

COMMON SPORTS INJURIES OF THE FOOT AND ANKLE

J. Michael Wieting, D.O., FAOCPMR, FAAPMR

**Professor, Department of Physical Medicine and
Rehabilitation**

Consultant in Athletic Medicine

Michigan State University

College of Osteopathic Medicine

**Medical Director, The Rehabilitation Center, Ingham
Regional Medical Center**

OBJECTIVES

1. To review epidemiology, diagnosis, and treatment of commonly encountered sports related foot and ankle injuries, including Achilles tendonitis, ankle sprain, and plantar fasciitis
2. To focus on role of manual medicine in the treatment of commonly encountered sports related foot and ankle conditions
3. To outline return to play considerations for these commonly encountered sports related foot and ankle conditions

ACHILLES TENDONITIS

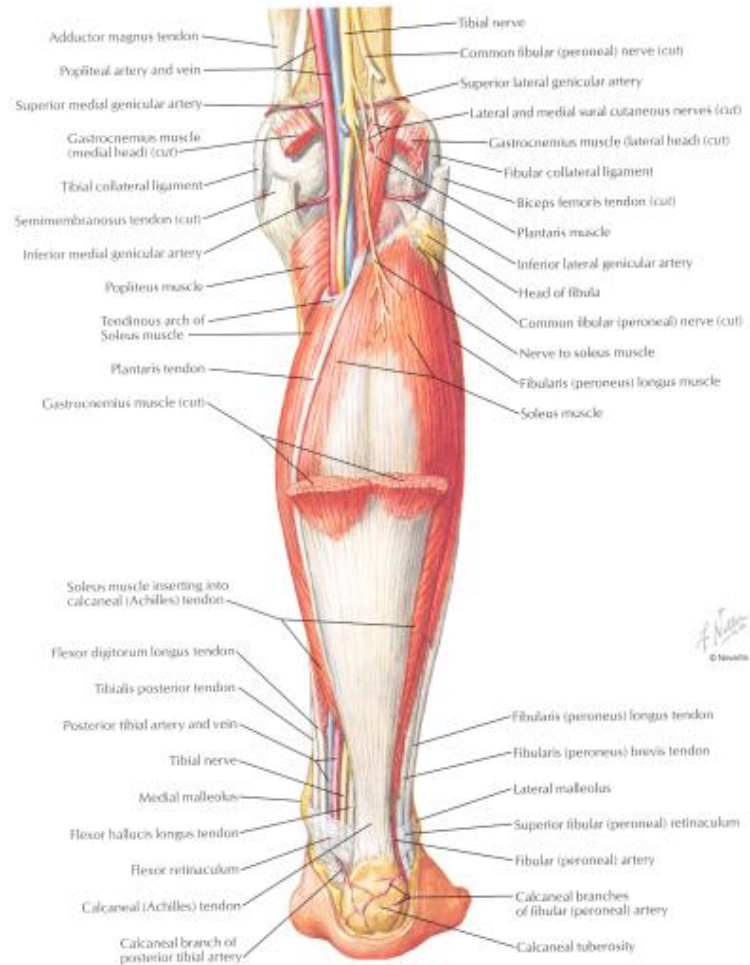
- 65% of all overuse running injuries
- Can occur in any sport involving running or fast direction changes
- Usually begins as inflammatory reaction around Achilles tendon/paratenon (surrounds tendon, not a true synovial sheath)
- Microtears, mucoid degeneration, longitudinal fissuring and scarring develop if not aggressively treated

– Clement, et. al. Am. J. Sports Med. 12(3), 179-184

ACHILLES TENDONITIS

(cont'd)

- Achilles tendon = true conjoined tendon of gastrocnemius and soleus muscles
- Blood supply is from its own anterior mesentery
- Least vascular and most injured area is 2-6 cm. above the tendon insertion on the os calcis
- Usually can withstand 2000 lb. during running
- Prone to degeneration due to tenuous blood supply



F. Netter
© Newell

ACHILLES TENDONITIS

(cont'd)

- Although most patients feel they have acute inflammation (tendonitis), they often have chronic problem (tendonosis) where asymptomatic intratendinous degeneration has occurred over time.
 - Leadbetter. Clin. Sport Med. 11:533-78

TENDONITIS AND RUPTURE

- **Associated (rare) with fluoroquinolone antibiotic and systemic steroids**
 - DelaGarza, et al. Arch. Med. Res. 1997 (429-430)
 - Casparian, et al. South. Med. J. 2000 (488-91)
 - Kissel, et al. J. Foot Surg. 1991, 390-97

