



ARE ORTHOSES EFFECTIVE IN THE MANAGEMENT OF HEEL PAIN?

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Incidence

- In a systematic review assessing the frequency of running-related musculoskeletal injuries (8 studies; pooled n = 3500 runners), the incidence of plantar fasciitis ranged from 4.5% to 10%, with the prevalence ranging from 5.2% to 17.5% (1)
- In a prospective assessment of non-traumatic foot and lower-limb injuries in 166 runners involved in various running specialties, 98 (59%) indicated they had developed an overuse injury, with 30 (31%) reporting plantar fasciitis. (2)
- Approximately 10% of the United States general population experiences bouts of heel pain, which results in 1 million visits per year to medical professionals for treatment of plantar fasciitis. (3)

1. Lopes AD, Hespanhol Junior LC, Yeung SS, Costa LO. What are the main running-related musculoskeletal injuries? A systematic review. *Sports Med.* 2012; 42: 891– 905

2. Di Caprio F, Buda R, Mosca M, Calabrò A, Giannini S. Foot and lower limb diseases in runners: assessment of risk factors. *J Sports Sci Med.* 2010; 9: 587– 596.

3. Riddle DL, Schappert SM. Volume of ambulatory care visits and patterns of care for patients diagnosed with plantar fasciitis: a national study of medical doctors. *Foot Ankle Int.* 2004 May. 25(5):303-10.

Risk Factors

- ◉ Limited dorsiflexion ROM
- ◉ High BMI
- ◉ Running
- ◉ Rearfoot varus
- ◉ Cavus foot, High arch configuration, Low Medial longitudinal arch in females
- ◉ Work related conditions: assembly line work, prolonged standing, hard surfaces, in and out of vehicles
- ◉ Hamstring tightness
- ◉ Limb length *discrepancy* (*long leg > short leg*)
- ◉ Decreased intrinsic muscle strength

Diagnosis

- ◉ Plantar medial heel pain: most noticeable with initial steps after a period of inactivity but also worse following prolonged weight bearing
- ◉ Heel pain precipitated by a recent increase in weight-bearing activity
- ◉ Pain with palpation of the proximal insertion of the plantar fascia
- ◉ Positive windlass test
- ◉ Negative tarsal tunnel tests
- ◉ Limited active and passive talocrural joint dorsiflexion range of motion
- ◉ Abnormal Foot Posture Index score
- ◉ High body mass index in nonathletic individuals

Causes of Medial Heel Pain

● Plantar Fascia

- > Plantar fasciitis - pain with first steps of the day
- > Plantar fascia tear/rupture - sudden, acute, knife-like pain, ecchymosis

● Soft Tissues

- > Fat pad syndrome - atrophy of heel pad
- > Heel bruise - history of acute impact injury
- > Bursitis - swelling and erythema of posterior heel
- > Tendonitis - pain with resisted motions

