19- Common Foot and Ankle Disorders

Objectives:

- To understand the anatomy of Foot and Ankle.
- To get a concise idea on common Foot and Ankle disorders.
- To differentiate from simple disorders and serious ones.
- To learn about initial management and prognosis.

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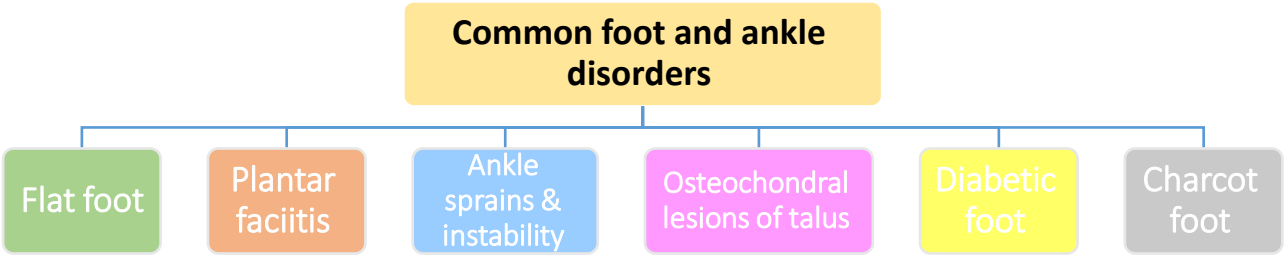
References: 435 team, 436 slides, Doctor's notes



★ Importance of foot and ankle

- Subject to **most weight bearing** (Loading) of the body.
- Important **proprioception** function.
- Their **sensory** role is very important.
- Their appearance or deformity is easily noticeable.
- Faulty or improper shoe wear can cause symptoms.
- With advancing age; deformity becomes more common.

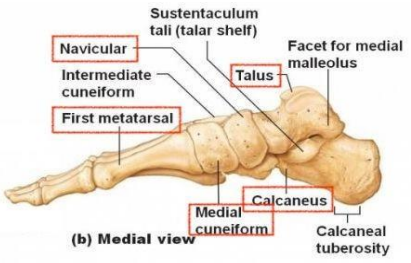
★ Anatomy

The foot is (consist of 26 bones) divided into:

- **Forefoot:** Phalanx + Metatarsals
- **Midfoot:** Navicular + Cuboid + 3 cuneiforms
- **Hind (rear) foot:** Talus + Calcaneus

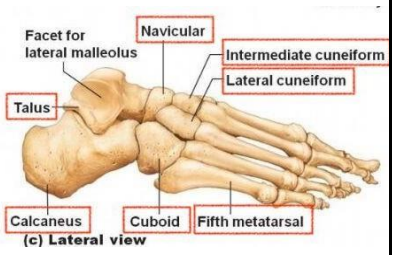
Foot Skeleton

Medial aspect



We have more bones on the medial side than we have on the lateral side; that's because medial side gives stability while lateral gives flexibility

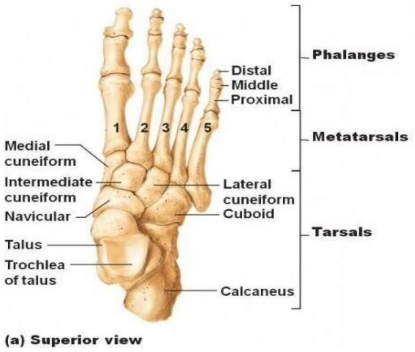
Lateral aspect



Imaging (X-ray standing)

Should be done in standing position since it's the function of the foot to bear weight

Superior view



Flat foot [High yield osmosis notes]


normal to low arch


flat foot Pes planus


high arch Pes cavus

- Reducion of longitudinal arches of the foot.
- Most cases are **developmental**[1]: i.e. arches do not develop normally[2].
- Usually is painless.[3]
- Rarely acute flat[4] foot can be encountered. [Unilateral and usually happens after trauma]
- Rigid flat foot can be the result of **tarsal coalition** (fibrous or bony cross union between bones of the foot) "abnormal connection between bones in the back of the foot"

Imaging

Normal X-ray	Flat foot: Lateral Weight bearing X-rays
	
Blue line: along the talus all the way to the metatarsal bone should be continuous with a 0 angle, up to 4 degree is considered normal. If the angle is >4 degree → considered flat foot.	