TENDONITIS AND RUPTURE (cont'd)

- **Most commonly associated with running**
 - ◆ Kannus, et al. Age Aging. 1989; 18:263-70
- **Etiology is multifactorial**
- **Most common cause is overuse**
 - ◆ Josca, et al. Am. J. Sports Med. 1989; 17(3), 338-43
- **Also associated with rapid increase in mileage, increased interval training, running downhill or sloping hills**

DIAGNOSIS OF ACHILLES TENDONITIS

- Symptoms

- Shooting pain, sudden onset, after increased activity

- Signs

- Pain, usually focal, along tendon proximal to os calcis (2-6 cm. above)
- If chronic, very painful thickening or irregular contour

6 S's OF RUNNING INJURIES

Shoes = abnormal wear in tread or shoe

Surface = running surface – firmness and topography

Speed = sudden increase in speed or distance

Stretching = poor or excessive mobility

Strength = muscle strength, imbalance

Structure = anatomic malalignment or somatic dysfunction

- Brennan, et al. in Karageanes, SV. Principles of Manual Sports Medicine Lippincott, 2005.

ACHILLES TENDONITIS

(cont'd)

Treatment

- PRICE
- Decrease inflammation
- Aggressive stretching of gastroc/soleus complex
- Strengthening with stretching to improve tendon's ability to withstand repetitive load & length changes

ACHILLES TENDONITIS

(cont'd)

- Eccentric strengthening esp. of plantar flexors
 - based upon length, load, and speed
- Stretching
 - increase length of muscle – tendon unit
 - reduces strain with joint movement
- Increase load to myotendon unit
 - increases its tensile strength
- Increases speed of contraction
 - to increase contractile force.

Fyfe, et al. Clin. Sports Med. 1992 (11) 3, 601-24.

Galloway, et al. Clin. Sports Med. 1992; 11: 771-82.

PREDISPOSING FACTORS

- **Change from padded heeled training shoes to competition shoes without heels.**
- **Plantar fasciitis (compensation with ankle dorsiflexion to avoid pronation with pain)**
- **Uphill or downhill running**
- **Soft running shoe heel counter causing tendon to twist**

ACHILLES TENDONITIS

(cont'd)

- Heel lifts (early and short term, to avoid heel cord shortening)
- Heel pad – to decrease tendon stretching
- Better heel counter in shoe to limit side to side shifting and tendon irritation
- Cryotherapy
- Ultrasound – in chronic cases to loosen old scarred connective tissue
- Reducing weight-bearing activity
- Air cast or pneumatic brace to protect ankle and keep heel in neutral
- Wobble board exercise to stimulate proprioception
- Sport specific progressions esp. in single leg stance to increase normal motor patterns and control of the lower limb

Treatment of Achilles Tendonitis

Direct Techniques

- Muscle energy
- HVLA

Typical Dysfunction

- Plantarflexed talus
- Anteromedial talus
- Posterolateral talus
- Cuneiform depression
- Navicular inversion

ANKLE SPRAINS

- Ankle is most common site for musculoskeletal injury
- Ankle sprains make up 75% of musculoskeletal injuries
- Most common in sports involving running, jumping (football, basketball, tennis, soccer, gymnastics)
 - Malanga, et al. in PM&R: Principles and Practice Lippincott, 2005

ANKLE SPRAINS (cont'd)

- Most common ankle injury involves lateral ligament complex (80-85% of all ankle sprains)

DeLisa, PM&R: Principles and Practice Lippincott, 2005

- Symptom = sudden onset lateral ankle pain from mis-step or “turning over” of ankle
- Signs = immediate swelling, local tenderness, signs of hemorrhage, joint laxity, weight-bearing intolerance variable

ANKLE SPRAINS (cont'd)

- Grade I = mild sprain of anterior talofibular ligament (no loss of ligament continuity) with negative ankle drawer and talar tilt test
- Grade II = disruption of anterior talotibular ligament with positive ankle drawer test and negative talar tilt test (partial tear with laxity, end point present)
- Grade III = disruption of lateral ligament complex with positive ankle drawer and talar tilt test (complete ligament rupture with no end point)
 - DeLisa, PM&R: Principles and Practice Lippincott, 2005

ANKLE SPRAIN -EVALUATION

- Risk factors

Previous ankle sprain or use of ankle brace

- History

Stepping onto uneven surface with resultant plantar flexion and inversion

- Examination

- Check uninjured side first to assess laxity

- Local swelling and ecchymosis – quickly

- Tender to palpation, esp. laterally

- Limited range of motion

- Antalgic gait

- If swollen entire joint = consider fracture or serious intra-articular injury

ANKLE SPRAIN – EVALUATION (cont'd)

