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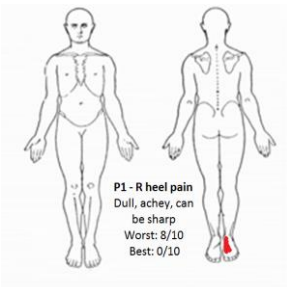
FOOT AND ANKLE CASE 3

Dhinu Jayaseelan, DPT, OCS, FAAOMPT

Orthopaedic Manual Physical Therapy Series
Charlottesville 2017-2018

John Doe, 28 y/o male



Initial Hypotheses

- Plantar fasciitis
- Tarsal tunnel syndrome
- Insertional Achilles tendinopathy
- Calcaneal stress fracture
- Post tib tendinopathy
- Ankylosing spondylitis

FAAM

- ADL: 81%, Sports: 59%

Outcome Measure Psychometrics

	Foot and Ankle Ability Measure (FAAM)	Foot Function Index (FFI)	Foot Health Status Questionnaire (FHSQ)
Items	21 ADL scale 8 sports subscale	23 items, 3 subscales: pain, disability, activity limitation	13 items, 4 subscales: pain, function, footwear, general foot health
Scoring	Higher scores = greater self-reported function	Higher scores = greater disability	Higher scores = greater self-reported function
Reliability	0.89 (ADL) 0.87 (sports)	0.69 – 0.87	0.74 – 0.92
MDC	5.7 (ADL) 12.3 (sports)	n/a	n/a
MCID	8 (ADL) 9 (sports)	n/a	13 (pain) 7 (function) 2 (footwear) (General foot health unresponsive to change)

 Martin RL, JOSPT 2007

Subjective Exam Asterisks

(Aggravating/easing factors, description/location of symptoms, behavior, mechanisms of injury)

28 y/o male, 1.5 yr history of plantar heel pain	
MOI	After running first ½ marathon; notes no specific training program or history of running
Aggravating activities	First steps in am, after prolonged sitting at desk (1 hr), prolonged standing (> 1 hr), running
Alleviating activities	Stretching, not doing above
Prior treatment	MD prescribed OTC inserts and stretches after initial onset, reported min/mod benefit
PMHx	2 inversion ankle sprains in high school (same side)

Structure(s) at fault

Joints in/refer to painful region	Myofascial tissue in/refer to painful region	Non-contractile tissue in/refer to painful region	Neural tissue in/refer to painful region	Other structures to be examined (non-MSK)
Talocrural Subtalar Distal tib-fib Talonavicular Calcaneocuboid TMT joints Hip, SIJ, L-spine	Achilles tendon Post tib tendon FHL, FDL Trigger point referral	Plantar fascia Fat pad Retrocalcaneal bursa Deltoid, spring ligaments	Tibial n. (medial calcaneal/plantar) L5,S1	Calcaneal fx? Ankylosing spondylitis?

- Primary hypothesis after subjective: chronic plantar fasciitis
- Differential (rank order): tarsal tunnel, post tib tendinopathy, insertional AT, myofascial pain syndrome, lumbar radic

Physical Exam Asterisks

(Special tests, movement/joint dysfunction, posture, palpation, etc)

28 y/o male, 1.5 yr history of plantar heel pain	
Posture	Pes cavus bilaterally
ROM	Decr DF (worse with knee straight) and pronation
Single leg heel raises	L: 26 reps; R: 15 reps*
Special tests	(+) windlass test, (-) SLR/slump, Tinel's
Stability tests	(-)
Palpation	TTP (+) R medial calcaneal tubercle and proximal ½ plantar fascia (thickness also noted)*
Joint accessory motion	Hypomobile R TCJ AP, STJ medial glide, midfoot throughout, 1st MTP AP and PA glides

Rate your assessment of severity/irritability

Justify your assessment with examples from the subjective and/or objective exam

- Severity: None Min **Mod** Max
  - Impacts ability to run or WB for durations, not disabling in functional tasks
- Irritability: None **Min** Mod Max
  - Symptoms brought on with prolonged activity reduced fairly rapidly

Stage and stability?