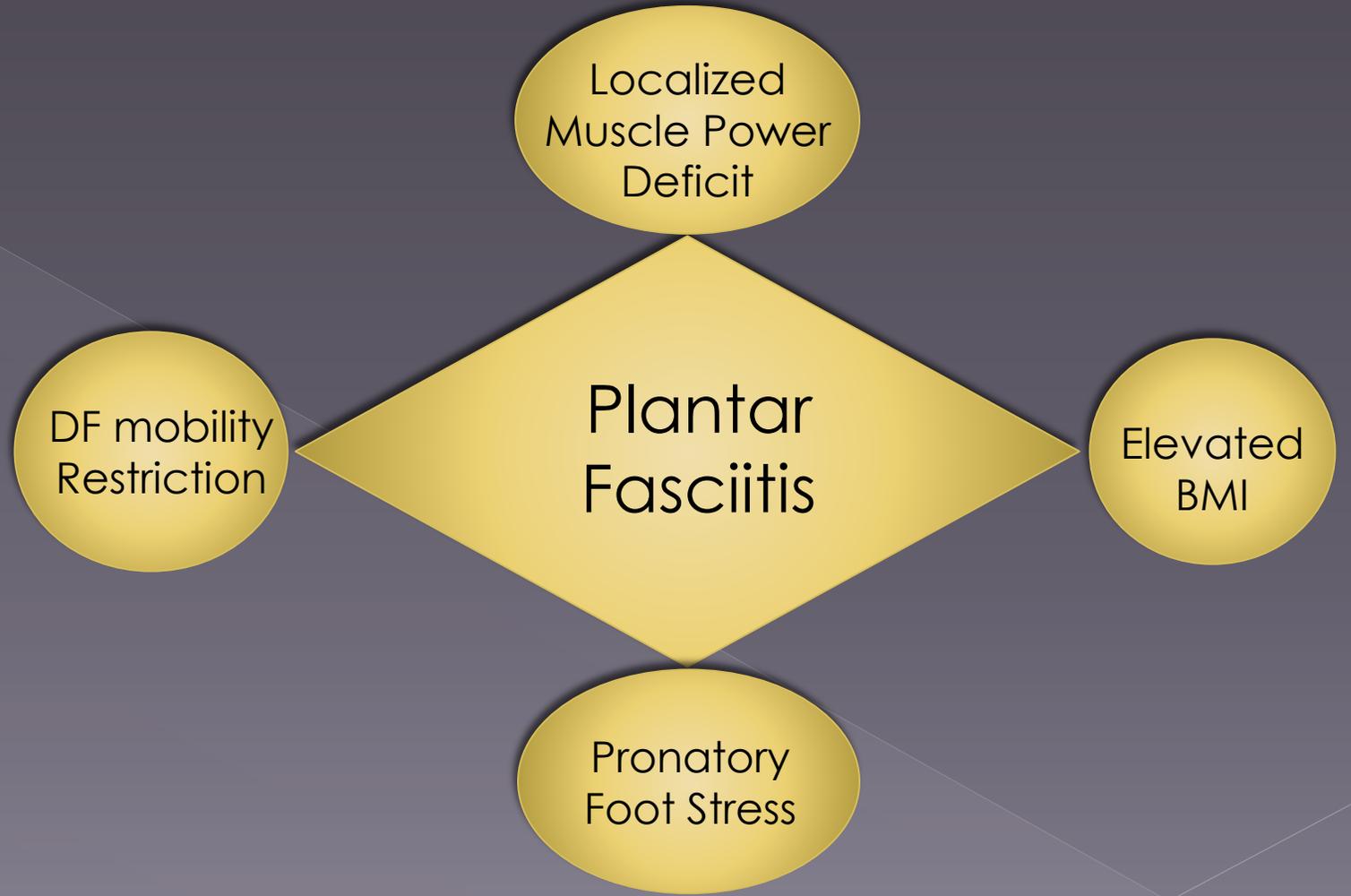
Causes of Medial Heel Pain

○ Skeletal

- > Bony point tenderness
- > Calcaneal stress fracture - pain with weight-bearing; worsens with prolonged weight bearing
- > Paget's disease - bowed tibias, kyphosis, headaches
- > Tumor - deep bone pain; constitutional symptoms late in the course
- > Calcaneal apophysitis (Sever's disease) - posterior heel pain in adolescents

○ Neurological

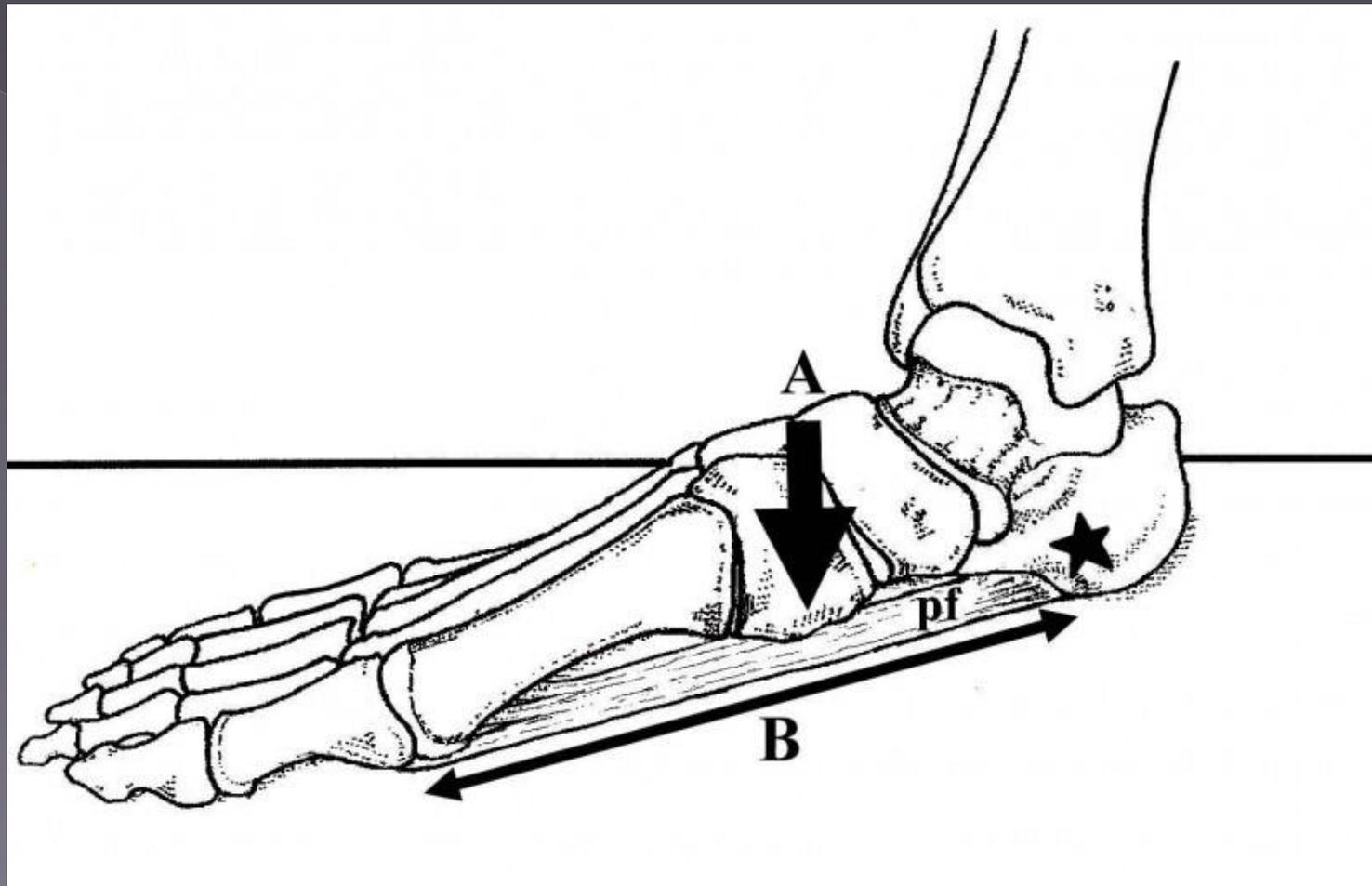
- > Radiating burning pain, numbness and tingling, especially at night
- > Tarsal tunnel syndrome - diffuse nerve symptoms over plantar surface
- > Posterior tibial nerve entrapment - medial plantar heel symptoms
- > Abductor digiti quinti nerve entrapment - burning pain in heel pad area



Validated Outcomes Measures

- Foot and Ankle Ability Measure (FAAM)
- Foot Health Status Questionnaire (FHSQ)
- Foot Function Index (FFI)
- Lower Extremity Functional Scale (LEFS)
- Validated self-report questionnaires before and after interventions

Pronation the Root of All Evil!