- Fibular head tenderness = consider fracture (Maisonneuve fracture)
- Check for 5th metatarsal fracture
- If side to side difference on anterior drawer test is over 5 mm or talar tilt of over 10 degrees – consider grade III injury
 - Title, et al. Orthop. Clin. N. Am. 2002, 33 (3), 587-599





R
KPM



ANKLE SPRAIN – EVALUATION (cont'd)

- Check the foot for injuries to the midfoot, navicular, talus, malleoli, and peroneal and Achilles tendons
- Check for abnormal hip extension and rotation, SI involvement (innominate shear), or lumbar dysfunction
- X-rays: AP, lateral, mortise view to find fractures
 - Stress views have no role in acute setting and are not helpful in predicting future function
 - Wolfe, et al. Am. Fam. Physician 2001, 93-104
 - Title, et al. Orthop. Clin. N. Am. 2002, 33 (3), 587-599

TREATMENT

- I. Pain control (ice, NSAIDs) and relative rest
 - Compression and elevation (taping)
 - Proper weight-bearing (crutch, walking boot)
- II.
 1. Non weight-bearing exercise
 2. BAPS proprioceptive training.
 - ◆ A randomized prospective trial involving 1127 volleyball players has suggested that proprioceptive balance board training may be effective in reducing recurrent, not first, ankle sprains.
 - Verhagen, et. al. Am J Sports Med. 2004, Sept (1385-1394)
 3. Ankle strengthening (alphabet drawing, isometrics)
 4. Gait (to tolerance) training
 5. Joint mobilization

TREATMENT (cont'd)

III.

1. Single leg balance
2. Heel to toe raises
3. Pronation and supination exercise
4. Sagittal plane exercise
5. Manual resistive isotonic
6. Concentric and eccentric ankle strengthening

IV.

1. Agility drills
2. Heel and toe walk
3. Sport specific training
4. Manual PNF

Karageanes, SV. Principles of Manual Sports Medicine.
2005

MANUAL MEDICINE

- First, rule out fracture and intra-articular injuries
- Direct techniques
 1. Talar mobilization – talus gets mal-aligned with ankle PF and inversion. Restores motion and releases restricted lymphatic and venous fluid (HVLA or ME)
 2. Cuboid release – calcaneocuboid joint dysfunction can result from increased tension along plantar fascia with excessive pronation (HVLA or ME)

MANUAL MEDICINE

(cont'd)

3. Fibular Head Dysfunction (HVLA or ME)
 - Fibular head can be pulled posteriorly by stretched and contracted peroneus muscles
4. Ipsilateral rib dysfunction (HVLA, ME)
due to reflex muscle contraction when attempting to recover balance while falling

MANUAL MEDICINE – Indirect Technique

- Lymphatic Pump – to improve impaired venous and lymphatic drainage
- Soft Tissue release for eccentric load to the ankle from peroneus muscles stretching and then contracting to evert the ankle in response to inversion and PF
 - Karageanes, SV. Principles of Manual Sports Medicine. 2005

MANUAL MEDICINE

(cont'd)

Return to play – Can be hard to decide

1. Full active ROM
2. Little to no swelling
3. Ankle strength at 90% of uninjured one
4. Painless hopping and toe raises
5. Painless sports specific drills
6. Proprioception intact

TURF TOE

- Most common in football, esp. offensive linemen, defensive backs, and receivers
- Sprain of first MTP joint capsule
- Hyperextension – from unforgiving and stiff playing surface (esp. artificial turf)
- Also associated with other forces (other players falling on athlete, for example)
 - McKeag and Hough. Primary Sports Medicine. Brown and Benchmark 1993

TURF TOE (cont'd)

Examination

- Pain at MTP joint and with weight-bearing, esp. during “push off” in running
- Decreased ROM

TURF TOE (cont'd)

