Common pain conditions in foot and ankle region

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Outline of talk

- Structure and function of foot
- Etiology of foot pain
- Painful conditions
  - hindfoot, midfoot, forefoot
- Management
Structure and function of foot
Foot Anatomy

Different anatomical components can give rise to pain

26 bones
Joints
Ligaments
Plantar fascia
Plantar fat pad
Foot shape

Foot shape is specific for foot biomechanics
Altered shape leads to foot pain

Transverse arch  Longitudinal arch
Foot Functions

Abnormal function causes pain

Weight bearing

Ambulation
Functional segments of foot

Different segment has different role in biomechanics

Hindfoot
Midfoot
Forefoot
Ankle
Gait cycle

Each foot segment has unique function in the gait cycle
Etiology of foot pain
Causes of foot pain

• Injury
• Abnormal biomechanics
• Disease of internal structure
Foot pain caused by injury

Various forms of injury lead to pain

- Single impact
- Repeated microtrauma
- Chronic overuse
Foot pain caused by injury

Injury could involve various components of foot

- Ligament
- Muscle
- Tendon
- Bone
- Joint
Abnormal biomechanics and foot pain

Abnormal interaction of foot with external environment causes pain

- Tight heel cord
- Cavus foot
- Flatfoot
- Forefoot deformity
- Footwear
Painful structural disorder of foot can be systemic disease with local manifestation.

- Diabetes
- Gout
- Peripheral vascular disease
- Rheumatoid
Painful local foot pathology

- Deformity
- Arthritis
- Nerve entrapment
- Nail
- Skin: wart, fungus
- Metatarsalgia
Painful conditions of ankle and hindfoot
Osteochondral lesion of talus

- Detached cartilage and subchondral bone from talus articular surface
- Acute case: persistent pain after ankle sprain
- Chronic case: activity-related pain and swelling
- MRI to stage lesion
- Low grade:  
  - period of protected wt bear
- High grade:  
  - arthroscopic debridement
Achilles tendinopathy

- Zone of hypovascularity 2-6cm above insertion
- Midsubstance tendinosis / rupture
- Insertional tendinosis
- Other painful conditions:
  - Haglund deformity
  - Retrocalcaneal bursitis
Achilles tendon rupture

- Acute indirect trauma on chronic pre-existing tendinosis
- Sudden forceful plantarflex contraction
- Feel snapping sensation without actual physical contact
- Clinical tests: unable to rise on toes, palpable gap, calf-squeeze test
- Diagnosis easily missed: ankle movement by toe flexor tendons
Plantar fasciitis

- Start-up pain
- Tender spot at medial side of calcaneal tubercle
- Heel spur unrelated to anatomical location
- Shock wave for persistent case
- Distinguish from:
  - Plantar nerve impingement
  - Fat pad atrophy
Painful condition of midfoot
Flatfoot

- Arch height is a morphological variance
- Asymptomatic flatfoot requires no treatment
Symptomatic adult flatfoot

- **Posterior tibial tendon dysfunction**: commonest cause for pathological flatfoot
- Symptom around medial midfoot and plantar arch, radiate along course of posterior tibial tendon
Course of posterior tibial tendon
Pathological flatfoot

- Collapsed foot arch, hindfoot valgus
- Unstable single leg stance
- Early treatment: orthotic support for flexible deformity
- Late stage: reconstruction of tendon and realignment of bone
Painful conditions of forefoot
Stress fracture of metatarsus

- Typical activity: athlete, dancer, military
- Xray shows periosteal reaction, sclerosis
- Treated with off-loading
- Operative fixation for professional athlete
- Important to look for predisposing cause: biomechanical disorder
- Distinguish metatarsal base and midfoot injury
Morton neuroma

- Compression neuropathy of plantar digital nerve with perineural fibrosis
- Present as paraesthesia of toes
- Relieved with local massage or take off shoe
- Typically at 3<sup>rd</sup> inter-space:
  - relative immobile nerve formed by medial and plantar branch
- Beware over-diagnosis, esp with MRI
- Need to treat underlying cause of overload of forefoot
Metatarsalgia

Pain on plantar surface around metatarsal head: “ball of the foot”

- Mechanical causes: forefoot overload
- Structural causes: metatarso-phalangeal joint pathology or deformity
Metatarsalgia: forefoot overload

- Tight heel cord
- Cavus foot
- Hypermobile first ray
- Plantar fat pad atrophy
Metatarsalgia of MTP jt pathology

- Synovitis / arthritis
- Can be result of forefoot overload
- Freiberg infraction: osteochondrosis of metatarsal head, commonest 2\(^{nd}\) MT, cause swelling and stiffness
- Hammertoe deformity: excessive wt bear of MT head
Hallux rigidus

- Local degeneration of 1\textsuperscript{st} MTP jt
- Present with stiffness, pain on dorsiflexion of toe, e.g., walk upslope or play tennis
- Tender along dorsal jt line
- Differentiate from hallux valgus
- Treat as arthritis: rest, support, reduce activity
Painful foot conditions of systemic disease
Gout

- Commonest cause of acute mono-arthritis
- 1st MTP jt, ankle, subtalar jt
- Genetic and diet factors
- X-ray periarticular punched out lesion, overhang edge, no jt space narrowing
- Surgical excision of tophus may trigger acute gout and wound complications
- Treatment includes identify cause of secondary hyperuricemia
Rheumatoid arthritis

- Foot and ankle are common site of first presentation:
  - MTP jt, flatfoot
- Inflammation of joints, tendons, ligaments
- Blood tests for suspected case
Rheumatoid arthritis

- Drug as disease-modifying treatment
- Maintenance therapy with physio and orthotics
- Surgery for symptomatic deformity
Foot pain with non-organic contributing factor

- Diffuse area of pain
- Inappropriate intensity of pain
- Skin hypersensitivity
- Joint stiffness and irritation
- Muscle wasting
- Avoidance gait
Management of foot pain
Foot pain: history taking

- Onset
- Injury
- Activity
- Medical history
- Family history
- Footwear
Foot pain examinations (1)

- Site of tender
- Deformity / swelling / callosity
- Arch
- Sensation / pulse
- Movement
Foot pain examinations (2)

- Stance / gait
- Nail / skin / shoe
- Other body parts: back, hip, knee
Detect non-organic factors

- Psycho – social history
- Functional history
- Inconsistent physical finding
- Mismatch with anatomy
Xray investigation

- Standing view
- Foot
- Ankle
Foot pain management

- Pain relief
- Systemic disease treatment
- Local support: orthotics
- Footwear
- Surgery
- Preventive measures
Physical therapy

- Swelling control
- Pain relief
- Range maintainence
- Muscle strengthening
Occupational therapy

- Specific skill training
- Strength-based approach
Foot pain surgery

- Correct deformity / biomechanics
- Reconstruct structural deficit
- Surgery for arthritis
Interventional pain management
Non-organic factors

- Identify
- Treat
- Modulate
Pre-defined treatment target

- Pain relief
  - Based on clinical information
  - Set by patient and care-giver
  - Revised as treatment continues

- Improve function

pains
Foot pain prevention (1)

- Footwear
- Skin condition
- Foot care, limb conditioning
- Systemic disease control
Foot pain prevention (2)

- Overall health perspective
- Sports activity precaution
- Psycho – social factors
- External environment
Conclusions

Foot pain is **common presentation** of large variety of medical conditions

Understanding **anatomy and function** of foot essential to management

Etiology can be **systemic disorder**, **biomechanics deficit**, or **structural pathology**

Identifying underlying abnormality for treatment and **prevention** of future recurrence