

# Examination of the foot and ankle

## Introduction

For foot and ankle examination you have to think on your feet according to what you find, like hand examination. For a short case you are unlikely to get time to go through every part of the examination but always be seen to be doing:

### Exposure

#### Look

#### Gait

#### Feel

#### Move

#### Neurological

#### Vascular

#### Special tests

Common short cases in FRCS Orth

Pes Cavus

Flat foot- tarsal coalition/ tib post insufficiency

Hallux valgus

Hallux rigidus

Rheumatoid foot

## Exposure

Both shoes and socks off. At least have trousers rolled up to the knees, preferably down to underwear

## Look

- **General clues**

Age of patient, obvious rheumatoid disease, walking aids

- **Shoes**

For raises, insoles, uneven wear

- **Patient standing facing you and from behind**

- **Ask patient to stand on tiptoes** if they cant can be due to hallux rigidus

- **Foot shape**

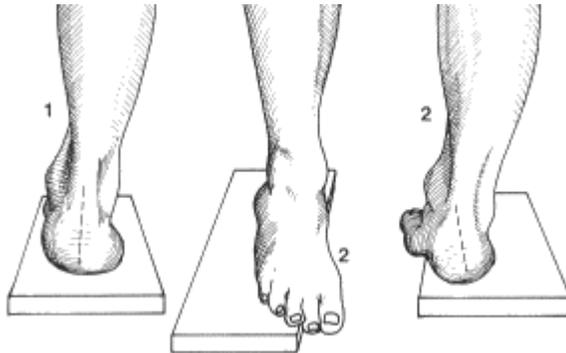
Normal

Flat-

Valgus heel, low arch, forefoot abducted and supinated. If foot flat proceed **now** to distinguish between flexible and fixed flat foot by asking patient to stand on tiptoes, look from behind and see if the heel valgus corrects. Also perform the single tiptoe test for tibialis posterior insufficiency and look for the 'too many toes sign' from behind.

High arched foot-

High arch (cavus), may also have a varus hindfoot (cavovarus). The first ray is often in more plantarflexion than the others causing a pronated forefoot. The hindfoot varus may be fixed or mobile, distinguish **now** using Coleman's block test:



Note the position of the heel when standing on a 2cm block. Then get the patient to stand with the first ray hanging free over the medial edge of the block (the 1<sup>st</sup> MT head must not touch the ground). If the varus remains then the subtalar joint is fixed. If it corrects to valgus then the joint is mobile.

#### Skewfoot

Hindfoot valgus and forefoot adduction. Ask patient to stand on tiptoes and see if hindfoot corrects.

#### Metatarsus adductus

Neutral hindfoot and adduction of forefoot

- **Skin** , ulcers, hairlessness, calluses
- **Muscle wasting**
- **Nails**
- **Swellings**
- **Toe deformities-** Hallux valgus, claw toes, hammer toes

## Gait

Always watch the patient walk. In foot and ankle gait look specifically at the three rockers

- **No 1 rocker-**

From heel strike to foot flat, the anterior compartment of the leg (tibialis anterior) contracts eccentrically, thus lengthening, while the gastroc soleus is quiescent.

Can be abnormal if achilles tendon tight causing failure of heel strike or tib ant weak causing slapping foot

- **No. 2 rocker-**

During foot flat the gastroc soleus complex is contracting eccentrically, and the anterior tibialis is quiet. The momentum of the body dorsiflexes the ankle.

Can be abnormal if ankle stiff.

- **No. 3 rocker-**

During heel rise the gastroc soleus complex contracts concentrically, and the tibialis anterior (anterior compartment) is quiescent.

Can be abnormal if weak tendoachilles or lack of movement or pain at 1<sup>st</sup> Mtp joint

- **Patient seated on an examination couch and legs dangling, examiner sits in a chair and holds the foot.**
- **Look at soles of feet for callus formation**

## Feel

Ask if there is a tender area. Don't forget to watch the patients face throughout  
Feel with back of the hand for temperature difference

- **Ankle**

Feel for tender areas, systematically checking:

1. the anterior joint line
2. the lateral gutter and lateral ligaments
3. the syndesmosis
4. the posterior joint line
5. the medial ligament complex
6. the medial gutter

Feel for an effusion, synovitis, deformity, bony prominence and loose bodies.

- **Hindfoot and midfoot**

Palpate the following structures from Lateral to Dorsum to Medial surfaces:

**Lateral (from distal to proximal)**

1. Styloid process of fifth metatarsal
2. Groove in the cuboid for Peroneus Longus tendon (just posterior to 1)
3. The peroneal tubercle (a small lateral extension of the calcaneus, separating the peroneus longus & brevis tendons)
4. Sinus Tarsi - soft tissue depression just anterior to the lateral malleolus. (Sinus Tarsi is filled with EDB & fat pad & ligaments)
5. Dome of Talus (made prominent by plantarflexing ankle)

**Medial (from proximal to distal)**

1. First Metatarso-cuneiform joint.
2. Navicular Tubercle - most obvious bony prominence in front of medial malleolus. (insertion of Tibialis Posterior tendon)
3. Head of Talus - felt just behind the navicular, by everting & inverting the midfoot.
4. Sustentaculum Tali - one fingerbreadth below medial malleolus. (serves as an attachment for the spring ligament & supports the talus)
5. Medial Malleolus.