★ Rigid or flexible flat foot:

	Normal	Flexible (Can corrected without surgery)	Rigid (stiff) (Needs surgery)
Alignment	Straight or minimal valgus	Extreme valgus	
Standing on tip toes	Rhe heel moves inward (from valgus to varus). The arch is still present.	The **heel moves inward** (from valgus to varus) The arch will reconstruct in flexible flat foot.	**Does not move inward** (stay in valgus) The arch will remain absent in rigid flat foot.
Subtalar motion (inversion/ eversion)	Normal ROM	**Normal ROM**	**Reduced or absent**
Etiology		**Ligamentous** laxity تكون الأربطة مرتخية	**Tarsal coalition:** Fibrous or bony union between bones of the foot

[1] Could be acquired in elderly due to posterior tibialis weakness.
[2] (Normally, the arch is formed within 4-6 years).
[3] 80:20 rule: 20% of the population has it, 80% of them are asymptomatic.
[4] Gradual loss of the arch in case of an injury to the foot resulting in complete tear of the **posterior tibialis** tendon.

 Flexible	 Rigid

★ Management:

- Usually NO action is needed. (**A**symptomatic)
- if symptomatic **Always** start with conservative (5 steps)
  - **Foot exercises:** Strengthen muscles but will not correct deformity.
  - **Orthotics/insoles:** Protective, correct Malalignment.
  - **Good shoes:** beneficial on the long run.
- **Surgery:**
  - Rigid[5] flat foot. "Removal of coalition"
  - Painful flat foot with complication.
  - Acute flat foot.

Always start with conservative
1- weight loss
2-shoes
3-Orthotics
4-activity modifications
5-physiotherapy

Hallux valgus Toronto notes

- Means **lateral** deviation of big toe.
- Usually at the metatarsophalangeal joint.
- Often is associated with a **bunion**[6] [7] [8] (swelling and protrusion at the medial aspect of big toe).[9]
- Common at middle age and elderly[10], mainly females[11].
- Most cases are painless. [If painful, would be due to shoe pressure on large toe or an inflamed bunion due to arthritis.]
- **Severe HV** interferes with shoe wear.

Hallux Valgus Measurements

Hallux valgus angle: (no. 2)
Angle between line extending along 1st metatarsal and a line extending along proximal phalanx.
- **Normal**: <15°
- **Mild HV:** 16-25°
- **Moderate HV:** 26-35°
- **Severe HV:** > 35°

1st intermetatarsal angle: (no. 4)
Angle between 1st metatarsal long axis and 2nd metatarsal
- **Normal** < 10°

Hallux interphalangeus angle: (no.1)
Angle between long axis of proximal and distal phalanges
- **Normal** < 8°

(Normal foot)

[5] Usually have gastrocnemius muscle tightness
[6] Hallux valgus ≠bunion. **bunion** (swelling and protrusion at the medial aspect of big toe). Hallux valgus is the hole deviation of the big toe away from the central line.
[7] Sometimes people have a bunion without hallux valgus and we treat it by a bunionectomy; a surgery by which we remove the bunion.
[8] a bunion is not a growth instead it's exposure of the metatarsal head
[9] اسبابها كثيرة أهمها ال shoes وال weight
[10] Rheumatoid arthritis
[11] Heals

★ Management:

Always start with conservative
1- weight loss
2-shoes
3-Orthotics
4-activity modifications
5-physiotherapy

- If painless (most common) reassure.
- If painful (interfering with walking), always start with conservative (5-steps)
- Correct and suitable **shoe wear.**
- Avoidance of **tight shoes.**
- Protection to the bunions. (by cushioning)
- **Surgery** is reserved for symptomatic and disturbing cases. (if conservatives fail to relieve pain for 3-6 months)
  - Surgery is annoying (hardware on skin).
  - Removal of bunion is **not** cosmetic, patient has to be symptomatic.
- Following surgery; patient has to continue proper shoe wear.