- Acute Subacute **Chronic** Acute on chronic
  - 1.5 yr history, no recent mechanism or indicators of inflammatory processes
- **Stable** Improving Worsening Fluctuating Red flags?
  - Symptoms generally the same, not better or worse, appears mechanical/MSK

- Are the relationships between the areas on the body chart, the interview, and physical exam consistent? "Do the features fit" a recognizable clinical pattern? If YES, what?

Chronic plantar fasciitis

(plantar fasciosis, plantar fasciopathy)

- Identify any potential risk factors (yellow, red flags, non-MSK involvement, biopsychosocial)

Frustration with lack of improvement?

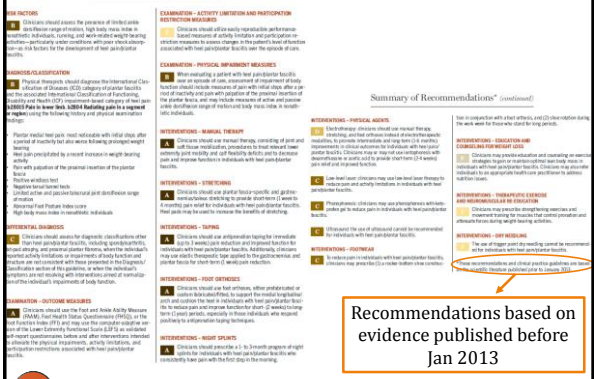
ROBROY L. MARTIN, PT, PhD • TODD E. DAVENPORT, DPT • STEPHEN F. REISCHL, DPT • THOMAS G. MCPOIL, PT, PhD
JAMES W. MATHESON, DPT • DANE K. WUKICH, MD • CHRISTINE M. MCDONOUGH, PT, PhD

Heel Pain—Plantar Fasciitis: Revision 2014

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. 2014;44(11):A1-A23. doi:10.2519/jospt.2014.0303

Summary of Recommendations*



Summary of Recommendations* (continued)

Recommendations based on evidence published before Jan 2013

Plantar Fasciitis

- Background/Demographics
  - Most common foot condition treated in health care, up to 2 million Americans / year
  - Affects athletic and non-athletic populations
  - Mean symptom duration: 13.3 – 14.1 months
- Risk Factors:
  - Limited ankle DF ROM (Odds Ratio: 23.3)
  - High BMI in non-athletic patients (OR: 5.6)
  - Work-related WB activities (OR: 3.6)
  - Running
  - Cavus foot, high arch

JBJS 2003 Riddle
JOSPT 2014 CPG

Plantar Fasciitis

- Subjective Report
  - Pain in plantar aspect of heel
  - Worse with initial steps after prolonged inactivity or prolonged weight bearing
  - Precipitated by recent increase in WB activity
- Objective Examination
  - Tenderness at plantar fascia (medial calcaneal tubercle)
  - (+) Windlass test
  - (-) Tarsal tunnel/neurodynamic tests
  - Decr A/PROM ankle DF; 1st ray extension mobility

JOSPT 2014 CPG

Additional Considerations

- Patients with chronic PF demonstrate the following: (Fernandez-Lao, et al. 2016)
  - Widespread and bilateral hypersensitivity
  - Lower Q of L
  - Increased thickness of the plantar fascia in the affected foot (+ correlation to symptoms Mahowald S 2011)
  - Increased fascial vascularity (+ correlation to symptoms Chen H 2013)
- Imaging not typically necessary, unless ruling out other conditions

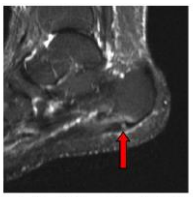


Figure 3 Sagittal STIR sequences showing features of plantar fasciitis. The red arrow shows high signal within the proximal thickened plantar fascia with adjacent soft tissue and bony oedema.
Clinical Radiology (2009) 64, 931–939

