MSK-
part 2 : Lower limb

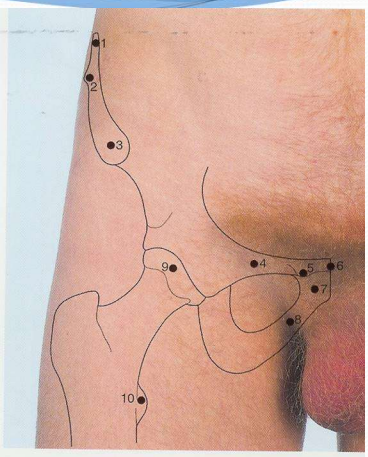
BELMATT
HEALTHCARE TRAINING

Dorthe Swaby-Larsen

PELVIS & HIP

Important anatomical considerations:

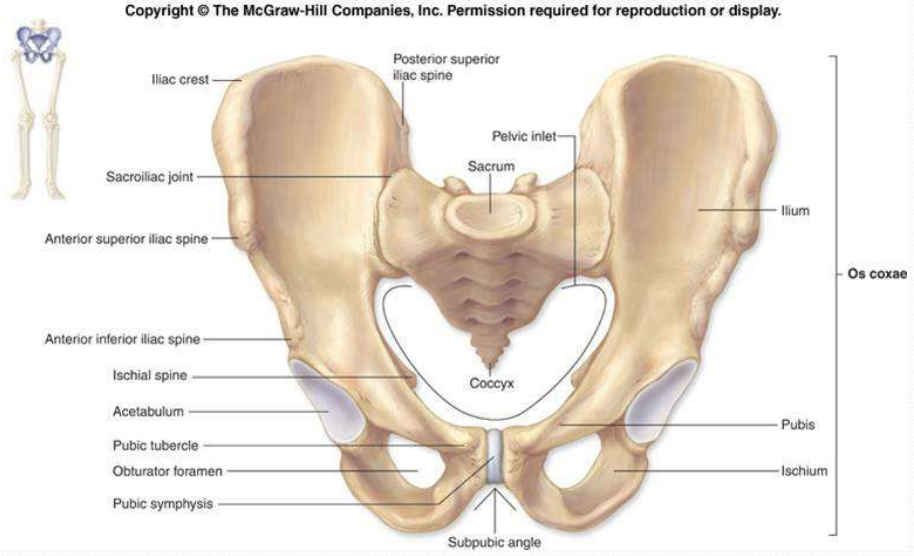
- The pelvis provides structure, strength for weight bearing and protect internal organs.
- The femoral head & neck lie within the joint capsule of the hip joint
- Head of femur moves with the acetabulum, supported by ligaments
- The pelvis forms a ring, made up of the sacrum, and 2 innominate bones, each made up of an ilium, pubic bones and ischium
- The bones are supported by strong ligaments
- The pelvis has a rich blood supply from the internal & external iliac arteries



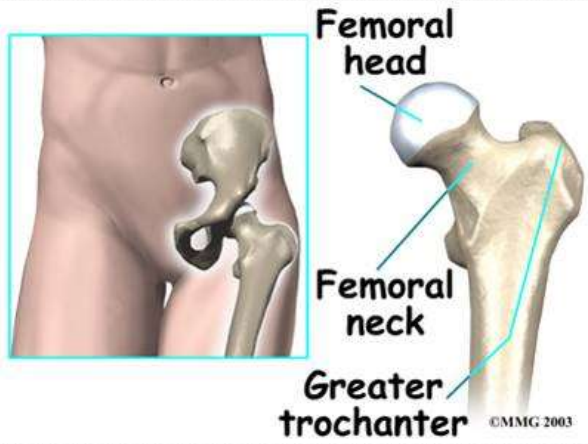
8.2
Femoral triangle: bones

1 Iliac crest
2 Iliac tubercle
3 Anterior superior iliac spine
4 Superior pubic ramus
5 Pubic tubercle
6 Symphysis pubis
7 Body of pubis
8 Inferior pubic ramus
9 Head of femur
10 Lesser trochanter

HIP

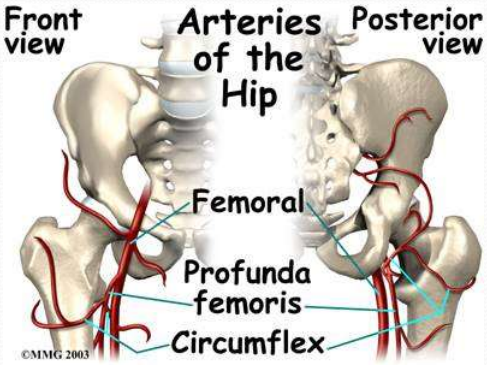


Femur



The femur is divided into the head, neck, shaft and has a bony prominence (greater trochanter), which serves as attachments for muscles

Arterial supply



The blood supply to the head of the femur comes from the femoral artery, with circumflex branches around the neck of the femur, off which smaller branches supply the head.