Treatment

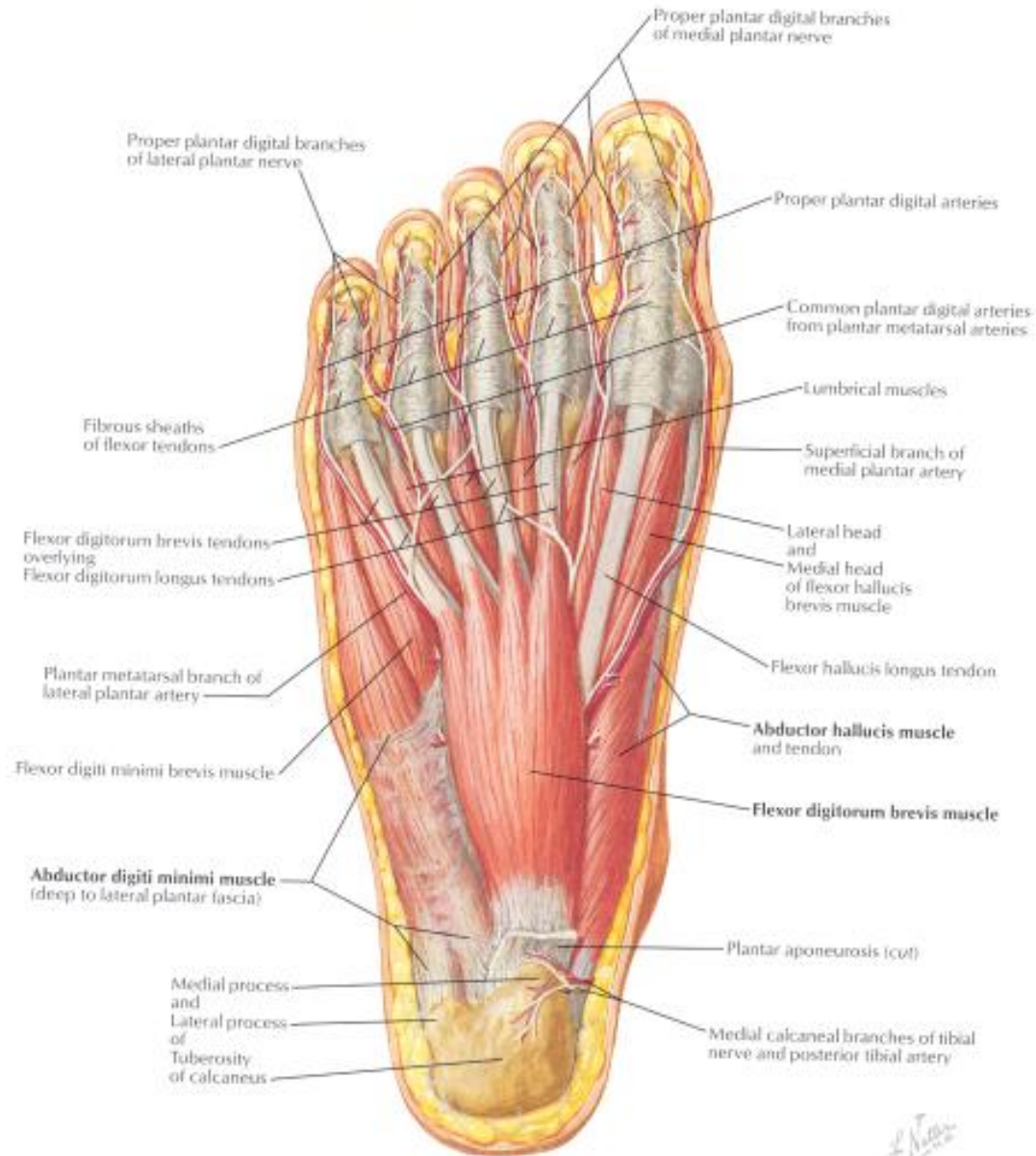
- PRICE
- Tape to limit joint motion
- Long rigid shoe orthotic
- Use firmer shoe
- First metatarsal splint
- Corticosteroid

PLANTAR FASCIITIS

- **The most common cause of heel pain in sports medicine**

McKeag and Hough. Primary Sports Medicine. Brown and Benchmark 1993

- **Plantar fascia runs across medial foot from medial calcaneus to the metatarsals to maintain the medial arch of the foot**
- **Most authorities feel main pathology is around the calcaneal attachment of the plantar fascia and FDB muscle, both of which attach inferior to calcaneal spur**



PLANTAR FASCIITIS

(cont'd)

Causes

- Cause is felt to be soft tissue tightness, weakness of soleus, tibialis anterior and posterior and inflammation and/or microtearing near the origin of the plantar fascia
- Sudden loading of the feet and inflammation or insidious irritation from repeated overload are thought to be causative

PLANTAR FASCIITIS

(cont'd)

Predisposing Factors

- Pronated foot with high longitudinal arch
- Tight Achilles tendon mechanism
- Hypermobility pes planus
- Cavus foot
- Change in distance or time, shoes

Signs

Pain to palpation of anterior medial calcaneus

PLANTAR FASCIITIS

(cont'd)