Treatment Planning

Impairments	Functional Limitations	Goals
Pain Foot/ankle hypomobility Decr gastroc length Plantarflexion weakness Altered gait	Inability to run Limited standing tolerance	Normalize joint mobility No walking or running gait deviations Pain free return to run

- What is your primary objective after intial eval?
  - Education: anatomy, pathology, prognosis
  - Manual therapy: calf/PF STM, rearfoot mobilizations gr III-IV
  - Exercise prescription: self-stretching, neuro re-ed (load dispersion, facilitate mid/medial foot loading)

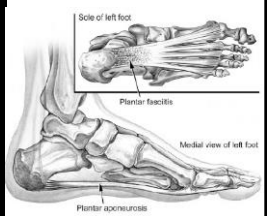
Anatomy / Pathophysiology

- 3 dense bands of connective tissue
- O: medial calcaneal tubercle
- I: fans distally into base of proximal phalanx

- Usually chronic/degenerative process related to repetitive microtrauma
- Histologic analysis: marked thickening/fibrosis of PF, collagen necrosis, chondroid metaplasia, calcification

Plantar Fasciitis and the Windlass Mechanism: A Biomechanical Link to Clinical Practice

Lori A. Bolgla; Terry R. Malone



Journal of Athletic Training 2004;39(1):77–82

Abnormalities Resulting from the Underpronated Foot:

- Related to joint stiffness, decreased plantar fascia extensibility, muscle tightness
- Unable to dissipate forces or absorb shock (lacks pronation)
- Decreased distance between met heads and calcaneus
- Plantarflexed 1st ray

Journal of Athletic Training 2004;39(1):77–82

Gait Implications

(Cavus foot, midfoot stiffness)

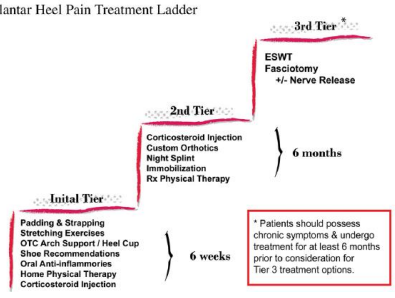
- Plantar heel pain associated with: lower maximum force beneath heel and medial forefoot, greater mid/forefoot contact time (Sullivan et al, Gait Posture 2015)
- Gait cycle breakdown/ plantar fascia considerations:
  - IC and LR: shock absorption
    - More lateral loading = less dampening of GRFs
  - MS: pronation
    - Midfoot stiffness prevents 'unlocking' of transverse tarsal segments
  - TS, PS: supinate, become rigid for toe off
    - PF 1st ray doesn't extend as well

Clinical Practice Guideline

The Diagnosis and Treatment of Heel Pain: A Clinical Practice Guideline–Revision 2010

James L. Thomas, DPM [1], Jeffrey C. Christensen, DPM [2], Steven R. Kravitz, DPM [3], Robert W. Mendicino, DPM [4], John M. Schuberth, DPM [5], John V. Vanore, DPM [6], Lowell Scott Weil Sr, DPM [7], Howard J. Zlotoff, DPM [8], Richard Bouché, DPM [9], Jeffrey Baker, DPM [10]

Plantar Heel Pain Treatment Ladder



J.L. Thomas et al. / The Journal of Foot & Ankle Surgery 49 (2010) S1–S19

Physical Therapy Treatment

- A lot of options…
  - Joint mobilization/manipulation, soft tissue
  - Gastroc, soleus, plantar fascia stretching
  - Exercise
    - Pes planus – strengthen intrinsics, proximal segments; mid/lateral loading v. medial overloading
    - Pes cavus – exercise emphasizes load dispersion, medial loading v. lateral overloading
  - Education
  - Orthotics/Inserts, Night splints?
  - Modalities: TDN? Ionto? LLLT? ESWT? Taping? Ultrasound?