Intracapsular fracture of the proximal femur may severely disrupt the blood supply, the avascular necrosis occur

LOOK

- Undress your patient down to their underwear
- Observe the patient whilst they are standing, at all angles
- Observe the patient walking, looking at gait and pelvic movements
- Observe Patient Lying Supine
  - Looking for muscle atrophy, scars, bruising or erythema
  - Look for any obvious discrepancy in leg length-

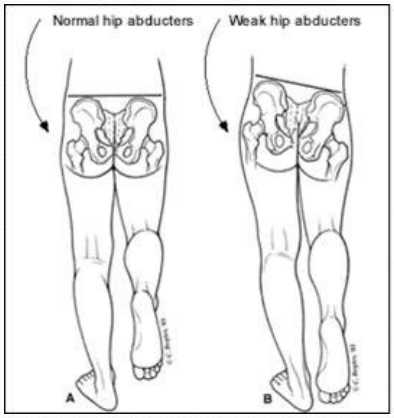
Gait

Normal

Note the angle of the pelvis drops on the weight bearing leg on normal gait

Abnormal

The pelvis on the non weight bearing legs , when weight bearing in the affected hip- Trendelenburg gait



GALS SCREENING

GALS examination *(gait, arms, legs and spine), is often used as a quick screening tool to detect locomotor abnormalities and functional disability in a patient*

Screening questions

1. ***"Do you have any pain or stiffness in your muscles, joints or back?"***
   - Screens for common symptoms present in most forms of joint pathology (e.g. osteoarthritis, rheumatoid arthritis, ankylosing spondylitis).
2. ***"Do you have any difficulty getting yourself dressed without any help?"***
   - Screens for evidence of fine motor impairment and significant restriction joint range of movement.
3. ***"Do you have any problem going up and down the stairs?"***
   - Screens for evidence of impaired gross motor function (e.g. muscle wasting, lower motor neuron lesions) and general mobility issues (e.g. restricted range of movement in the joints of the lower limb).

Rf: Potter (2022)

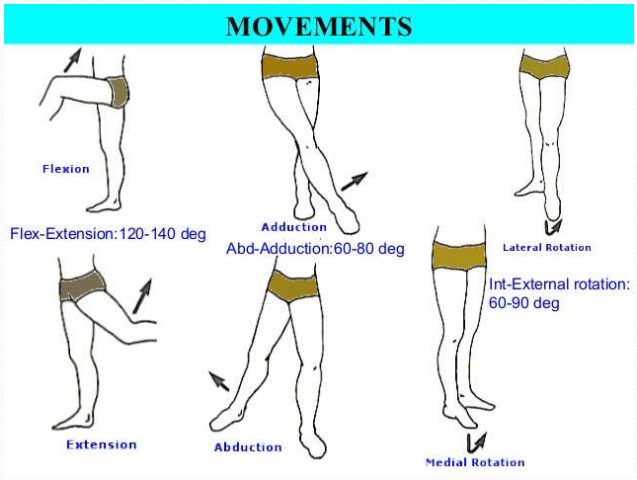
GALS video

Feel

- Palpate around the hip area, very few bony land marks can be felt.
- Palpate the greater trochanter
- Feel around inguinal area, feeling for tenderness, heat and lymph nodes
- Make sure you examine back and knee.
- Neurovascular assessment

Move

- Always compare one side with the other
- Make sure that the pelvis is fixed in order to see the true movement of the hip
- Main movements are:
  - Flexion-extension
  - Internal – external rotation
  - AB & ADduction



FABERS test

- FABER stands for **F**lexion, **AB**duction, and **E**xternal **R**otation of the hip.
- Ask the patient to lie supine on the exam table.
- Place the foot of the effected side on the opposite knee.
- Pain in the groin area indicates a problem with the hip and not the spine.
- Press down gently but firmly on the flexed knee and the opposite anterior superior iliac crest.
- Pain in the sacroiliac area indicates a problem with the sacroiliac joints.

FALLS

NICE (2013) defines a fall as 'an unintentional or unexpected loss of balance resulting in coming to rest on the floor, the ground, or an object below knee level'.

SPLATT …

- Symptoms
  - Dizziness, light-headedness, vertigo chest pain, palpitations (arrhythmias)
  - Syncope /postural hypotension/LOC/
  - Any neuropathy
  - Change in eye sight
  - Medication
- Previous falls
  - Is this first fall (acute event) or one of many (frailty/dementia)
  - 50% of falls are recurrent
- Location
  - Falls occurring outdoors have a better prognosis than those in the home –as fitter
- Location
  - Falls occurring outdoors have a better prognosis than those in the home
- Activity
  - Walking, hanging out washing, extending neck, standing on chair ?
- Time
  - Getting out of bed, after taking tablets, after a meal, when coughing/straining/ passing urine
- Trauma sustained

Ref; Nicholl & Wilson 2007

Sequelae of ….

Falls

- Friction burns from carpets
- Significant burns (eg radiator)
- Fear of falls(up to 30%)
  - Loss of confidence, immobility
- Anxiety/depression
- Anxiety in carers
- Move to safer envionment

Long lie (> 1hr on floor)

- Pressure sores
- Rhabdomyolysis
- Hypothermia
- Hypostatic pneumonia
- 50% of those who lie on the floor for > 1 hr are dead within 6/12- even if no injury sustained from the fall

Ref; Nicholl & Wilson 2007

CWTCH= HUG in Welsh…

- Nursing home staff in Wales are trialing a new checklist for when an older person falls
- Prolonger time lying on the floor can cause serious physical harm such as pneumonia and dehydration
- Even if not safe to move the person, consider offering pain killers and fluid

- **C**an you move them ?
- **W**ill it harm the person- for example by causing any new neck or backpain ?
- **T**reat – dress wounds or offer pain relief
- **C**up of tea-offer fluid or food
- **H**elp- know when to call an ambulance or doctor

Ref: rcni.com/cwtch

Lying & Standing Blood Pressure

- It is evidence-based.
- A drop in blood pressure (BP) on standing (orthostatic hypotension – OH) is a common occurrence in acutely unwell hospitalised patients and is a risk factor for falls.