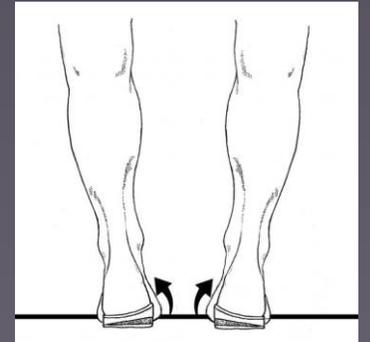
New Techniques For Treating Plantar Fasciitis by Thomas C. Michaud, D.C.,
Published Jun. 6, 2014, Updated Nov. 16, 2016

Irving DB, Cook JL, Young MA, Menz HB. Obesity and pronated foot type may increase the risk of chronic plantar heel pain: a matched case-control study. BMC Musculoskelet Disord. 2007; 8: 41.

- In a case-control study in which 80 individuals with chronic plantar heel pain were matched with 80 control participants, the chronic plantar heel pain group had a more pronated foot posture than the controls when assessed with the Foot Posture Index (FPI-6).

Pronation

- Pronation does not necessarily lead to lower extremity problems. Donatelli et al analyzed the static and dynamic foot postures of 74 professional baseball players. Although 43% of subjects demonstrating excessive pronation reported previous lower extremity injuries, the remaining 57% with similar pronatory patterns experienced no difficulties
- These researchers concluded that excessive pronators were no more likely to be injured than those without excessive pronation. Other researchers similarly reported that excessive pronation, in and of itself, did not result in lower extremity abnormalities



Donatelli R, Wooden M, Ekedahl SR, Wilkes JS, Cooper J, Bush AJ. J Orthop Sports Phys Ther. 1999 Jun; 29(6):316-25; discussion 326-30.

Reischl SF, Powers CM, Rao S, Perry J. Foot Ankle Int. 1999 Aug; 20(8):513-20.

Powers CM, Chen PY, Reischl SF, Perry J. Foot Ankle Int. 2002 Jul; 23(7):634-40

*Illustration: New Techniques For Treating Plantar Fasciitis by Thomas C. Michaud, D.C., Published Jun. 6, 2014, Updated Nov. 16, 2016

Heel Pain—Plantar Fasciitis:

*Clinical Practice Guidelines
Linked to the International Classification
of Function, Disability, and Health from
the Orthopaedic Section of the
American Physical Therapy Association*

J Orthop Sports Phys Ther. 2008;38(4):A1-A18. doi:10.2519/jospt.2008.0302

“ankle dorsiflexion, obesity, and work-related weight bearing were reported to be independent risk factors, reduced ankle dorsiflexion appeared to be the most important.”

B

Clinicians should consider limited ankle dorsiflexion range of motion and a high body-mass index in nonathletic populations as factors predisposing patients to the development of heel pain/plantar fasciitis.

Equinus IS the Root of all EVIL



Plantar Fasciosis

- Largest predictive factors for plantar fasciitis:
Lack of DF and Obesity
- Limited Evidence to support “foot type” as a predictor for Plantar fasciitis
- Lack of ankle DF mobility = Increased mid-tarsal pronation / “pronatory Stress”
- “Fasciosis” probably a better term
 - 50 samples following following plantar fascia surgery
 - ZERO showed evidence of inflammatory process

Excessive Motion

- Cornwall stated that difficulties result when the joints of the foot are continually functioning beyond a normal end range.
- Plantar fasciitis results from the duration of excess motion and not merely from the motion itself.

Cornwall MW. Common pathomechanics of the foot. *Athl Ther Today*. 2000;5(1):10–16

Chandler TJ, Kibler WB. A biomechanical approach to the prevention, treatment and rehabilitation of plantar fasciitis. *Sports Med*. 1993 May; 15(5):344-52 .

Kwong PK, Kay D, Voner RT, White MW. Plantar fasciitis. Mechanics and pathomechanics of treatment. *Clin Sports Med*. 1988 Jan; 7(1):119-26

Plantar Fascia Unhappy Triad

The Hardest Heel Pain Patient to Treat



Cavus / Supinated
Foot



Full Dorsiflexion
ROM



Runner / High
Impact

CLINICAL PRACTICE GUIDELINES



Heel Pain—Plantar Fasciitis: Revision 2014

J Orthop Sports Phys Ther 2014;44(11):A1-A33. DOI: 10.2519/jospt.2014.0303

Robroy L. Martin, Todd E. Davenport, Stephen F. Reischl, Thomas G. McPoil, James W. Matheson, Dane K. Wukich, Christine M. McDonough, Roy D. Altman, Paul Beattie, Mark Cornwall, Irene Davis, John DeWitt, James Elliott, James J. Irrgang, Sandra Kaplan, Stephen Paulseth, Leslie Torburn, James Zachazewski, Joseph J. Godges

Journal of Orthopedic and Sports Physical Therapy | VOLUME 44 | ISSUE 11 | NOVEMBER 2014 |