- **Forefoot**

Palpate the all bones and joints in a circle, paying particular attention to:

1. First Metatarsal head
2. First MTPJ
3. Metatarsal heads
4. Web spaces

- **Feel for Dorsalis pedis and Posterior tibial pulses**

## Move

Compare both sides

- **Ankle**

Active Combined - ask the patient to lift foot up (dorsiflex) and down (plantarflex)

Passive -

Dorsiflexion :Put one hand on the heel with the same forearm supporting the foot. Make sure the foot is in neutral. The other hand supports the tibia. Dorsiflex the ankle by lifting the forearm under the foot. (Normal = 55 degrees)

Assess for gastrocnemius/ soleus tightness by doing this with the knee flexed and the knee extended

Plantarflexion :(Normal = 15 degrees)

- **Subtalar**

Hold the calcaneus with one hand and the talar head/neck with the thumb & index finger of the other hand. Apply varus and valgus stress with the hand on the calcaneus feeling for movement of the talus (at extremes of subtalar motion) with the other hand. Holding talus rather than the tibia isolates subtalar from ankle motion. (Normal = 5 degrees in each direction)

- **Midtarsal** (Talo-navicular & Calcaneo-cuboid joints)

Hold the calcaneus with one hand and move the forefoot medially & laterally with the other hand = adduction (20 degrees) & abduction (10 degrees). This movement cannot be seen, but can be felt.

- **Tarsometatarsal joints**

Active motion is zero, but test the joints for stability (by pushing each joint up & down)

- **1<sup>st</sup> MTP Joint**

Normal ROM = 70-90 degrees DF; 45 degrees PF. Normal toe-off requires 35-40 degrees DF.

- **Other toes**

Assess flexibility of any lesser toe deformities

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## Special tests

- **Muscle power/integrity**

### **Tibialis posterior**

Get the patient to contract the tibialis posterior in the plantar-flexed/inverted position against resistance. Palpate the tendon too. The tendon may be weak, impalpable or palpably thin. Always examine for an Achilles contracture which is present in most people with tibialis posterior insufficiency and may only be apparent with the heel held in neutral or varus.

### **Tibialis anterior**

Manual test = the patient should sit on the edge of the examination table. Test resisted dorsiflexion and inversion. Palpate the tibialis anterior muscle as you perform the test.

Ask the patient to walk on his heels with his feet inverted. The tibialis tendon can be seen prominent.

### **Peroneals**

Manual test = Secure the ankle by stabilising the calcaneus and with the other hand feel the peroneal tendons while testing resisted eversion. (Reverse of the Tibialis Anterior test)

Peroneal Snapping = DF & PF the ankle with the foot everted and palpate for 'snapping' of the peroneal tendons over the lateral malleolus

Ask the patient to walk on the medial border of his feet.

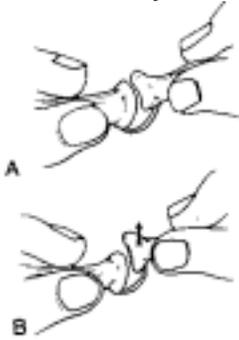
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- **Stability tests**

**Ankle anterior draw test**, hold ankle in plantar flexion for this



**Talar tilt** Hold the talus at the neck and feel for an end point on tilting the talus  
**MTPJ instability** – drawer test with toe in 20 deg plantarflexion



- **Other tests**

**Mulder's click** : a specific test for mortons neuroma. Squeeze forefoot from medial and lateral sides , may feel a click as the neuroma flips between the metatarsal heads.

**Fibular draw test**

With disruption of the syndesmotic ligaments, the examiner may initiate increase in posterior displacement which usually reproduces pain

**Squeeze test**

compression of the proximal calf causes pain at the distal syndesmosis; - anatomically, squeezing the proximal calf will cause separation of the distal fibula and specifically will cause separation of the anterior tibiofibular ligament

## **Examination of the achilles tendon**

- **Simmonds/ Thompson test.** Lie the patient prone and squeeze the calf to elicit movement at the ankle = intact TA.
- Palpate for gaps and tenderness. Distinguish between insertional tendonopathy, non-insertional tendonopathy and retro-Achilles bursitis. Look for a Haglund's prominence.

**At the end of the examination always ask to look at the spine, say you would like to perform a neurological examination and ask to use Semmes Weinstein hairs if diabetes is suspected**

## Common short case

### Pes cavus -a gift

- **Look**

Describe high arches, claw toes, heel varus if present, calf wasting

Colemans block test

Watch walking, may have foot drop if HSMN

Look for calluses on sole of foot

- **Move**

All Joints, especially toes for degree of flexibility claw toes

- **Test sensation in foot**
- **Ask to look at spine**
- **Ask to look at hands for muscle wasting, sensory loss, power loss**
- **Ask to do a full neurological examination**

- **Be able to give a list of the causes of pes cavus:**

**Neuromuscular until proven otherwise**, as up to 60% found to be neurological

- **Congenital**

- Idiopathic
- Arthrogyriposis
- Residual CTEV

- **Acquired**

- **Neuromuscular**

- Muscular disease eg. Muscular dystrophies
- Peripheral nerve disease- HSMN (most common neuromuscular cause), diabetes
- Spinal cord problems-Polio, diastematomyelia, tethered cord, syringomyelia, spina bifida
- Long tract and central disease- Friedrichs ataxia, cerebral palsy

- **Traumatic**

- Compartment syndrome,
  - crush,
  - burns,
  - iatrogenic (overlengthening of achilles tendon)
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