Plantar Fasciitis: What to Do With Refractory Patients

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Goals

- Basic science background - brief
- Diagnosis - really brief
- Treatment
  - Brief summary of treatment options
  - Discuss my approach to patients
Etiology

- **Acute (rare) - may occur from trauma**

- **Chronic**
  - Repetitive overloading of the plantar fascia (Kogler 95,96,99)
  - Tendonopathic & chronic enthesitic changes
    - Collagen degeneration
    - Fiber disorientation
    - Increased ground substance
    - Absence of inflammatory cells (Maffulli 03 & Yuan 03)
Key findings on history & exam

- Worse pain with 1st AM steps
  - Pain after prolonged non-weight bearing
- Pain with barefoot walking
- No symptoms & signs of neurologic involvement
- Pain & tenderness over plantar fascia origin
- Windlass test
- Sensitivity 13.6%; Specificity 100%
- Weight-bearing windlass
  - Sensitivity 31.8%; Specificity 100%

(DeGarceau 2003 Foot & Ankle Intl)
## Treatment options

### “Traditional”
- Stretching & strengthening
- Modalities
- NSAIDs
- Cortisone
- Night splints & walking boots
- Foot wear, orthotics, heel cups & arch supports
- Surgery

### “Newer”
- Deep tissue techniques
- Extracorporeal & intracorporeal shock wave
- Prolotherapy, PRP, botox autologous blood injection
- Nitroglycerin patches
- Nerve ablation – cryo & RF
My approach

- Relative rest
- Stretching
  - Consider night splint
  - Physical therapy
    - Strengthening?
- Arch support
  - Check shoes
  - Arch taping
  - OTC
  - Orthotic
- Patience

- Adjunctive
  - Acetaminophen
  - NSAIDs
My approach, continued

- More patience
- For chronic or those who like intervention
  - Injection
    - Autologous blood vs. PRP vs. cortisone
  - ECSW
  - Surgery
Panel comments
Any questions?
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References


- De Garceau D, Dean D, Requejo SM, Thordarson DB. The association between diagnosis of plantar fasciitis and Windlass test results. Foot Ankle Int. 2003;24:251-5. (PMID:12793489)


Ibrahim MI, Donatelli RA, Schmitz C, Hellman MA, Buxbaum F. Chronic plantar fasciitis treated with two sessions of radial extracorporeal shock wave therapy. Foot Ankle Int. 2010;31:391-7. (PMID:20460065)


Epidemiology

- 2 million person/yr in US
- 1 million patient visits/yr
- 3rd most common injury in runners
- Cost of treatment to third-party payers ranged from $192-376 million in 2007 in USA

(Riddle 2004, Tauton 2002, Tong 2010)
Radiologic studies

- Plain x-rays - only useful to r/o other conditions
  - Heel spurs 2x more likely in pt with PF

- MRI or Dx UTZ
  - Both show increases in fascia thickness in PF of 1.5 - 1.9 mm
Differential diagnosis

- Plantar fascia rupture
- Calcaneal fracture
- Calcaneal apophysitis
- Heel fat pad syndrome
- Longitudinal arch strain
- Nerve entrapment
- Tumor
Modalities

- Studies including ultrasound, laser, magnetic fields
- Overall - no significant improvement
- When to use
  - Resistant cases
  - Speed is of essence
**NSAIDs**

- A randomized, PC study of 29 patients
  - 17 on placebo and 12 on NSAIDs
- Both groups improved at the 1, 2 & 6 month follow-up
  - Trend toward improved pain control & disability in the NSAID group
- Significant improvements overall in both groups.

*(Donley 2007 Foot Ankl Intl)*
Corticosteroid injection

- Short term benefits

- Risks/side effects
  - Pain
    - Post-injection flare (2-5%)
  - Infection
    - 0.072% with aseptic technique
    - 0.0001% with sterile technique
  - Bleeding
  - HPA suppression

Gray 1983
AAOS orthopaedic surgeons survey re: cortisone

- 90% use cortisone
  - 73% injected plantar fascia in past yr
- 89% observed complication
  - Subcutaneous fat atrophy (64%)
  - Skin atrophy & pigment changes (54%)
  - Tendon rupture (39%)
  - Cartilage damage (20%)
  - Infection (18%)

Fadale & Wiggins 1994 J Am Acad Ortho Surg
Is a 3-phase bone scan a cortisone success prognosticator?

- 14/20 feet responding to injection had focal hyperemia on the blood-pool images
- None with diffuse uptake on the blood-pool images responded.

(Frater 2006 J Nuclear Med)
Injecting cortisone

- Dose
  - ~ 40 mg of methylprednisolone
  - ~ 1 cc of most corticosteroid preparations
  - + 2 cc anesthetic
  - 25 gauge 1.5” needles
Plantar fascia injection technique #1

- **Advantage**
  - Easy to hit target

- **Disadvantages**
  - Increased risk of heel fat pad atrophy
  - Increased risk of plantar fascia rupture?
Plantar fascia injection technique #2

- **Advantages**
  - Decreased risk of heel fat pad rupture
  - Decreased risk of plantar fascia rupture?

- **Disadvantages**
  - Greater chance of missing target
  - Less effective?

- Ultrasound guidance?
Night splints

- Multiple trials including crossover and RCT show significant improvement
  - 4 positive; 1 no effect
Walking boot?

- Pilot study 16 subjects in randomized single blinded study
- Stretching vs. “SAS brace”
- No difference
- Sharma NK. 2010
Arch support

- Both taping & orthotics show increases in function &/or decreases VAS in most studies
  - 5 positive; 1 no effect
Orthotics vs. night splints

- RCT of 43 patients to foot orthosis, foot orthosis and night splint, or night splint alone.