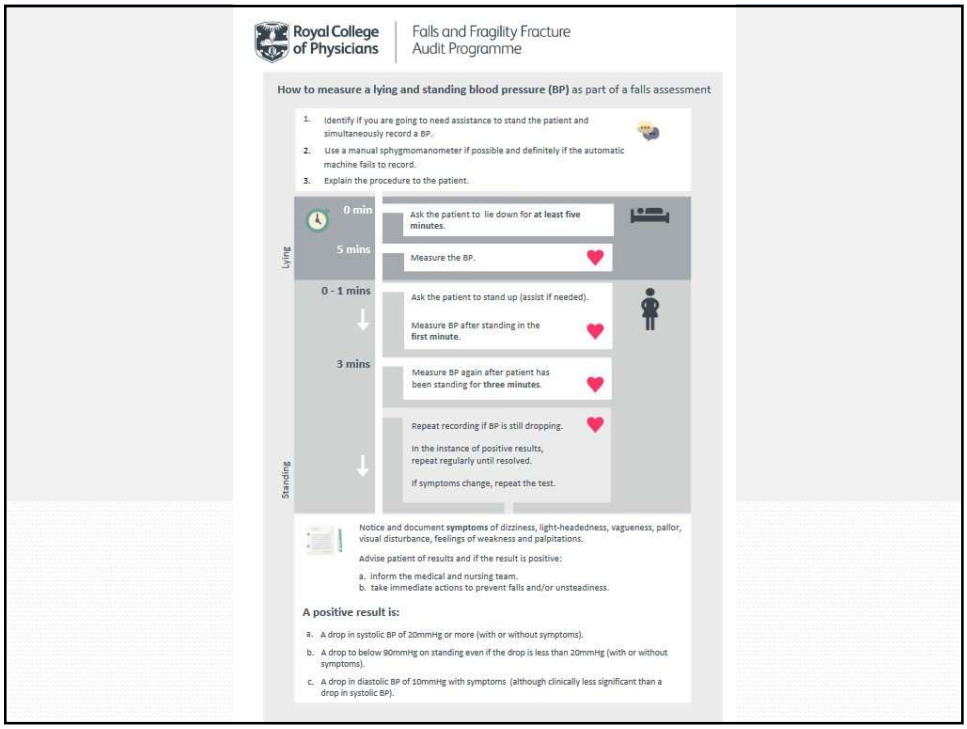
Lying & Standing BP

- Explain procedure to the patient.
- The first BP should be taken after lying for at least five minutes.
- The second BP should be taken after standing in the first minute
- A third BP should be taken after standing for three minutes
- This recording can be repeated if the BP is still falling
- Symptoms of dizziness, light-headedness, vagueness, pallor, visual disturbance, feelings of weakness and palpitations should be documented

A positive result is:

- A drop in systolic BP of 20mmHg or more (with or without symptoms)
- A drop to below 90mmHg on standing even if the drop is less than 20mmHg. (with or without symptoms)
- A drop in diastolic BP of 10mmHg with symptoms (although clinically much less significant than a drop in systolic BP)
- Take immediate actions to prevent falls and or unsteadiness

REF: RCP, 2017



Royal College of Physicians | Falls and Fragility Fracture Audit Programme

How to measure a lying and standing blood pressure (BP) as part of a falls assessment

1. Identify if you are going to need assistance to stand the patient and simultaneously record a BP.
2. Use a manual sphygmomanometer if possible and definitely if the automatic machine fails to record.
3. Explain the procedure to the patient.

Lying

0 min — Ask the patient to lie down for **at least five minutes.**

5 mins — Measure the BP.

Standing

0 - 1 mins — Ask the patient to stand up (assist if needed).

Measure BP after standing in the **first minute.**

3 mins — Measure BP again after patient has been standing for **three minutes.**

Repeat recording if BP is still dropping.

In the instance of positive results, repeat regularly until resolved.

If symptoms change, repeat the test.

Notice and document **symptoms** of dizziness, light-headedness, vagueness, pallor, visual disturbance, feelings of weakness and palpitations.

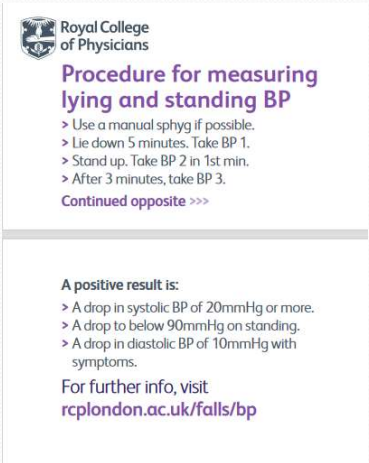
Advise patient of results and if the result is positive:

a. inform the medical and nursing team.
b. take immediate actions to prevent falls and/or unsteadiness.