Imaging	
hallux valgus pre-op	**hallux valgus post-op**
	
There a lot of procedures, but in basic steps: ⇒ Correct deviated metatarsal. ⇒ Excise the part of the bunion not all of it. ⇒ Release Adductor hallucis longus tendon as it is a deforming force.	

التهاب اللفافة الأخمصية Plantar fasciitis Toronto notes, Kaplan notes

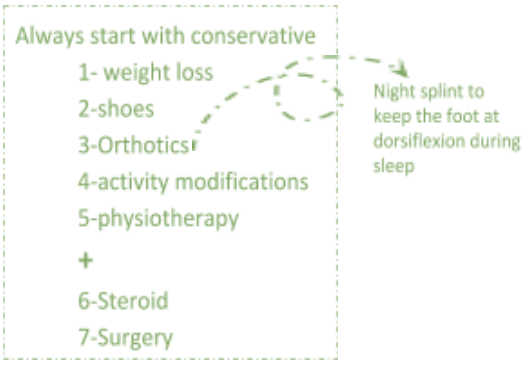
- Common disorder at middle age and elderly. affect about 90% of the population
- Insidious in onset; unilateral or bilateral. Vague pain at heel region.
- **Localized tenderness** to insertion of plantar fascia into calcaneum.
- Plain lateral X-ray of heel frequently shows **calcaneal spur** (مسمار القدم)[12], (prominence or ossification at the site of anterior calcaneum at plantar fascia insertion site)[13]
- Commonly associated with flat feet.
- No visible heel swelling, no skin changes and no increase in local temperature.
- Inflammatory process is at site of pain; i.e. at plantar fascia insertion into calcaneum.
- Heel pain like stabbing pain when patient puts foot to the ground **first step in the morning; and gets less after some walking.**[14]

Imaging	
X-ray: Bilateral Calcaneal Spur (Early)	**X-ray: Calcaneal Spur (Advanced)**
	

[12] No relation between the spike (spur) you see on x-ray and the pain. some patient have very large spikes with no pain and some have very severe pain with no spike, what we get from that is that it doesn't have to be removed to alleviate the pain.
[13] It is an indication of inflammation for many years.
[14] When we sleep or set for long periods our feet are in plantar flexion, making the achilles tendon short and when we step on the floor for the first time, we do dorsi flexion which stretches the achilles tendon stretching the plantar fascia with it causing pain.

★ **Management:** Most important; **proper shoes & weight reduction**

- NO easy or simple management is available.
- Mainly conservative.
- Includes **stretching exercises** to plantar fascia: active and passive.
- Use of **soft heel insoles** (Silicone) may be helpful.
- **Shock wave therapy (SWT)** may be effective[15]. Resistant cases only
- Local **steroid** injections are helpful sometimes. Very resistant cases



#Surgery (very rare): last solution Release of gastrocnemius muscle "NO surgery for planter fascia itself".

(435) If the first 5 steps of conservative didn't relieve the pain;

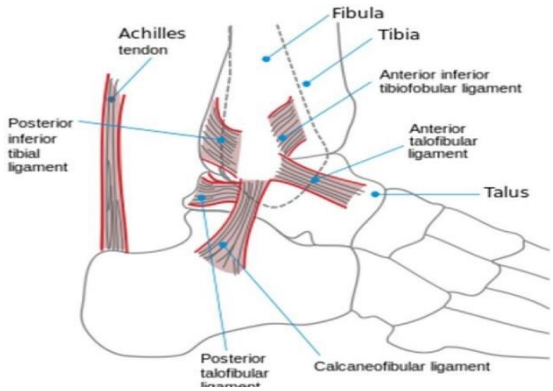
1. We do **MRI** to confirm diagnoses.
2. give **steroid injection** if the steroidal injections didn't relieve the pain,
3. Do nerve conduction study to determine other causes. Other causes which although rare but give same symptoms of plantar fasciitis are: **tarsal tunnel syndrome** posterior to the medial malleolus compressing on lateral and medial plantar nerves (branches of posterior tibial nerve) and **nerve entrapment** due to large muscle in athletes.