Predictors of Response to Physical Therapy Intervention for Plantar Heel Pain

Foot & Ankle International
2015, Vol. 36(4) 408–416
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DOI: 10.1177/1071100714558508
fai.sagepub.com

Shane M. McClinton, DPT, FAAOMPT[1,2], Joshua A. Cleland, PT, PhD[3], and Timothy W. Flynn, PT, PhD[4]

- 6 visits over 4 weeks: MT + exercise v. electrophysiological agents + exercise
- Individuals with symptoms < 7.2 months were 4.2-8.5 times more likely to respond (depending on success criteria)
- Age and BMI not significant predictors to success

The symptomatic and functional effects of manual physical therapy on plantar heel pain: a systematic review

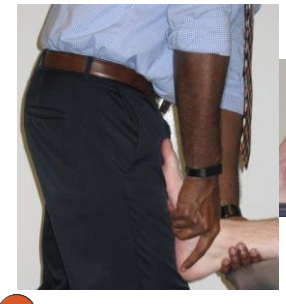
John J. Mischke[1], Dhinu J. Jayaseelan[2], Josiah D. Sault[3], Alicia J. Emerson Kavchak[3]

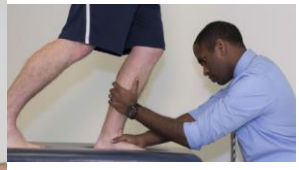
[1]Department of Physical Therapy, University of Montana, Missoula, MT, USA, [2]Department of Physical Therapy and Health Care Sciences, The George Washington University, Washington, DC, USA, [3]Department of Physical Therapy, University of Illinois at Chicago, Chicago IL, USA

- 1248 articles screened, 8 RCTs included in analysis
- 4 scored 6/10 or more on PEDro, others low quality
- *Manual therapy associated with improved outcomes in pain and function compared to comparative group/control*
- MT: joint treatment, soft tissue, neural mobilization

TCJ Distraction (thrust/non-thrust)

Talocrural AP Glide





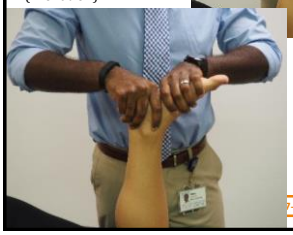
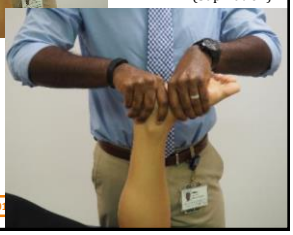
Subtalar Glides

(Lateral) (Medial)


Non-specific Midfoot Pronation/Supination Mobilization

(Neutral)

(Pronation) (Supination)

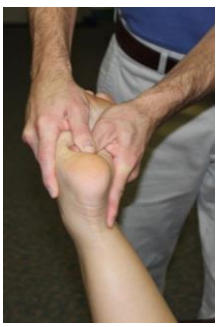
Plantar Glides with M→L Rotation

Navicular on Talus, Cuboid on Calcaneus

Medial Cuneiform on Navicular


Dorsal Cuboid Whip Manipulation





1st MTP Plantar Glide

(indicated for limited extension)

Soft Tissue Mobilization

Fig. 2. Deep massage to calf muscles using elbow.

Fig. 1. Technique of deep muscle massage.

"The angle of your hands guides your depth" – Jim B.

(Superficial)

(Deep)

TrP Release

Flexibility for Runners

Jeffrey Jenkins, MD[a,*], James Beazell, PT, DPT, OCS, ATC[b]

Clin Sports Med 29 (2010) 365–377

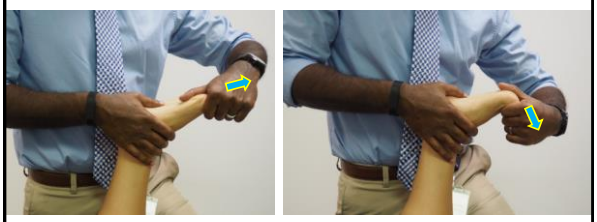
Plantar Fascia-Specific Stretching Exercise Improves Outcomes in Patients with Chronic Plantar Fasciitis