A positive result is:

a. A drop in systolic BP of 20mmHg or more (with or without symptoms).
b. A drop to below 90mmHg on standing even if the drop is less than 20mmHg (with or without symptoms).
c. A drop in diastolic BP of 10mmHg with symptoms (although clinically less significant than a drop in systolic BP).

RCP: Laynards



Royal College of Physicians

Procedure for measuring lying and standing BP

> Use a manual sphyg if possible.
> Lie down 5 minutes. Take BP 1.
> Stand up. Take BP 2 in 1st min.
> After 3 minutes, take BP 3.

Continued opposite >>>

A positive result is:

> A drop in systolic BP of 20mmHg or more.
> A drop to below 90mmHg on standing.
> A drop in diastolic BP of 10mmHg with symptoms.

For further info, visit
rcplondon.ac.uk/falls/bp

Hip Fracture

- Majority of Hip fractures occur in older patients because of **low energy trauma** (e.g. a fall from standing height).
- Other causes
  - High energy trauma: may cause neck of femur fractures in younger patients
  - Pathological fractures: fracture in a diseased bone (due to a tumour or infection) Reduced bone mineral density: osteopenia and osteoporosis.
  - May be seen in younger patients due to long term corticosteroid use, alcohol consumption or malnutrition.
  - Stress fractures: less common
- SYMPTOMS :
  - Pain: in the hip, groin or knee
  - Unable to weight-bear
    - But if impacted: some patient may still be able to walk
  - Decreased or painful mobility of the affected hip

Clinical examination

- Examination of the hip is necessary but avoid excessive movement
  - Affected leg is shortened, externally rotated and abducted
  - Palpation of the hip produces pain
  - Unable to perform a straight leg raise (useful for discerning occult hip fractures)
  - Pain on gentle internal and external rotation of the affected leg (log roll test)
  - Soft tissue symptoms: bruising and swelling in and around the hip area

KNEE

Important knee considerations

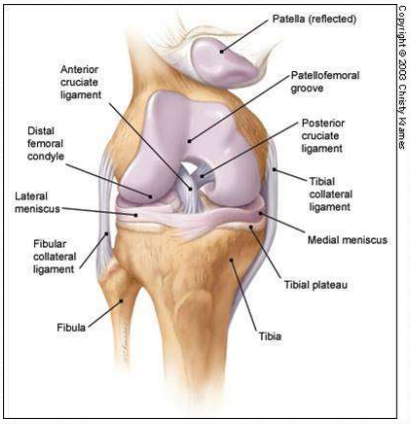
- The largest **synovial joint** of the human body;
- Undergoes under tremendous stress, as it works as **shock absorber;**
  - Patello-femoral loading: when going upstairs 3.5 times the body weight goes through the patellofemoral joint.
- Most of the injuries are **soft tissue injury** and only the 6-12 % of the injury resolve with a facture.

<u>The function of this joint:</u>

- Movements;
- Shock absorber;
- Gives stability;

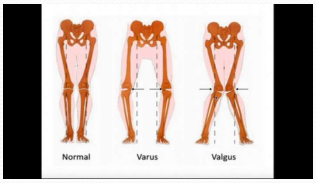
Knee

- Bones x 3
  - Femur
  - Tibia
  - Fibula
- Patella – sesamoid bone
- Ligaments for stability

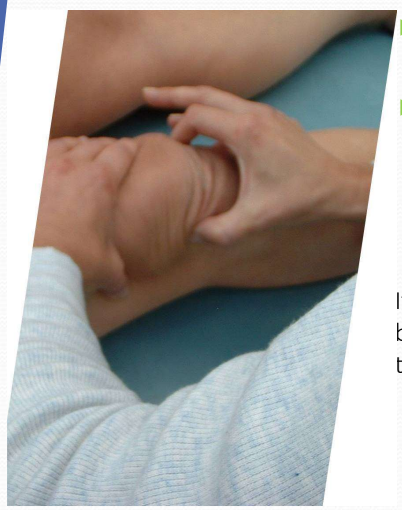


Look:

- Patient gait and weightbearing.
- Swelling (Localise, diffuse, dimension …)
- Erythema
- Bruise
- Wound
- Scar (previous surgery ?)
- Muscle wasting (palpate the quadriceps and hamstring muscles)
- Varus or Valgus knee



Effusion

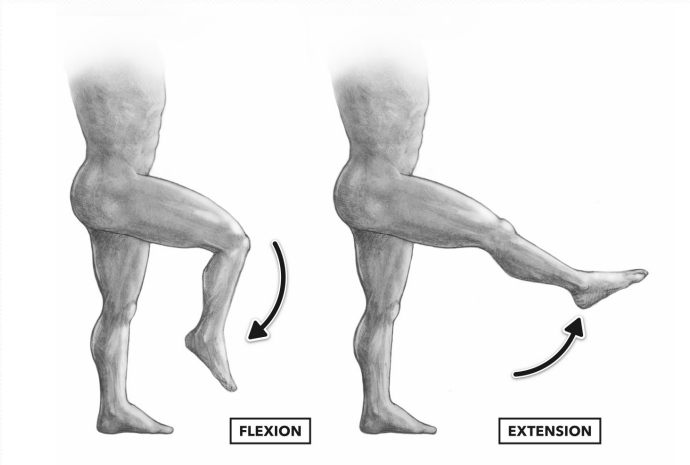


- Keep knee straight and the quadriceps relaxed
- Position right index finger & thumb gently on either side of distal pole of patella
- Gently push the suprapatellar pouch fluids into the joint (Milking down) sweeping medially to lateral without displacing patella.