Ankle sprains Mayo clinic

- One of the most common injuries.
- Usually occurs during sports activities but may occur at home or street.
- The injury is partial **or** complete ligament rupture.
  - **History of twisting injury.** Most commonly inversion
  - Pain, swelling and bruising at and around ankle. Swelling in look, tenderness in feel usually soft tissue not bone
  - No tenderness of lateral malleolus; but tenderness anterior, posterior or inferior to it i.e. over ligaments.
  - Dorsiflexion and plantar flexion possible; but inversion and eversion very painful.[16]
  - Positive anterior drawer test.
- X-Rays: **NO fracture.** You have to rule it out

Lateral Collateral Ligament Complex

1. **Anterior talofibular ligament (ATFL);**
   Most commonly injured **"Anterior drawer test** is +"
2. **Calcaneofibular ligament (CFL);**
3. **Posterior talofibular ligament (PTFL)**



Most common cause of instability is **Lateralization** of the talus

[15] to break down the thick tissue, اللي مانعرف كيف يصير

[16] always compare, since it might be hyperlaxity

★ Management:[17]

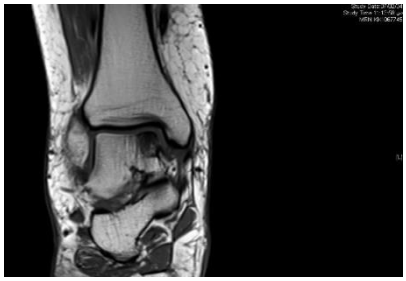
RICE: Rest, Ice, compressors, Elevation.

- Apply **Back-slab splints** for few days if not able to weight bear.
- Might use protection with **brace**.
- **Early physiotherapy** and strengthing.
- Mostly heal with no surgery.
- **Surgery:** if physiotherapy fails and there is clear instability.
- **PRICES: recent view** = **P**rotection[18], relative **R**est,**I**ce, **C**ompression, **E**levation and **s**upport.

Osteochondral defects of talus[19]

- Very localized areas of joint damage; due to lack of blood supply.
- Lack of blood supply is often post traumatic, but occasionally No cause can be found.
- A local cartilage and varying depth of underneath bone are involved and may separate of main talus inside the ankle joint.
- Usually **postero-medial part** of dome of talus. Bcs commonest sprains happen in inversion فيضغط على هالمكان
- Localized pain on weight bearing and even at rest may present. Joint line tenderness specially in planter-flexion + on & off swelling with walking a lot.

ويؤدي في النهاية الى arthritis cartilage الجزء المنفصل يجلس يدور ويخدش في ال

Imaging		
Plain AP X-ray: lesion is suspected	CT Coronal view; lesion highly suspected	MRI: lesion is confirmed
		
Bone is white highly sclerotic (marble-like) indicating loss of blood supply, very fragile and easily broken.		MRI with contrast the bone is white, and the lesion is black, due to loss of blood supply. **Modality of choice**

★ Management:[20]

Depends on:

- Symptoms: pain and recurrent swelling.
- Size of OCD: large and Loose or
- Loose fragment (urgent surgery within few weeks "injury to cartilage *Calcaneum*")

Always start with conservative
1- weight loss
2-shoes
3-Orthotics
4-activity modifications
5-physiotherapy

- **Arthroscopic debridement** of the lesion and drilling of its base.
- **Fixation with headless screw** of large OCD with large bony part.