- All patients had significant improvement on their Foot and Ankle Outcome Scores at 12 week and 1 year follow-up visits.

- The foot orthosis had significantly
  - better pain reduction
  - better compliance
  - fewer side effects.

(Roos 2006 Foot Ankle Intl)
Treatment

- Do nothing
  - Most/many patients in control group of RCT eventually heal

- Key is proper framing

- Rest, ice, stretching, cross-friction massage
Shoe exam

- Beware of midshoe breakdown
- If shoe bends easily midsole instead of at MTP joint
  - Cause overstretch of the plantar fascia with each step
Surgical

- Risks
  - Infection, bleeding, pain
  - Scarring, nerve damage
  - Loss of arch
Surgical release

- Retrospective review of 22 consecutive patients with chronic plantar fasciitis & endoscopic plantar fascia release after at least 6 months postoperatively
  - Satisfaction rate of 97.7%
  - All patients reporting at least a 50% improvement in pain.
  - Modified Mayo Foot and Ankle Score, 15 of 22 (68%) had good or excellent results

(Hogan 2004 Foot & Ankle Intl).
Surgical release

- 32 patients endoscopic plantar fasciotomy.
  - 16 athletic patients all had results were excellent or good.
  - Good or excellent results in the non-athletic group were obtained only in patients who walked for exercise.
  - All five patients with poor results having a BMI of more than 27.

(Saxena 2004 Foot & Ankl Intl)
Long term effects

- Change in center of pressure in gait analysis compared to non-operated foot (Tweed JL 2009)
“Newer” treatments
Deep tissue techniques

- A.R.T., ASTYM & Graston
- Theory
  - Mechanical breakdown of scar tissue
  - Stimulate healing cascade
Extracorporeal shock wave therapy (ECSW)

- High energy shock waves generated
- Mechanical pressure & tension force plus trailing cavitation bubbles which collapse into "micro-jets"
  - Both induce microtrauma
    - Induces blood vessel formation
      - Increased delivery of nutrients
      - Increased dissolution of calcific deposits
Low-energy shock wave
- Series of three or more treatments.
- Minimal to mildly painful

High-energy shock wave
- Single session.
- Quite painful - require anesthesia (regional block or general)

Theory is to induce neovascularization & healing via creating localized inflammatory process
## ECSW study results

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Intracorporeal pneumatic shock application

- 50 patients in RCDB study
- 6 month follow-up
  - Excellent & Good outcomes (92%) vs. control group (24%) ($P < 0.001$)
  - VAS were 2.04 in treatment group vs. 7.16 control group

- Dogramaci Y. Arch Orthop & Trauma Surg 2010
Prolotherapy – the theory

- Proliferates cause local irritation triggering inflammatory cascade
  - Irritants (phenol, tannic acid) & particulates (pumice granules)
  - Osmotic agents (zinc sulfate, dextrose, glycerin)
  - Chemotactic attracters (cod liver extract/sodium morrhuate)
Prolotherapy – the evidence

- Limited & mixed
- Side effects – short-term stiffness & pain
- Not usually covered by insurance

(Ryan 2009) - Dextrose 3 tx q 6wk in 20 patients; G+Ex in 75% no change in 25%
Autologous blood injection (also enriched platelet plasma)

- Rationale: stimulate acute healing cascade
- Via cellular and humoral mediators
- Procedure: 2cc of blood + 1cc lidocaine
Autologous blood injection

- RCT 44 patients treated with either autologous blood injection or methylprednisolone acetate.
- At the 6-month follow-up, both groups had similar significant decreases in VAS pain scores.

Kiter 2006 Am Pod Med Assoc
Autologous blood injection

- 16 patients
  - Pain decreased from 7.13 to 2.75.
  - Nirschl activity staging scale decreased from 6.19 to 2.88.
  - 62% were able to resume strenuous activity
    - 70% that returned to strenuous activity could do so without pain.
  - Nineteen percent reported no response to blood injection

Platelet rich plasma (PRP)
Platelet rich plasma (PRP)
Botox injection

- **Theory**
  - Abductor hallucis & FHB are the injection sites.
  - Increases flexibility of the plantar musculature.

- Mostly case reports

- *(Babcock 2005)* RCT Botox vs. Saline significant improvement in Pain @ 3 & 8 wks

- *(Huang 2010)* RDBC significant improvement in pain & decrease in PF thickness @ 3 & 12 weeks
Nitroglycerin patches

- **Theory**
  - Dilates blood vessels leading to increased blood flow
  - Increases levels of nitric oxide, which may stimulate healing

- **Treatment regimen**
  - 1/4 patch 0.2 mg/hr for 18-24°
  - 4/6 to 12+ week course

- **Side effects – headache**

Paolini 2007, McCallum 2011
Cryosurgery: percutaneous denervation

- 61 cases of chronic plantar fasciitis.
- Mean VAS 8.38 to 1.26 after 1 day
- After 1 year
  - Mean VAS score was 1.26
  - 32 heels being totally asymptomatic
  - 90% having a VAS score < 4.
  - Three patients eventually needed surgery

(Allen 2007 J Foot & Ankl Surg)
Radiofrequency nerve ablation

- 22 patients
- VAS 8.12 initially
- 3.26 after 1 week
- 1.46 1 month
- 1.96 3 months
- 2.07 6 months
- No further changes at 1 year
- Liden B 2009
Prevention

- Primary
  - Congenital
    - Hypermobile medial column cavus
    - Pronation of subtalar joint
    - Low medial longitudinal arch
    - Equinus foot
    - Weak intrinsic foot muscles

- Secondary