HEEL PAIN—PLANTAR FASCIITIS: REVISION 2014

I	Evidence obtained from high-quality diagnostic studies, prospective studies, or randomized controlled trials
II	Evidence obtained from lesser-quality diagnostic studies, prospective studies, or randomized controlled trials (eg, weaker diagnostic criteria and reference standards, improper randomization, no blinding, less than 80% follow-up)
III	Case-control studies or retrospective studies
IV	Case series
V	Expert opinion

GRADES OF RECOMMENDATION BASED ON		STRENGTH OF EVIDENCE
A	Strong evidence	A preponderance of level I and/or level II studies support the recommendation. This must include at least 1 level I study
B	Moderate evidence	A single high-quality randomized controlled trial or a preponderance of level II studies support the recommendation
C	Weak evidence	A single level II study or a preponderance of level III and IV studies, including statements of consensus by content experts, support the recommendation
D	Conflicting evidence	Higher-quality studies conducted on this topic disagree with respect to their conclusions. The recommendation is based on these conflicting studies
E	Theoretical/foundational evidence	A preponderance of evidence from animal or cadaver studies, from conceptual models/principles, or from basic science/bench research supports this conclusion
F	Expert opinion	Best practice based on the clinical experience of the guidelines-development team

CLINICAL GUIDELINES

Summary of Recommendations

F PATHOANATOMICAL FEATURES

Clinicians should assess for impairments in muscles, tendons, and nerves, as well as the plantar fascia, when a patient presents with heel pain.

B RISK FACTORS

Clinicians should consider limited ankle dorsiflexion range of mo-

F EXAMINATION: FUNCTIONAL LIMITATION MEASURES

Clinicians should utilize easily reproducible functional limitations and activity restrictions measures associated with the patient's heel pain/plantar fasciitis to assess the changes in the patient's level of function over the episode of care.

B INTERVENTIONS: MODALITIES**E** INTERVENTIONS: MANUAL THERAPY

There is minimal evidence to support the use of manual therapy and nerve mobilization procedures short-term (1 to 3 months) for pain and function improvement. Suggested manual therapy procedures include: talocrural joint posterior glide, subtalar joint lateral glide, anterior and posterior glides of the first tarsometatarsal joint, subtalar joint distraction manipulation, soft tissue mobilization near potential nerve entrapment sites, and passive neural mobilization procedures. There is minimal evidence to support the use of prefabricated or custom foot orthoses for long-term (1 year) pain management or function improvement.

F DIFFERENTIAL DIAGNOSIS

Clinicians should consider diagnostic classifications other than heel pain/plantar fasciitis when the patient's reported functional limitations or physical impairments are not consistent with those presented in the diagnosis/classification section of this guideline, or the patient's symptoms are not resolving with interventions aimed at normalization of the patient's physical impairments.

A EXAMINATION: OUTCOME MEASURES

Clinicians should use validated self-report questionnaires, such as the Foot Function Index (FFI), Foot Health Status Questionnaire (FHSQ), or the Foot and Ankle Ability Measure (FAAM), before and after interventions intended to alleviate the physical impairments, functional limitations, and activity restrictions associated with heel pain/plantar fasciitis. Physical therapists should consider measuring change over time using the FAAM as it has been validated in a physical therapy practice setting.

10 days) pain relief. Studies indicate that taping does cause improvements in function.

A INTERVENTIONS: ORTHOTIC DEVICES

Prefabricated or custom foot orthoses can be used to provide short-term (3 months) reduction in pain and improvement in function. There appear to be no differences in the amount of pain reduction or improvement in function created by custom foot orthoses in comparison to prefabricated orthoses. There is currently no evidence to support the use of prefabricated or custom foot orthoses for long-term (1 year) pain management or function improvement.

B INTERVENTIONS—NIGHT SPLINTS

Night splints should be considered as an intervention for patients with symptoms greater than 6 months in duration. The desired length of time for wearing the night splint is 1 to 3 months. The type of night splint used (ie, posterior, anterior, sock-type) does not appear to affect the outcome.

2008 Guidelines

Summary of Recommendations*

HEEL PAIN—PLANTAR FASCIITIS: CLINICAL PRACTICE GUIDELINES REVISION 2014

Summary of Recommendations* (continued)

INTERVENTIONS – PHYSICAL AGENTS

D Electrotherapy: clinicians should use manual therapy, stretching, and foot orthoses instead of electrotherapeutic modalities, to promote intermediate and long-term (1-6 months) improvements in clinical outcomes for individuals with heel pain/plantar fasciitis. Clinicians may or may not use iontophoresis with dexamethasone or acetic acid to provide short-term (2-4 weeks) pain relief and improved function.

C Low-level laser: clinicians may use low-level laser therapy to reduce pain and activity limitations in individuals with heel pain/plantar fasciitis.

C Phonophoresis: clinicians may use phonophoresis with keto-profen gel to reduce pain in individuals with heel pain/plantar fasciitis.

C Ultrasound: the use of ultrasound cannot be recommended for individuals with heel pain/plantar fasciitis.

INTERVENTIONS – FOOTWEAR

C To reduce pain in individuals with heel pain/plantar fasciitis, clinicians may prescribe (1) a rocker-bottom shoe construc-

tion in conjunction with a foot orthosis, and (2) shoe rotation during the work week for those who stand for long periods.

INTERVENTIONS – EDUCATION AND COUNSELING FOR WEIGHT LOSS

E Clinicians may provide education and counseling on exercise strategies to gain or maintain optimal lean body mass in individuals with heel pain/plantar fasciitis. Clinicians may also refer individuals to an appropriate health care practitioner to address nutrition issues.