If there is an effusion, you will see/feel fluid bulging through either side of the patella tendon.

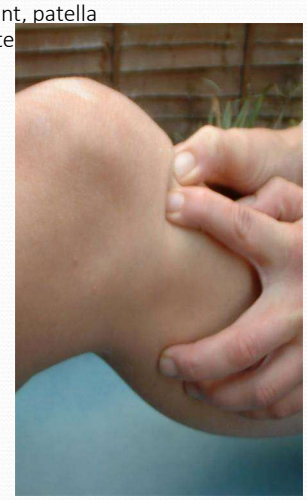
MOVE

Test ability to Straight Leg Raise



Feel / Palpation

Purcell (2017) advices to perform the palpation of the knee structures in **Full extension** of the knee joint for the patellofemoral joint, patella and **in 90-degree flexion** for the menisci and tibia plate



Palpate:

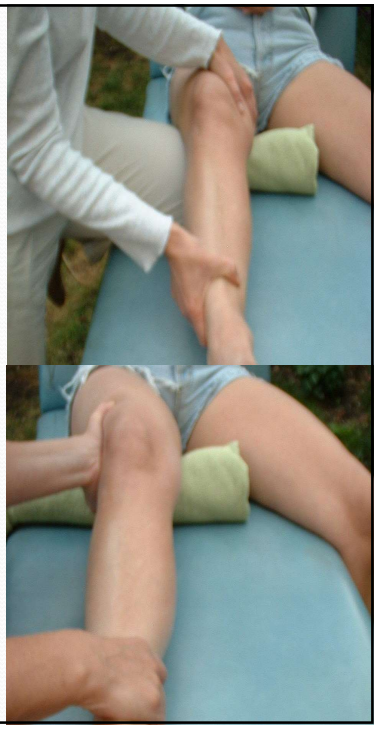
- Joint line (proximal and distal joint)
- Ligament insertions
- Tendons
- Condyles
- Fibular head
- Tibial tubercle
- Patella
- Popliteal fossae (Baker Cyst)

FEEL

- Temperature (use back of hand)
- Effusions
- Pulses (popliteal & pedal)
- Sensation: Peroneal nerve

Collateral Ligaments stress test

- Flex the knee 10- 15°
- Relax quadriceps by placing your knee under the patients' thigh. If possible, lie patient down.
- LCL: Gently pull the upper thigh toward you and push the lower leg away to stress the lateral ligament.
- MCL: gently push away the upper thigh and pulling the lower leg toward you to stress the medial ligament.
- Compare with uninjured knee for Laxity of the ligament



Anterior and Posterior Draw test

Use for the assessment for the cruciate ligaments

ACL:

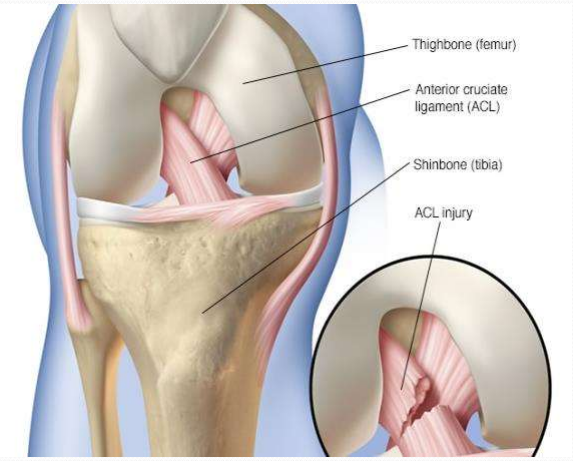
- Flex the knee at 80-90°
- Sit on patient foot.
- Grab the tibia and pull toward you.

PCL:

- Flex the knee at 80-90°
- Sit on patient foot.
- Grab the tibia and push toward the patient.

Assess for Laxity and pain

Cruciate Ligament Injuries



ACL most subject to injury;

MOI:
Sudden change in direction when running or slowing down running;
Twisting of the knee with a Varus movement

PCL
MOI:
common in motorbike accident (dashboard)

Group 1

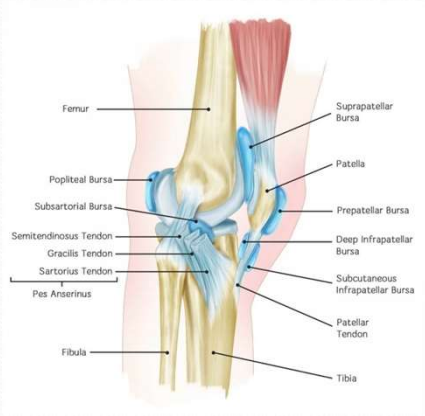
Grind Test:

great variant of McMurray,

Limitation:
- swelling knee
- anterior knee pain.

