

## Rehabilitation of the Foot & Ankle

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### OBJECTIVES

- Common F&A pathology
- Evidence-based treatment for conservative management of common F&A injuries
- Understanding the ageing foot
- Footwear and orthotic recommendations

### Common Injuries and Pathology

- Ankle sprains
- Osteochondral lesions
- Tendon lesions



### Ankle Sprains

Inversion



Eversion



Syndesmotic



High ankle sprain

1 in 10,000 will sustain an ankle sprain every hour in the United States  
40% of all sports injuries  
80% of all soccer injuries

### Recurrent Sprains & Chronic Ankle Instability

<p><b>Mechanical Stability</b></p> <ul style="list-style-type: none"> <li>• Ligament integrity             <ul style="list-style-type: none"> <li>– ATFL</li> <li>– CFL</li> <li>– Deltoid</li> <li>– Syndesmosis                 <ul style="list-style-type: none"> <li>• Anterior inferior tibiofibular</li> <li>• Posterior inferior tibiofibular</li> <li>• Interosseous tibiofibular</li> <li>• Posterior transverse inferior tibiofibular</li> </ul> </li> </ul> </li> </ul>	<p><b>Functional Stability</b></p> <ul style="list-style-type: none"> <li>• Ankle proprioception             <ul style="list-style-type: none"> <li>– Muscles</li> <li>– Tendons</li> <li>– Ligaments</li> <li>– Capsular innervation</li> </ul> </li> </ul>
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### Functional Rehab: Ankle Sprain

- Early:
  - PRICE/EMM; immobilization if needed (semi-rigid)
  - Isometric and isotonic strength-training exercises
  - Joint mobilization → restore ROM
- Intermediate:
  - Proprioceptive & balance training
  - Hip & core strengthening
- Advanced:
  - Plyometrics
  - Sport-specific activities

### Osteochondral Lesions

Range from contusions of cartilage and bone, to a fracture involving cartilage, or cartilage and underlying subchondral bone

-Compression  
-Shearing  
-Avulsion

- Pain with WB
- Limited ROM
- Catching
- Locking
- Swelling

- NSAIDS
- PT for grades I-II (45% success rate)

### Return to Sport Suggestions

**BRACING**

- Lace-up preferred over semi-rigid, elastic, and tape
- Bracing more cost effective than tape
- Bracing reduces incidence of sprains, but does not decrease severity of sprains

**TAPING**

- Increased self-efficacy
- Improved perceived confidence

### Tendon Lesions

- Posterior Tibial
- Peroneal
- Achilles
- Flexor Hallucis Longus

**Tendons**

Dorsal View: Achilles tendon, Peroneus brevis, Peroneus longus, Extensor digitorum longus, Extensor hallucis longus, Extensor hallucis brevis.

Medial View: Achilles tendon, Flexor hallucis longus, Tibialis posterior, Flexor digitorum longus, Extensor digitorum brevis, Tibialis anterior.

### Eccentrics

- Curwin and Stanish - original eccentric program
  - 3x10 eccentric loading, titrated by pain
  - Load increased weekly and speed changed daily
- Alfredson et al. - modified eccentric program
  - 3x15 unilateral eccentric heel raises, no concentric component (knees extended and flexed)
  - Twice daily
  - 12 weeks
  - Slow and controlled, with moderate pain. Add external resistance via a back pack or weight machine if the exercise becomes too easy

### Achilles Tendinopathy

Moderate level evidence for treatment of achilles tendinopathy with:

- Stretching
- Foot orthoses (running)
- IASTM
- Taping for short term pain relief

Low level evidence:

- Low level laser
- Iontophoresis with dexamethasone

Contradictory evidence:

- Heel lifts

### Tibialis Posterior Tendinopathy

- Most powerful inverter of foot
- Dynamic stabilizer of arch

"Too Many Toes Sign"

Posterior Tibialis Tendinopathy	Pn, swelling posterior to medial malleolus Pn worse with WB and with INV and PF against resistance	PRICEMM Foot orthotic Medial heel wedge and medial column post PTT strengthening
Peroneal Tendinopathy	Pn, swelling posterior to lateral malleolus Pn with active EV and DF against resistance Hx chronic lateral ankle pn and instability	PRICEMM Foot orthotic Lateral heel wedge Eversion strengthening
Achilles Tendinopathy	Pn, swelling, crepitus at tendon (3-5cm above insertion) Recent chng in intensity or duration of training Hamstring and gastroc-soleus inflexibility	PRICEMM Gastroc and soleus stretching Eccentric strengthening
FHL Tendinopathy	Pn and swelling over posteromedial ankle Dancers or athletes with repetitive push-off Pn w resistive flexion of great toe	PRICEMM Shoe with firm sole Core strengthening

### The Ageing Foot & Ankle

- Lowered ADL capability
- Balance & gait deficits
- Decreased quality of life
- Older people (>65) account for the largest proportion of consultations for foot problems with general practitioners and podiatrists



### Age-Related Changes

- Plantar Soft Tissue
  - Maintained thickness of heel pad and plantar fascia, but greater stiffness
- Skin
  - Overall loss of elastin and collagen fibers
  - Increased hardness, dryness, loss of elastic recoil
  - Predisposition to xerosis, fissuring, development of corns and calluses
- Joint Mobility
  - 12-30% loss ankle ROM
  - 32% loss of great toe extension



### Age-Related Changes cont.

- Foot Strength
  - 24-40% reduced strength in foot and ankle musculature
- Foot Posture and Dynamic Foot Function
  - Gradual lowering of medial longitudinal arch
  - Pronated posture
  - Reduced midfoot and metatarsal mobility
  - Decreased plantarflexion at toe-off in gait cycle
  - Pes planus → inc likelihood of hammer toes, overlapping toes

### Foot Orthoses - Rationale

- Alter foot posture → kinematic postural changes of lower limb and pelvis
- Alter foot posture → change in muscle firing patterns of lower limb and pelvic musculature

### Foot Orthoses & Insoles – Do they work?

- Shock absorbing insoles: potential benefit in male runners to reduce PF and achilles tendon load; no benefit shown in females...more research needed
- Custom foot orthoses can be effective against:
  - Shin pain (73%)
  - Tibia (35%)
  - Femur (47%)
  - Metatarsals (75%)
- Custom: Inability to control rear and midfoot motion, but can control first ray motion

## Research Based Treatment: Take Home Points



1. Sprains/chronic instability– early mobilization, bracing over taping, whole body approach (regional interdependence)
2. Tendinopathies – eccentrics, proper shoe wear/orthotics
3. Custom orthoses preferred compared to over-the-counter
4. Aging foot – joint mobility, flexibility, balance, functional movement patterns



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