INTERVENTIONS – THERAPEUTIC EXERCISE AND NEUROMUSCULAR RE-EDUCATION

F Clinicians may prescribe strengthening exercises and movement training for muscles that control pronation and attenuate forces during weight-bearing activities.

INTERVENTIONS – DRY NEEDLING

F The use of trigger point dry needling cannot be recommended for individuals with heel pain/plantar fasciitis.

*These recommendations and clinical practice guidelines are based on the scientific literature published prior to January 2013.

Recommendations

- 2008: There appear to be no differences in the amount of pain reduction or improvement in function created by custom foot orthoses in comparison to prefabricated orthoses. There is currently no evidence to support the use of prefabricated or custom foot orthoses for long-term (1 year) pain management or function improvement
- 2014: Clinicians should use foot orthoses, either prefabricated or custom fabricated/fitted, to support the medial longitudinal arch and cushion the heel in individuals with heel pain/plantar fasciitis to reduce pain and improve function for short- (2 weeks) to long-term (1 year) periods, especially in those individuals who respond positively to antipronation taping techniques
- Clinicians should prescribe a 1- to 3-month program of night splints for individuals with heel pain/plantar fasciitis who consistently have pain with the first step in the morning.

Recommended Therapies

- ⦿ A_Level Evidence

- > Manual Therapy – Soft tissue and joint mobilization
- > Stretching – fascia and gastro-soleus complex
- > Taping – Anti-pronation taping
- > Foot Orthoses – no preference for CFO or PFO, short or long term
- > Night Splints – 1-3 months for patients with AM 1st step pain

- ⦿ C & D Level Evidence

- > Physical Agents – (C) - US, Phonophoresis, Low Level Laser (D)
Electrotherapy
- > Footwear – (C) – Rocker soles, Cushion sole, Shoe rotations

Antiinflammatory vs Mechanical Tx

- A randomized clinical trial of 103 patients. 3 treatment categories: corticosteroid injections; viscoelastic heel cups, and low-Dye taping for one month followed by rigid custom orthotics for two months.
- After three months of treatment. 70 percent of participants in the mechanical treatment group rated their outcome as "excellent" or "fair" compared to the anti-inflammatory (33%) and accommodative treatment (32%) groups ($p=0.005$)

Corticosteroid Injections ICSI

- There is limited evidence supporting the effectiveness of ICSI as a first-tier intervention for heel pain/plantar fasciitis, because the benefits do not offset the risk for harms, including long-term disablement. The results of 2 systematic reviews failed to yield evidence favoring any substantive clinical benefit of ICSI for patients with heel pain/plantar fasciitis. Potential harms associated with ICSI may include injection-site pain, infection, subcutaneous fat atrophy, skin pigmentation changes, plantar fascia rupture, peripheral nerve injury, and muscle damage.

Timothy E. McAlindon, Michael P. LaValley, William F. Harvey, Lori Lyn Price, Jeffrey B. Driban, Ming Zhang, Robert J. Ward. Effect of Intra-articular Triamcinolone vs Saline on Knee Cartilage Volume and Pain in Patients With Knee Osteoarthritis. JAMA, 2017; 317 (19): 1967 DOI: 10.1001/jama.2017.5283

- 140 patients with symptomatic knee osteoarthritis with features of synovitis received injections in the joint with the corticosteroid triamcinolone (n = 70) or saline (n = 70) every 12 weeks for two years.
- Injections with triamcinolone resulted in significantly greater cartilage volume loss than did saline (average change in cartilage thickness of -0.21 mm vs -0.10 mm) and no significant difference on measures of pain

The SOOTHE Trial

A pragmatic, parallel-group assessor-blinded randomized trial (Steroid injection versus foot orthoses (SOOTHE) heel pain trial). One hundred participants with plantar heel pain will be randomly allocated (i.e. two groups of approximately 50) to receive either an ultrasound-guided corticosteroid injection or prefabricated foot orthoses. Outcome measures will be obtained at baseline, 4, 8 and 12 weeks, with two primary endpoints at 4 and 12 weeks to reflect the hypothesized temporal effects of each intervention. The primary outcome measure will be the foot pain domain of the Foot Health Status Questionnaire.

Lewis RD, Wright P, McCarthy LH. Orthotics Compared to Conventional Therapy and Other Non-Surgical Treatments for Plantar Fasciitis. The Journal of the Oklahoma State Medical Association. 2015;108(12):596-598.

CFO – custom foot orthosis
 CSI – corticosteroid injection
 ABII - autologous blood intralesional injection
 ESWT – Extracorporeal shockwave therapy
 EPA – Electrophysical agents

Study Investigators	Study Type	Study Size (n)	Treatment Modalities	Outcomes
Roos et al. ³	3-arm RCT	43	CFO, night splints or CFO with night splints	Pain relief and improved function reported for all groups with significantly reduced pain at 52 weeks for the combined group.
Landorf et al. ^{3,4}	3-arm RCT	136	Prefabricated orthotic, CFO or placebo “sham” orthotic.	Both prefabricated orthotics and CFOs significantly improved function at 3 mo. compared to placebo. No significant improvement in pain compared to placebo.
Baldassin et al. ³	2-arm RCT	142	Prefabricated orthotic or CFO	Pain relief and improved function was similar for both study groups at 8 weeks.

Lewis RD, Wright P, McCarthy LH. Orthotics Compared to Conventional Therapy and Other Non-Surgical Treatments for Plantar Fasciitis. The Journal of the Oklahoma State Medical Association. 2015;108(12):596-598.