- Lie the patient on a prone position.
- Flex the leg at 90°
- Apply pressure on the ankle pushing down onto the knee.
- Gentle perform rotation of the tibia onto the knee

Knee Bursitis

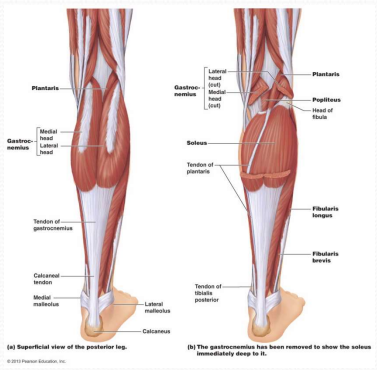


To x-ray or not to x-ray?

- **Ottawa Knee Rules**
  - aged 55 years or over
  - tenderness at the head of the fibula
  - isolated tenderness of the patella
  - inability to flex knee to 90 degrees
  - inability to bear weight (defined as an inability to take four steps, ie. two steps on each leg, regardless of limping) immediately and at presentation

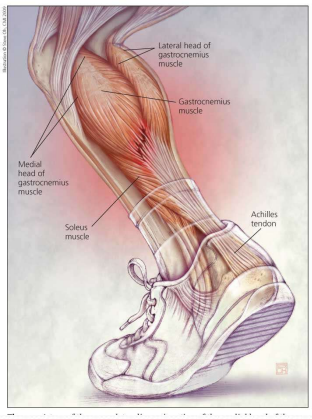
- **Pittsburgh Knee Rules**
  - Blunt trauma or a fall as mechanism of injury plus either of the following:
  - Age younger than 12 years or older than 50 years
  - Inability to walk four weight-bearing steps in the emergency department

Lower leg/calves



Lower limb injuries

Achilles Rupture



Gastrocnemius Tear

Tears of the gastrocnemius

- Hx: Pain in the back of calf whilst performing some activity (common in badminton but also known as tennis leg)

Examination:

- Problems weight bearing
- Passive dorsiflexion limited particular with an extended knee
- Tenderness over specific head of muscle

CHECK ACHILLES TENDON

Treatment:

- Usually resolves spontaneously 3-4 weeks-physio helpful
- Heel raise may help
- Crutches

Medial and lateral head of gastrocnemius.

Usually well defined and identifiable

Achilles tendon

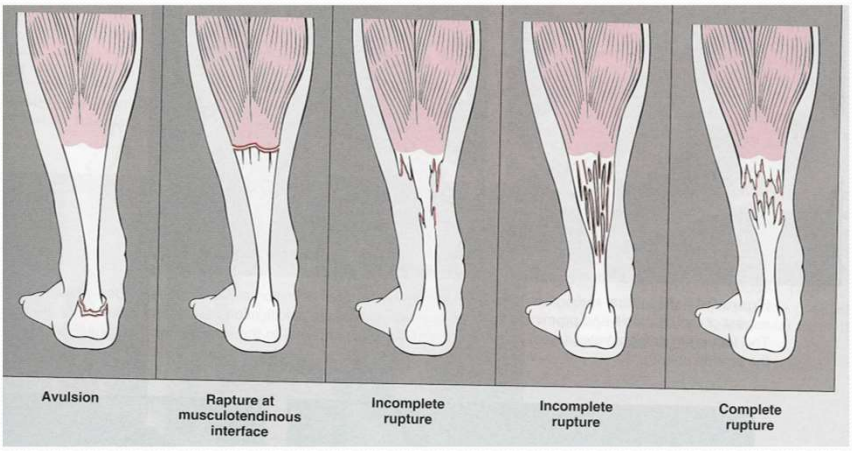
- History: Sudden onset of severe, sharp pain at the back of the heel/calf whilst running or playing sport.
- **LOOK**: soon after injury, there may be little swelling. Note any flattening of Achilles tendon
- **FEEL**: Tenderness over Achilles tendon, there may be a palpable gap but this is not always present.
- **MOVE**: The patient may still be able to planter flex due to the actions of flexor hallucus longus and the long flexors of the toes, but this is usually weak and painful.

The patient will be unable to stand on metatarsal heads

Simmons test (Calf squeeze test)

- Lie patient down or kneel on a chair with both feet hanging over seat.
- Squeeze calf – and note planter flexion
- If there is little or no planter flexion, the Achilles tendon must be assumed to be ruptured.
- Both sides must be tested
- Treatment: refer to orthopaedics for conservative (POP with foot in planter flexion) or surgical repair

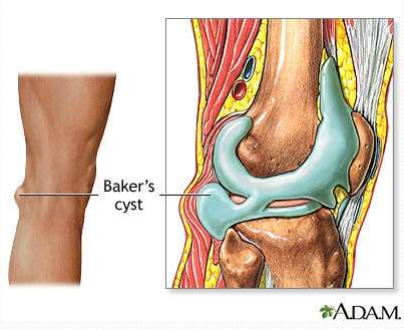
Different types of rupture



(Greenspan, 2000:p.313)

Bakers cyst

- Accumulation of joint fluid that forms a cyst in a synovial in association with knee joint
- Usually seen in patients with arthritis of the knee
- May rupture suddenly causing intense pain in calf
- Tenderness & swelling more diffuse than is Achilles rupture or gastrocnemius rupture
- Difficult to differentiate from DVT (more a dull, aching pain)
- Treatment: Initially conservative: Ice, analgesia. Occasionally drainage and/or corticoid injection



- Rarely surgery –depends on cause
- May rupture- ortho or rheumatology advice

Ruptured Bakers cyst

Dissecting down the calf is a bright fluid collection from a ruptured Baker's cyst (arrows) conspicuous against the low signal background on this fat suppressed sequence.

