Foot and Ankle Tendinopathies
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Most Common Types of Tendinopathy Affecting the Foot and Ankle

Achilles
Peroneal
Achilles Tendinopathy

• Terminology: confusing?
  – Tendinitis, Tendonitis, Paratenonitis, Tendovaginitis, Tenosynovitis, Achillodynia
  – Definition: Umbrella term for disease of a tendon (tendonitis/tendinosis)
  – Suggested that pain, swelling, and impaired performance be labeled “tendinopathy”
  – Tendonitis → Tendinosis
Achilles Tendinopathy

• “Tendonitis” is often used to depict tendon pain and swelling, inflammatory cells are infrequently seen except with tendon rupture
• Many clinicians use term tendonitis to describe what is actually a tendinosis
• Tendinosis is a degenerative process without histological or clinical signs of inflammation within the tendon
Achilles Tendinopathy

- Anatomy: Achilles forms at the junction of the medial and lateral gastrocnemius and soleus muscles and inserts into the posterior calcaneus
  - Surrounded by the paratenon
  - The mesotenon (middle layer) - the main blood supply
  - Blood flow lowered during contraction and can cease completely
Achilles Tendinopathy

• Anatomy cont:
  – Tendons transmit force generated by muscle to bone
    • Tensile strength is related to thickness and collagen content
    • Cross sectional area of 1sq cm can support 500-1000 kg
    • Loading of the Achilles reaches 9 kN during running ~ 12.5 x’s the body weight and 2.6 kN during slow walking
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• Histology of biopsied tendon:
  – Reveals cellular activation and increases in cell numbers and ground substance, collagen disarray, and neovascularization
  – Prostaglandin inflammatory elements are not present but substance P has been isolated
Achilles Tendinopathy

• Etiology
  – Tendon injury: acute versus chronic
  – Acute: extrinsic factors predominate
  – Chronic: intrinsic and extrinsic factors interact
  – Intrinsic factor: tendon vascularity, gastroc-soleus dysfunction, age, gender, body weight and height, pes cavus, lateral ankle instability, excessive pronation (whipping action on the Achilles), forefoot varus
Achilles Tendinopathy

• Etiology cont:
  – Extrinsic factors: changes in training pattern, poor technique, previous injury, footwear and training on hard, slippery or slanted surfaces
  – Excessive loading of tendons during training is the #1 stimulus for degeneration
  – Age: molecular properties of collagen, decreased water content and decrease in vascularity, Achilles becomes weak and stiff, the older athlete needs a stretching program
Achilles Tendinopathy

• Etiology cont:
  – Fluoroquinolones: affects tendon at a cellular level
Achilles Tendinopathy

- **Presentation**
  - Pain: initially at the beginning and end of a training session and lessened pain in between
  - Later: pain during exercise and then interference with ADLs
  - Acute phase the tendon is swollen and edematous
  - Chronic phase a tender nodular swelling present and is believed to be tendinosis
Achilles Tendinopathy

• Presentation cont:
  – Post static dyskinesia
  – Inability to wear a closed shoe
Achilles Tendinopathy
Achilles Tendinopathy

- Zones of involvement
Achilles Tendinopathy

- Zone 1
  - Tendinitis
  - Tendinosis
- Zone 2
  - Retrocalcaneal bursitis
- Zone 3: spur causes pain?
  - Tendinitis
  - Tendinosis
Achilles Tendinopathy

- Imaging
  - X-ray
  - Ultrasound
    - Quick, safe, inexpensive
    - Operator dependent, limited soft tissue contrast
    - Less expensive than MRI
  - MRI
    - Provides extensive information on the internal morphology and surrounding structures
    - Peritendinitis vs tendinosis
    - Good correlation between MRI findings and surgical findings
Achilles Tendinopathy

- Xray

Asymptomatic left

Symptomatic right
Achilles Tendinopathy

- Ultrasound

This grayscale ultrasound shows mid-portion Achilles tendinosis, demonstrating tendon thickening and hypoechoic areas.
Achilles Tendinopathy

- MRI pics
Achilles Tendinopathy

• Management
  – Conservative treatment is customary
  – Earlier treatment better outcome
  – Initial treatment
    • Activity modification- decrease activity at injured site but normal activity elsewhere
    • Correct training errors
    • Addressing muscle weakness
    • Correcting biomechanics
    • Complete rest could be detrimental since collagen repair and remodelling is stimulated by tendon loading
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• Management cont:
  – Cryotherapy in acute phase
  – Therapeutic ultrasound
  – Deep friction massage: advocated for tendinopathy along with stretching
  – Stretching and strengthening of the posterior muscle group
  – Eccentric muscle training
Achilles Tendinopathy

• Eccentric muscle training
  – Superior to concentric muscle training
  – More effective for mid substance tendinopathy vs. insertional tendinopathy
  – Some believe eccentric loading may lengthen the muscle tendon unit over time and increase its ability to bear load
  – ? Repetitive eccentric training may damage abnormal vessels and nerves in the tendon
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- Eccentric vs Concentric exercises pics
Achilles Tendinopathy