Porter and Shadbolt ³	3-arm RCT	125	CSI with stretching, ESWT with stretching, and stretching alone.*	Both CSI + stretching and ESWT + stretching provided superior pain relief at 12 mo. compared to stretching alone.
Lee and Ahmad ³	2-arm RCT	64	CSI or ABII. site pain for up to 7 days caused by CSI	CSI provided superior pain relief to ABII at 3 mo. but the differences were not significant at 6 mo..
Dimou et al. ^{3,5}	2-arm RCT	40	Manipulative chiropractic treatment or CFO	Manipulative chiropractic treatment significantly superior for reducing pain at 8 wk. compared to CFO.
Cleland ⁵	2-arm RCT	60	Manipulative chiropractic treatment or EPA and exercise	Manipulative chiropractic therapy significantly reduced pain at 4 wk.. compared with EPA and exercise. No significant differences at 6 mo.

Conclusions

- Results from this literature review indicate that patients with known acute symptomatic plantar fasciitis can be treated with a variety of non-surgical modalities that improve symptoms in the short term. Studies demonstrated adding orthotics, night splints, manipulation chiropractic, physical therapy, and/or corticosteroid injections offer improved symptom relief when conventional treatment options (NSAIDs, stretching and lifestyle change) are inadequate for

Everything Works

1 to 3 months with little to no risk. A recent study indicated that patients were compliant with both prefabricated and custom orthotics and that prefabricated orthotics were cost-effective. Current evidence suggests that the addition of orthotics to the treatment regimen for non-recalcitrant plantar fasciitis either alone or in conjunction stretching if conventional therapy fails to bring symptom relief. Manipulative therapy might also be considered.

A Randomized Controlled Trial of Custom Foot Orthoses for the Treatment of Plantar Heel Pain

James S. Wrobel, Adam E. Fleischer, Ryan T. Crews, Beth Jarrett, and Bijan Najafi
Journal of the American Podiatric Medical Association 2015 105:4, 281-294

- The CFO group had significantly improved total FFI-R scores (Revised Foot Function Index short form) (77.4 versus 57.2; $P = .03$) without group differences for FFI-R pain, SF-36 (36-Item Short Form Health Survey), and morning or evening pain. The PFO and CFO groups reported significantly lower morning and evening pain. For activity, the CFO group demonstrated significantly longer episodes of walking over the sham ($P = .019$) and PFO ($P = .03$) groups, with a 125% increase for CFOs, 22% PFOs, and 0.2% sham. Postural transition duration ($P = .02$) and balance ($P = .05$) improved for the CFO group. There were no gait differences. The CFO group reported significantly less stretching and ice use at 3 months.
 - > Seventy-seven patients with plantar fasciitis for less than 1 year were included
 - > Revised Foot Function Index short form (FFI-R)
 - > 36-Item Short Form Health Survey (SF-36)
 - > CFO Custom Foot Orthosis, PFO Pre-Fabricated Foot Orthosis
- **CFO group demonstrated 5.6-fold greater improvements in spontaneous physical activity versus the PFO and sham groups**

Radial shock wave treatment alone is less efficient than radial shock wave treatment combined with tissue-specific plantar fascia-stretching in patients with chronic plantar heel pain.

Rompe J, Furia J, Caccio A, et al. International Journal of Surgery. Volume 24, Part B, December 2015

- 152 patients with chronic plantar fasciopathy treated with low-energy radial shock-wave therapy without local anesthesia, administered weekly for three weeks (Group 1, n = 73) or the identical shock wave treatment and to perform an eight-week plantar fascia-specific stretching program (Group 2, n = 79).
- A program of manual stretching exercises specific to the plantar fascia in combination with repetitive low-energy radial shock-wave therapy is more efficient than repetitive low-energy radial shock-wave therapy alone for the treatment of chronic symptoms of proximal plantar fasciopathy

Manual Therapy and Plantar Fasciitis



Manual therapy and exercise is a superior management approach over electrophysical agents (US, Iontophoresis and Ice) and exercise in management of patients with plantar heel pain (4 week and 6 month follow-up)

Cleland JA, Abbott JH, Kidd MO, Stockwell S, Cheney S, Gerrard DF, Flynn TW. Manual Physical Therapy and Exercise Versus Electrophysical Agents and Exercise in the Management of Plantar Heel Pain: A Multicenter Randomized Clinical Trial. *JOSPT* August 2009.

Intervention	Details	Figures
<p>Plantar fascia and flexor hallucis longus stretch and tissue mobilization Indication: plantar soft tissue restriction, thickening or degeneration</p>	<p>Patient is in a prone position with the knee extended. Calcaneus is held in eversion while maintaining talocrural dorsiflexion. The first ray and toes are stretched into dorsiflexion, while the operator's thumb glides proximal and distal along the path of the plantar fascia and flexor hallucis longus. Depth of soft tissue mobilization is determined by patient tolerance and reactivity. Stretch/mobilization is performed for approximately 3 min.</p>	
<p>Lateral glide/eversion rearfoot mobilization Indication: ankle joint rearfoot complex restriction</p>	<p>The tibia, fibula, and talus are stabilized against the table. The therapist then uses the opposite thenar eminence to grasp the calcaneus. A mobilizing force is directed through the therapist's arm and thenar eminence to the medial calcaneus.</p>	

Cleland JA, Abbott JH, Kidd MO, Stockwell S, Cheney S, Gerrard DF, Flynn TW. Manual Physical Therapy and Exercise Versus Electrophysical Agents and Exercise in the Management of Plantar Heel Pain: A Multicenter Randomized Clinical Trial. *JOSPT* August 2009.

