patients. Thus, future clinical trials are required to further investigate the results obtained in this study.

CONCLUSION

The combination of hip strengthening and MT resulted in reduced pain intensity, an increased pressure-pain threshold, and increased strength of hip muscles in the patient reported on in this case study.

FUNDING SOURCES AND CONFLICTS OF INTEREST

No funding sources or conflicts of interest were reported for this study.

CONTRIBUTORSHIP INFORMATION

Concept development (provided idea for the research): L.A.C.N., B.S.

Design (planned the methods to generate the results): L.A.C.N., B.S.

Supervision (provided oversight, responsible for organization and implementation, writing of the manuscript): L.A.C.N., B.S., N.A.M.F., T.L.

Data collection/processing (responsible for experiments, patient management, organization, or reporting data): B.S. Analysis/interpretation (responsible for statistical analysis, evaluation, and presentation of the results): L.A.C.N., L.T.S., N.A.M.F., T.L.

Literature search (performed the literature search): B.S., L.A.C., L.T.S.

Writing (responsible for writing a substantive part of the manuscript): B.S., L.A.C., L.A.C.N.

Critical review (revised manuscript for intellectual content, this does not relate to spelling and grammar checking): L.A.C.N., L.T.S., N.A.M.F., T.L.

Practical Applications

- Hip strengthening and MT improved heel pain for this patient.
- Muscle strength and pressure-pain threshold also improved after the treatment.

REFERENCES

1. Martin RL, Davenport TE, Reischl SF, et al. Heel pain-plantar fasciitis: revision 2014. *J Orthop Sports Phys Ther.* 2014;44(11): A1-33.
2. Crawford F, Thomson C. Interventions for treating plantar heel pain. *Cochrane Database Syst Rev.* 2003(3):CD000416.
3. Crawford F, Atkins D, Edwards J. Interventions for treating plantar heel pain. *Cochrane Database Syst Rev.* 2000(3):CD000416.
4. Pfeffer G, Bacchetti P, Deland J, et al. Comparison of custom and prefabricated orthoses in the initial treatment of proximal plantar fasciitis. *Foot Ankle Int.* 1999;20(4):214-221.
5. Ajimsha MS, Binsu D, Chithra S. Effectiveness of myofascial release in the management of plantar heel pain: a randomized controlled trial. *Foot (Edinb).* 2014;24(2):66-71.
6. Saban B, Deutscher D, Ziv T. Deep massage to posterior calf muscles in combination with neural mobilization exercises as

- a treatment for heel pain: a pilot randomized clinical trial. *Man Ther.* 2014;19(2):102-108.
7. Renan-Ordine R, Albuquerque-Sendín F, de Souza DP, Cleland JA, Fernández-de-Las-Peñas C. Effectiveness of myofascial trigger point manual therapy combined with a self-stretching protocol for the management of plantar heel pain: a randomized controlled trial. *J Orthop Sports Phys Ther.* 2011;41(2):43-50.
 8. 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.
 9. Celik D, Kuş G, Sırma SÖ. Joint mobilization and stretching exercise vs steroid injection in the treatment of plantar fasciitis: a randomized controlled study. *Foot Ankle Int.* 2016;37(2):150-156.
 10. Piper S, Shearer HM, Côté P, et al. The effectiveness of soft-tissue therapy for the management of musculoskeletal disorders and injuries of the upper and lower extremities: a systematic review by the Ontario Protocol for Traffic Injury management (OPTIMA) collaboration. *Man Ther.* 2016;21:18-34.
 11. Shashua A, Flechter S, Avidan L, Ofir D, Melayev A, Kalichman L. The effect of additional ankle and midfoot mobilizations on plantar fasciitis: a randomized controlled trial. *J Orthop Sports Phys Ther.* 2015;45(4):265-272.
 12. Kamonseki DH, Gonçalves GA, Yi LC, Júnior IL. Effect of stretching with and without muscle strengthening exercises for the foot and hip in patients with plantar fasciitis: a randomized controlled single-blind clinical trial. *Man Ther.* 2015 In press.
 13. Santos L, Almeida R, Wittmann J, Carmo O, Nogueira L. A utilização da reabilitação e exercícios terapêuticos na síndrome da dor femoropatelar—uma revisão sistemática. *Rev Bras Presc Fisiol Exerc.* 2013;7(39):225-236.
 14. Cibulka MT, White DM, Woehrlé J, et al. Hip pain and mobility deficits—hip osteoarthritis: clinical practice guidelines linked to the international classification of functioning, disability, and health from the orthopaedic section of the American Physical Therapy Association. *J Orthop Sports Phys Ther.* 2009;39(4):A1-25.
 15. Delitto A, George SZ, Van Dillen LR, et al. Low back pain. *J Orthop Sports Phys Ther.* 2012;42(4):A1-57.
 16. Lagally KM, Robertson RJ. Construct validity of the OMNI Resistance Exercise Scale. *J Strength Cond Res.* 2006;20(2):252-256.
 17. Maitland GD. *Vertebral Manipulation.* Oxford, UK: Butterworth-Heinemann; 1986.
 18. Mulligan B. *Manual Therapy “Nags,” “Snags,” “MWMs,” etc.* Wellington, NZ: Plane View Services; 1999.
 19. Beeson P. Plantar fasciopathy: revisiting the risk factors. *Foot Ankle Surg.* 2014;20(3):160-165.
 20. Looney B, Srokose T, Fernández-de-las-Peñas C, Cleland JA. Graston instrument soft tissue mobilization and home stretching for the management of plantar heel pain: a case series. *J Manipulative Physiol Ther.* 2011;34(2):138-142.
 21. Komura T, Prokopow P, Nagano A. Evaluation of the influence of muscle deactivation on other muscles and joints during gait motion. *J Biomech.* 2004;37(4):425-436.
 22. 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.
 23. Landorf KB, Radford JA, Hudson S. Minimal important difference (MID) of two commonly used outcome measures for foot problems. *J Foot Ankle Res.* 2010;3(7):1-6.