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[17] Always start with conservative, even if you are treating a professional athlete.
[18] Splints are better than back slap casts because you can wear/remove splint anytime and splints allow dorsiflexion and plantar flexion movements.
[19] Ankle injury resulting in loss of bone and cartilage in talus.
[20] doesn't heal by itself, since it's avascular

Diabetic foot Kaplan notes

Neuropathy (nerve damage): Long term diabetes or failure to control diabetes.

- Numbness, tingling and reduced sensation of the feet.
- Decreased circulation (neuropathy, calcification of vessels, CAD).

May result in delayed healing, Infection, **Gangrene** and **Amputation.**

How diabetes exactly causes neuropathy? By accumulation of sorbitol (sugar substitute) in nerves.

★ Care of Feet in Diabetes:

Primary target: **Prevention**

1. **Blood sugar control**.
2. Daily self-inspection of feet is mandatory.
3. Member of the family or assistant should do it.
4. Regular inspections by healthcare personnel should be arranged.
5. A visit to a doctor should take place immediately whenever any complication occurs.

★ Surgery in Diabetic Foot:

- Skilled care of wounds and ulcers in diabetic foot is **required**.
- **Wound debridement**, antibiotics and repeated dressing should be done.
- **Amputations** may become necessary when there is **Gangrene**.
- Toe amputation or ray amputation, forefoot amputation, below or above knee amputation.

Charcot foot[21]

Significant nerve damage to the foot leads to:

1. The bones of the foot become weak.
2. Joints inflamed, swollen as if infected and lax.

Walking on the foot leads to disintegration and collapse of the joints and **deformities**: such as **Rocker-bottom deformity.**

★ Etiology:

- Any disorder which lead to **Neuropathy**.
- There is decreased sensation and decreased ability to feel temperature, pain or trauma. Doctor said that it's a complex mechanism that we are NOT required to know, but in general it's **neuropathy** at first, then nerves send signals that they require more blood to regain function, so this will cause **hyper perfusion** of blood to the foot and will increase bone **resorption** as well, leading to new bone growth.

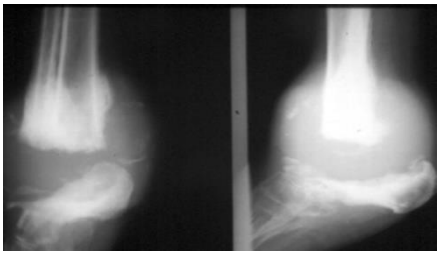
★ Charcot Foot Clinical picture:

- **Look:** Foot is red or dusky in color. There's swelling in the area and deformity.

Often mistaken by osteomyelitis. To differentiate we do **elevation test** we raise the leg up for 5-10 minutes, if persistent redness and swelling it is infection if redness and swelling subside it is Charcot foot.

- **Feel:** NO Pain or soreness, warmness of foot.
- **Move:** decreased ROM.
- **X-ray** changes are important to detect and interpret; **Early:** NO changes.
  Later: haziness, osteopenia, irregular joint destruction, subluxation or even dislocation.

[21] bone degeneration due to loss of blood supply, in diabetics

Diabetic foot 04/03/1428	**Advanced Case of Charcot**
 There's amputation of big toe	

★ Diagnosis of Charcot Foot:

- Good history[22] and clinical examination.
- Awareness.
- Exclusion of other causes which may give similar picture: like infection or tumor.
- MRI, bone scans can help.

★ Management:

Non-Surgical Management of Charcot Foot	**Surgery in Charcot Foot**	**Amputation in Charcot foot**
○ Immobilization ○ Custom Shoes and Bracing [we don't do cast because it might cause ulcers in a diabetic patient with neuropathy] ○ Activity modification	[we don't do surgery until blood sugar is controlled]  	○ May be indicated as a last option. ○ Mainly when there is severe instability which cannot be controlled by surgery or orthosis. ○ Also when surgery fails to achieve stability. ○ Presence of refractory infection increase the possibility of amputation.

[22] Always ask about diabetes and whether it's controlled or not