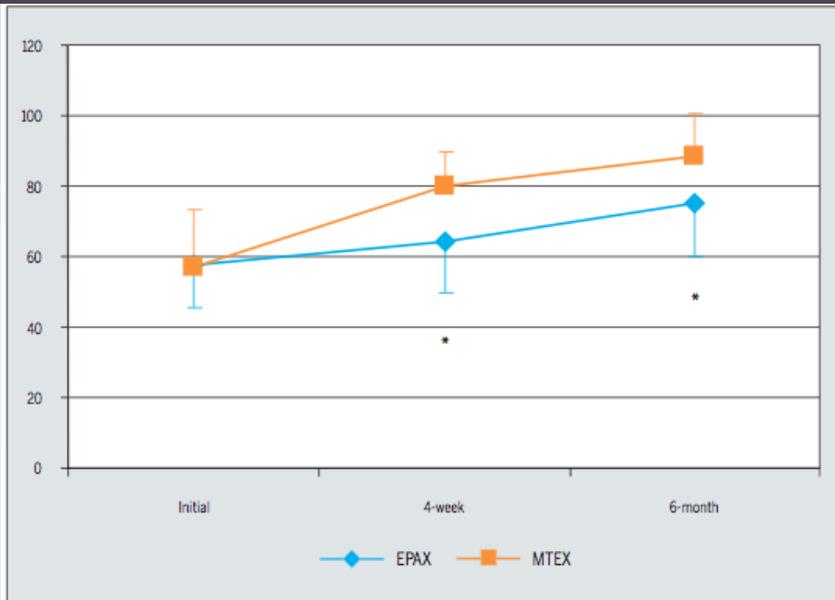


FIGURE 3. Mean Foot and Ankle Ability Measure score at each assessment point. Abbreviations: MTEX, manual physical therapy and exercise; EPAX, electrophysical agents and exercise. *Indicates a significant difference between groups ($P < .05$).

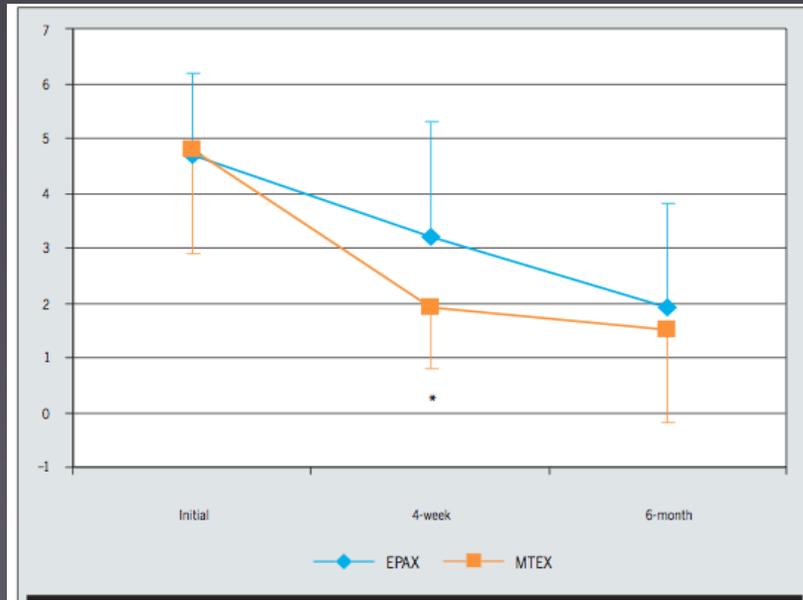


FIGURE 4. Mean Numeric Pain Rating Scale scores at each assessment point. Abbreviations: MTEX, manual physical therapy and exercise; EPAX, electrophysical agents and exercise. *Indicates a significant difference between groups ($P < .05$).

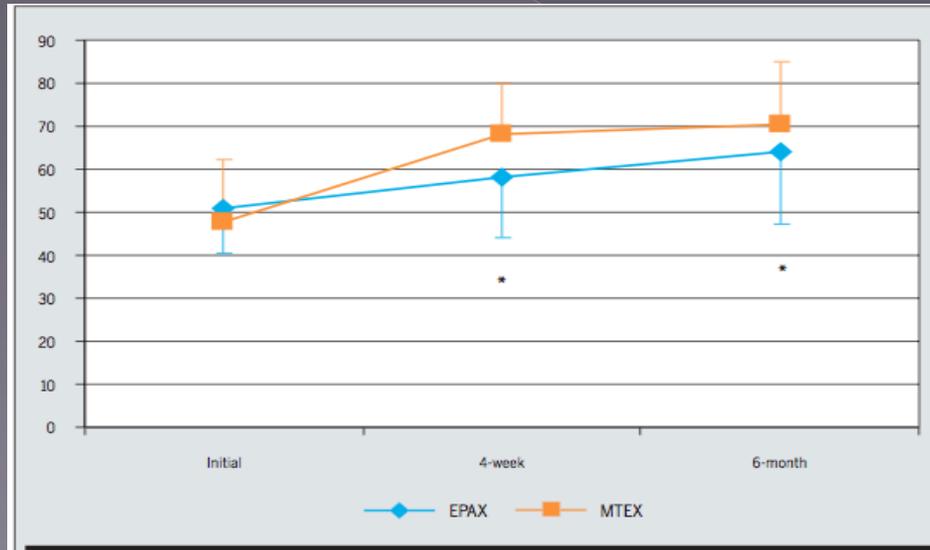


FIGURE 2. Mean Lower Extremity Functional Scale score at each assessment point. Abbreviations: MTEX, manual physical therapy and exercise; EPAX, electrophysical agents and exercise. *Indicates a significant difference between groups ($P < .05$).