Deep Vein Thrombosis

Symptoms:
- Pain: groin, thigh, popliteal, calf or foot
- Swelling
- Heat
- Colour changes
- Tenderness

High Risk Factors:
- Female on oral contraceptive pill
- Recently long distance travel
- Recent surgery (esp. abdominal, pelvic & lower limb)
- Previous PE or DVT
- Polycythamia
- Pregnant or post partum
- Immobility –whole body and/or leg
- Hx of DVT within young, first degree relative
- Known malignant disease
- Recent MI (within 6 weeks)

Treatment;
- Use Wells score

Wells Score

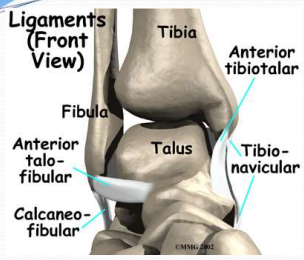
Clinical feature	Points
Active cancer (treatment ongoing, within 6 months, or palliative)	1
Paralysis, paresis or recent plaster immobilisation of the lower extremities	1
Recently bedridden for more than 3 days or major surgery within 12 weeks requiring general or regional anaesthesia	1
Localised tenderness along the distribution of the deep venous system	1
Entire leg swollen	1
Calf swelling 3 cm larger than asymptomatic side	1
Pitting oedema confined to the symptomatic leg	1
Collateral superficial veins (non-varicose)	1
Previously documented DVT	1
An alternative diagnosis is at least as likely as DVT	-2
Clinical probability simplified score	
DVT "likely"	2 points or more
DVT "unlikely"	1 point or less

ANKLE & FOOT

Ankle

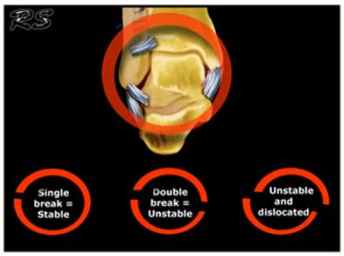
- Complex Joint
- Supports all the body weight
- Essential for proper walking and running motion
- Acts as spring/shock absorber through arches of the foot.

ANKLE Anatomy



Stability of the ankle

The ankle can be thought of as a ring in which bones as well as ligaments play an equally important role in the maintenance of joint stability.



If the ring is broken in one place the ring remains stable.
When it is broken in two places, the ring is unstable and may dislocate

Reference: http://www.radiologyassistant.nl/en/p4b6d817d8fade/ankle-fracture-mechanism.html

Ankle

Expose both legs up to the knee joint

Inspect –
- Compare limbs for any bruising, swelling.
- Assess calf bulk and tone

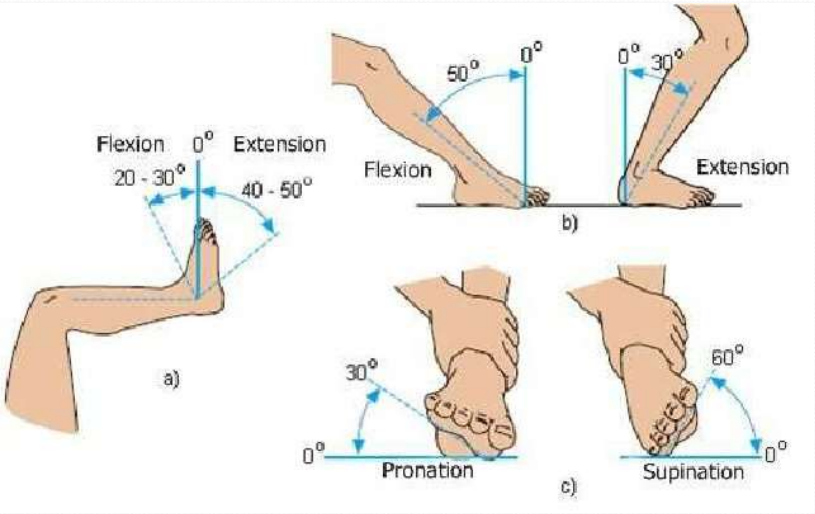
Feel – Knee – fibular head
Tibia
Medial malleolus + ligament
Foot – MT joints
- base of 5th MT
Lateral ligaments
Lateral malleolus

Move – **(Active, Passive)**
- **position for examination?**
- Inversion
- Eversion
- Flexion
- Dorsi flexion

Function-
- observe the patient walking – *may take some persuasion*
- check proprioception in chronic ankle problems