A Prospective Clinical Trial with Two-Year Follow-up

By Benedict F. DiGiovanni, MD, Deborah A. Nawoczenski, PhD, PT, Daniel P. Malay, MSPT, Petra A. Graci, DPT, Taryn T. Williams, MSPT, Gregory E. Wilding, PhD, and Judith F. Baumhauer, MD

- n = 82, mean symptom duration > 10 months
- All subjects received pre-fab soft insoles (Spenco), 3 wk course of Celebrex, and an educational video on PF
- PF stretching v. Achilles tendon stretching
- At 8 weeks, PF stretching superior to WB achilles stretching for pain, activity limitations, pt satisfaction
- No sig. difference at 2 yr f/u

1st MTP Extension and Ankle DF Mobilization with PF STM



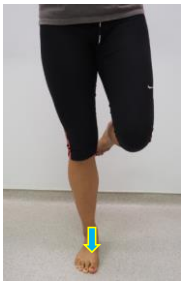
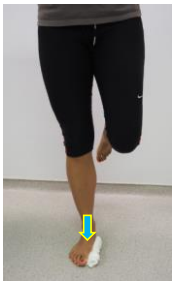
Scand J Med Sci Sports 2015: 25: e292–e300
doi: 10.1111/sms.12313

High-load strength training improves outcome in patients with plantar fasciitis: A randomized controlled trial with 12-month follow-up

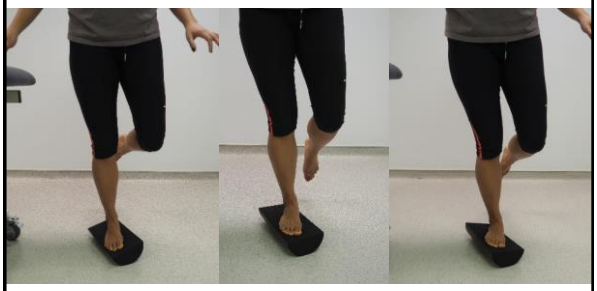
M. S. Rathleff[1], C. M. Mølgaard[2], U. Fredberg[3], S. Kaalund[4], K. B. Andersen[3], T. T. Jensen[4], S. Aaskov[5], J. L. Olesen[6,7]

- Plantar fascia specific stretching v. strengthening (single leg heel raises with towel under toes)
- 3x12 rep max progression → 10 rep max → 8 rep max every other day
- FFI 29 points lower at 3 mo in strength group
- No difference at 1, 6, 12 months

Motor Control
(WB Through Medial Column)

Controlled Pronation/Supination
(Unstable Surface)



Concentric Pronation, Eccentric Supination (with resistance)


- What are you going to reassess at subsequent visits?
  - VAS, pain with am steps, standing tolerance

PROGNOSIS/EXPECTATIONS

- How do you expect to progress your treatment over subsequent visits?
  - Motor control to become more dynamic, higher grade mobilization/manip, self-mobilization HEP

Associated factors for expected outcome:

- Favorable
  - Typical clinical presentation, low symptom irritability
- Unfavorable
  - Chronicity of symptoms

Possible referrals:

- Orthotist for custom inserts? Ortho for injection?

'Gap' in Knowledge

Patient or Population	Intervention	Comparison	Outcomes
Patients with plantar fasciitis	Manual therapy & exercise	Injection	Pain relief, functional status

- Article reviewed: Celik D, et al. Joint mobilization and stretching exercise vs steroid injection in the treatment of plantar fasciitis: a randomized controlled trial. Foot Ankle Int. 2016;37(2):150-6.
- Relevance to the clinical case: Both groups had significant improvement in FAAM and VAS in short term (3, 6, 12 wk) with greater improvement noted in injection group. Improvements continued from wk 12 through 1 yr for MT group only.

Clinical Pattern

Subjective	Objective
- Plantar heel pain - Overuse/insidious mechanism - Pain worse with first steps in am - Functional limitations: prolonged standing, running	- TTP at medial calcaneal tubercle - (+) Windlass test - Pes cavus - Joint stiffness and muscle length impairments - (-) neurodynamics