Symptoms:

- Heel and plantar foot pain, worse with first arising in a.m. or after period of inactivity

Examination:

1. Focal tenderness of plantar fascial origin at medial calcaneous and along plantar arch
2. Pain elicited by hyperdorsiflexion of the great toe with palpation along plantar fascia

PLANTAR FASCIITIS

(cont'd)

3. Associated tightness of gastroc-soleus complex
4. Weakness of soleus and possibly tibialis anterior and posterior

Imaging

- Plain films may reveal calcaneal traction spur (60% of the time) which is a sign of plantar fascia overload, not a cause of symptoms
- Plain films are not necessary for most patients

PLANTAR FASCIITIS

(cont'd)

Treatment

1. NSAIDs or analgesics
2. Aggressive stretching
3. Heel pad and/or night splint (soft – at 90° DF) for passive prolonged stretch of plantar fascia
4. Strengthening of gastroc, soleus, tibial and foot intrinsic muscles to restore dynamic stability of arch, foot, and ankle joints
5. Taping arch support
6. Consider ¼ inch heel lifts
7. Closed chain activities (mini-trampoline, jumping, hopping, squats)
8. Emphasize control of entire leg; one-legged stance is key to distributing loads over entire leg; hip abduction exercises

Kibler et al. Functional Rehabilitation of Sports and Musculoskeletal Injuries. Aspen, 1998

PLANTAR FASCIITIS

(cont'd)

9. Steroid injection may be helpful
(consider steroid necrosis of calcaneal fat pad)
10. Surgical release of plantar fascia as last resort
11. Manual Medicine
Counterstrain to plantar fascia – to loosen tight and fibrotic plantar fascia

PLANTAR FASCIITIS

(cont'd)

10. Emergency treatments for refractory cases
 - a. Extracorporeal shock wave therapy – for proximal plantar fasciitis
 - b. Botulinum toxin
11. Prevention
 - a. Exercises for strengthening foot and ankle
 - b. Towel grasp, marble pick-ups, toe raises
 - c. Stretching of gastroc, soleus, anterior and posterior tibialis, plantaris, EHL, and plantar fascia

PLANTAR FASCIITIS

(cont'd)

12. Other caveats

- Can take weeks to months to completely resolve, especially in chronic cases
- Rule out tarsal tunnel syndrome

RETURN TO PLAY CONSIDERATIONS

1. Heel and arch are pain free
2. Appropriate plantar fascia flexibility
3. Normal lower leg strength
4. Pain free running
5. Psychologically ready for competition

De la Garza, et al. Arch. Med. Res. 1997; 28 (3); 429-30

SUMMARY

1. **These conditions are all very common and easier to treat in the acute phase**
2. **Manual medicine is usually a valuable adjunct to treatment**
3. **Treatment is optimal if it involves multifaceted effort of a team including:**
 - **physician**
 - **ATC, PT**
 - **athlete**
 - **coach**
4. **Conservative care, in the province of primary care physicians, is almost always sufficient for complete symptom resolution; however, in refractory cases, specialized care may be needed**

REFERENCES

1. Casparian, JM, et al. South Med. J. 2000; 93 (5), 488-91.
2. Clement, DB, et al. Am. J. Sports Med. 12 (3), 1984.
3. De la Garza, EVA, et al. Arch. Med. Res. 1997; 28 (3), 429-30.
4. DeLisa, JA (Ed.). Physical Medicine and Rehabilitation: Principles and Practice (4th ed). Lippincott, Williams and Wilkins, 2005.
5. Fyfe, WD, et al. Clin. Sports Med. 1992; 11 (3), 601-24.
6. Galloway, MT, et al. Clin. Sports Med. 1992; 11; 771-82.
7. Josca, L., et al. Am. J. Sports Med. 1989, 17 (3), 338-43.
8. Kannus, P., et al. Age Aging 1989; 18: 263-70.
9. Karageanes, SV. Principles of Manual Sports Medicine. Lippincott, Williams and Wilkins, 2005.
10. Kibler, WB, et al. Functional Rehabilitation of Sports and Musculoskeletal Injuries. Aspen, 1998.

REFERENCES (cont'd)

11. Kissel, CG, et al. J. Foot Surg. 1991; 30 (4): 390-97.
12. McKeag DB, Hough DO. Primary Care Sports Medicine. Brown and Benchmark, 1993.
13. Title, CI, et al. Orthop. Clinic N. Amer. 2002; 33(3): 587-599.
14. Wolfe, MW, et al. Am. Fam. Physician. 2001; 63; 93-104.