• Concentric stretching
  – Concentric exercise is done by toe raises with progressive weight applied
  – Eccentric (“negatives” in weight-lifting)
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• Management cont:
  – NSAIDS questioned due to absence of prostaglandin inflammatory mediators within diseased tendon, especially chronic
  – Corticosteroid injections: controversial due to concern of Achilles rupture, generally should be avoided
  – Others: ESWT (low and high energy), PRP
    • Investigational?
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• Management continued
  – Surgical management for those who fail an exhaustive non-operative program
  – Various surgical techniques have been used: most involve removal of inflamed or diseased tissue and decompression of mechanical pressure from the adjacent calcaneus (Haglund’s deformity / Exostosis)
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• Management cont:
  – Surgery
    • FHL transfer utilized if significantly diseased tendon present
    • Generally good results but can involve a lengthy recovery.
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- Surgery
  - Non-insertional
Achilles Tendinopathy

- Surgery
  - Insertional
Achilles Tendinopathy

- Surgery cont:
  - FHL transfer
Peroneal Tendinopathy

• Anatomy:
  – Located in the lateral compartment of the leg
  – Everters of the foot and ankle
  – Share the same sheath until the peroneal tubercle
  – Os peroneum present 10% to 20% of the time
  – Vascularity: watershed areas
    • P. brevis: fibular groove
    • P. longus: near the lateral malleolus and cuboid
Peroneal Tendinopathy

• Anatomy cont:
  – Accessory muscle: peroneus quartus
    • Can be pathologic

• Pic
Peroneal Tendinopathy

• Etiology
  – Overuse
  – Trauma
    • Severe ankle sprains, ankle fractures, ankle instability, s/p calcaneal fracture
  – Underlying biomechanics or structural abnormality
    • Pes cavus, anterior cavus, forefoot valgus, plantarflexed first ray, met adductus, rearfoot varus
      – Mechanical disadvantage
Peroneal Tendinopathy

• Presentation
  – Pain along the course of the peroneal tendons
  – Possible swelling
  – Ankle instability, decreased resistance to inversion forces
  – Pain lateral lower leg
Peroneal Tendinopathy

• Examination
  – Isolated muscle testing
    • Edema, warmth, thickening
  – Assess ankle stability
  – Snapping peroneals: may indicate subluxation
  – Biomechanical exam: heel position, forefoot valgus
Peroneal Tendinopathy

• Mechanism of injury
  – Usually occur from inversion or recurrent inversion injuries to the ankle
  – When the ankle sustains a sudden dorsiflexion with reflexive contraction of the peroneal muscles.
  – Inversion injury may injure the superior peroneal retinaculum causing laxity
  – Usually have lateral ankle instability
Peroneal Tendinopathy

• Peroneal brevis tears
  – Longitudinal tear most common
  – “bucket handle tear”
  – Low lying muscle belly: volume effect
  – Distal injury associated with 5th met fractures

• Peroneal Longus tears
  – Less common
Peroneal Tendinopathy

• Associated Pathology
  – Ankle Instability: if pain, look for peroneal tendon injury
  – Hindfoot varus
  – Hypertrophic peroneal tubercle: mechanical irritation of the tendons
Peroneal Tendinopathy

• Imaging
  – WB x-rays foot/ankle
  – Diagnostic US: operator dependant and learning curve
  – MRI: Standard imaging modality
    • Can be unreliable with false positive and false negative results reported
    • Magic angle phenomenon with tendon at 55 degree angle to the magnetic field
    • Rely on patient hx and clinical exam
Peroneal Tendinopathy

• Conservative treatment
  – NSAIDS: ? With tendinosis
  – Lateral heel wedge
  – Bracing
  – PT
  – Helpful more with tendonitis, not as successful for the treatment of tears, high failure rate
Peroneal Tendinopathy

• Surgical treatment
  – Tx of the acute/chronic tear of the peroneal tendon is largely surgical in the symptomatic patient
    • Once torn the likelihood of the pathology worsening is present and treatment options become more complicated
  – Extent of injury not known before surgical exploration
Peroneal Tendinopathy

• Surgical treatment
  – Repair based on surgical findings
    • Retinaculum inspected
    • Tendons inspected
    • Low lying muscle belly
    • Tears repaired, tendon tubularized
    • >50% diameter intact – degenerated portion excised
    • <50% - tenodesis performed
    • Os peroneum excision: P.L. under cuboid
Peroneal Tendinopathy

• Surgical treatment
  – Correction of ankle instability
  – Calcaneal osteotomy (calcaneal varus deformity)
  – Peroneal tendon dislocation
  – Lateral wall ostectomy
  – Dorsiflexory first met osteotomy
Peroneal Tendinopathy

• Outcomes
  – Reports on outcomes are largely retrospective reviews or case reviews
  – Difficult to recommend one treatment or another
  – Can be associated with a protracted recovery in terms of returning to athletics