RESTORE DF = Posterior Glide



Green T, Refshauge K, Crosbie J, Adams R. A Randomized CONTROLLED Trial of Passive Accessory Joint Mobilization on Acute Ankle Inversion Sprains. *Phys Ther* 2001;81:984-994

Collins N, Teys P, Vincenzino B. The Initial Effects of a Mulligan's mobilization with movement technique on dorsiflexion and pain in subacute ankle sprains. *Man Ther* 2004;9:77-82

Lopez-Rodriguez S, Fernandez de-las-Penas C, Albuquerque-Sendin F, Rodriguez-Blanco C, Palomeque-del-Cerro L. Immediate effects of manipulation of the talocrural joint on stabilometry and baropodometry in patients with ankle sprain. *J Manip and Phys Ther* 2007;30:186-191

Dananberg 2004 JAPMA – 3 case series using the manipulation previously described for DF ROM return



Lateral Glide

Journal of
Orthopaedic &
Sports Physical
Therapy; vol 41, no
2, February 2011

60 patients, 15 men and 45
women (mean age, 44 +/- 10
years) with
a clinical diagnosis of plantar
heel pain were
randomly divided into 2 groups:
1. self-stretching (Str) group who
received a stretching protocol
2. self-stretching and soft tissue
TrP manual therapy (Str-ST) group
who received TrP manual

Pressure pain threshold
(PPT): minimal pressure
when the sensation of
pressure changes to
pain, assessed with a
mechanical pressure
algometer

CONCLUSIONS

THE CURRENT STUDY DEMONSTRATED that the addition of TrP manual therapies to a self-stretching protocol is superior to the sole application of self-stretching in the treatment of individuals with plantar heel pain at short term. The magnitude of this benefit was clinically important for the main outcomes, physical function and bodily pain. In addition, significant increases in PPT levels within the TrP group were also found supporting antinociceptive effects of TrP therapy. ©



FIGURE 3. Referred pain pattern from the gastrocnemii (A) and soleus (B) muscles. Modified with permission from Simons DG, Travell J, Simons L. *Myofascial Pain and Dysfunction: The Trigger Point Manual: Volume 1*. 2nd ed. Baltimore, MD: Williams & Wilkins; 1999.



FIGURE 5. Neuromuscular technique applied over trigger point taut band.

int



Instrument Assisted Soft Tissue Mobilization (IASTM)



....Lets use some STEEL to HEAL the HEEL

Self mobilization

* Illustration: New Techniques For Treating Plantar Fasciitis by Thomas C. Michaud, D.C., Published Jun. 6, 2014, Updated Nov. 16, 2016

IASTM

- Derived from Gua Sha
 - > “scrape skin”
 - > Repeated pressured strokes over lubricated skin with a smooth edged instrument placed against the oiled skin surface, pressed down firmly, and then moved down the muscles—hence the term *tribo-effleurage* (i.e., friction-stroking)—
- THEORY
 - > Color and rate of fading are diagnostic and prognostic
 - > May cause bruising or petechia... **NOT A GOAL!!!!**
 - Theory: increased amount and duration of erythema= indicative of severity of problem
 - > Quicker petechiae/erythema seem to have more myofascial pain, poorer tissue quality
 - > Response tends to decrease over time

IASTM

- Theories as to how it works:
 - > Expands and exploits principles of Transverse Friction Massage made popular by James Cyriax M.D.
 - > Limited research to date (RCTs)
 - > Mostly Case Studies and Animal Models
- Microtrauma to tissue creates inflammation
 - > Facilitates healing tendinopathies
 - Same reason eccentrics are used
- Facilitation of connective tissue healing
- Promotes Fibroblastic proliferation (Ultimate Goal of Tx)
 - > laying down of collagen fibers in tendon, ligament after injury



PLANTAR FASCIA-SPECIFIC STRETCHING EXERCISE IMPROVES OUTCOMES IN PATIENTS WITH CHRONIC PLANTAR FASCIITIS

A PROSPECTIVE CLINICAL TRIAL WITH TWO-YEAR FOLLOW-UP

BY BENEDICT F. DIGIOVANNI, MD, DEBORAH A. NAWOCZENSKI, PHD, PT, DANIEL P. MALAY, MSPT,
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Fig. 1

Conclusions: This study supports the use of the tissue-specific plantar fascia-stretching protocol as the key component of treatment for chronic plantar fasciitis. Long-term benefits of the stretch include a marked decrease in pain and functional limitations and a high rate of satisfaction. This approach can provide the health-care practitioner with an effective, inexpensive, and straightforward treatment protocol.

Level of Evidence: Therapeutic Level II. See Instructions to Authors for a complete description of levels of evidence.

Bone Joint Surg Am. 2003;85:1270-7.)

Subtalar Joint Position During Gastrocnemius Stretching and Ankle Dorsiflexion Range of Motion

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No significant difference in Ankle Dorsiflexion ROM gains when stretching with foot in supination or pronation

.....Investigators did not attempt to investigate the effects of STJ position and "stress" or joint reaction forces at other joints---clinical judgment should prevail



Summary: Plantar Fasciitis

- 1) Incorporate manual techniques of lateral STJ glides, STM gastroc and Cross Friction to fascia
- 2) Restore DF mobility to decrease mid tarsal pronatory stress
- 3) Control Pronation with taping and Orthotics
- 4) Improve Eccentric strength of the Posterior tibialis if pronation is a concern!!!!