Nerves and Vessels
- ankle pulses
- capillary refill

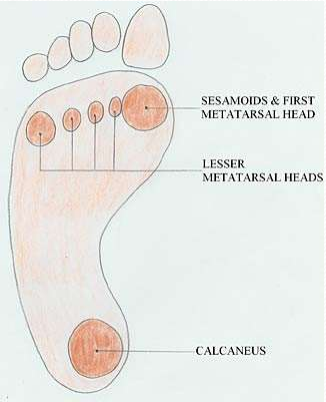
Sensation to touch



Weight distribution

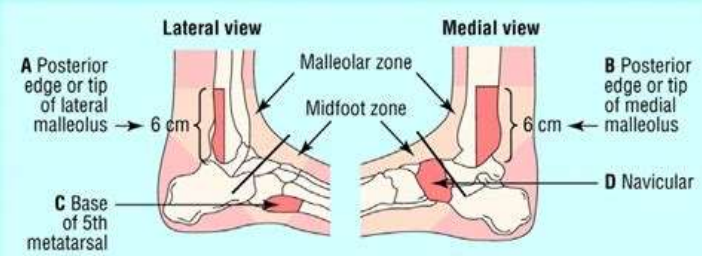
The weight of the body is supported by the foot, and is transmitted and distributed over 6 areas; the calcaneus in the heel, the sesamoids of the first metatarsal head, and the 2nd, 3rd, 4th and 5th metatarsal heads.

During normal gait the foot supports loads of up to 7 times bodyweight, and during barefoot gait, the forefoot actually encounters three times as much load distribution as the hindfoot.



Abnormal weight distribution

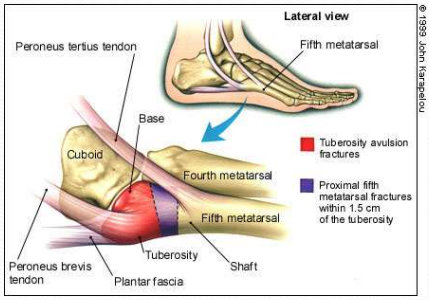
Ankle – to x-ray or not to x-ray?



An ankle x ray series is required only if there is any pain in malleolar zone and any of these findings:
- Bone tenderness at **A**
- Bone tenderness at **B**
- Inability to bear weight both immediately and in emergency department

A foot x ray series is required only if there is any pain in midfoot zone and any of these findings:
- Bone tenderness at **C**
- Bone tenderness at **D**
- Inability to bear weight both immediately and in emergency department

Base of 5th MT



Lisfranc

PLANTER FASCIITIS

Anatomy

- Planter fasciitis is the most common foot problem and one of the hardest to overcome.
- The plantar fascia is a thick fibrous tissue that attaches to the heel bone (calcaneus's) and spans across the bottom of the foot and arch and attaches to the back of the toes.
- It acts like a bowstring to maintain the arch of the foot

Contributing factors

- Flat (pronated) feet
- High arched rigid feet
- Poor shoe support
- Short shoes
- Walking/running uphill
- Soft terrain (sand)
- Increasing age
- Sudden weight increase-Seen in 40% of men and 90% of obese women
- Tight calf muscles and/or Achilles Tendon
- Occupation involving prolonged weight bearing (eg hair dressers, nurses)

When the calves are tight, the Achilles tendon pulls the heel bone upward, thus pulling the fascia tight (Left). When the calf muscles are stretched the less pull on the heel bone, thus less pull on the fascia (right).

Patients will classically present with symptoms that are worst getting out of bed or prolonged sitting and then decreases during the day

Treatment

Identification & elimination of risk factors

Medication: Anti-inflammatory to relieve pain. Over the counter drugs such as Ibuprofen are useful.

Rest

Stretching: It is absolutely necessary to do the stretches at least 2 times a day to find relief from plantar fasciitis. Stretching the calf muscles without re-injuring the fascia 2 times a day and especially before getting out of bed in the morning is well known to be a cure for many people.

Heel raise and other insoles: to maintain the long arch to keep the plantar fascia as short as possible and prevent further injury.

Ice: Very useful. Cold can of drink helpful under ach

Night Splints: In chronic cases, a dorsiflexion night splint is used- prevents re-injury upon rising.
Surgery: Surgery is rarely required for plantar fasciitis. It would only be considered if all other treatments fail.

Plantar fasciitis Rx

GOUT

Common condition- approx 200-275 people per 100.000 in western societies

•Disordered urate metabolism or excretion-

- •Uric acid is end product of breakdown from certain food
- •When levels are high, tissues become saturated and crystals forms which in turn triggers an immune response releasing inflammatory cytokines : causing swelling and pain

•75% of cases involves 1st metatarsal-phalangeal joint, but ankles, mid-tarsals and knee joints also presents acutely

•Presents with intense pain-tight overlying skin, redness, hot to touch

(Perry, 2019)

GOUT –cont.

RISK FACTORS

- Dietary factor – see table
- Alcohol (eg beer is very rich in purine)
- Metabolic syndrome & obesity
- Renal disease
- Certain medication

SIGNS & SYMPTOMS

- Acute pain at site
- Joint becoming swollen and red and tender to touch

(Perry, 2019)

Medication causing gout	
Anti TB drugs	Some causes reduction in excretion of uric acid- others, increased uric acid absorption
Aspirin	Decreased uric acid secretion
Diuretics	Increased uric acid reabsorption
Chemotherapy	Disruption of tumour cells causes hyperuricaemia
Testosterone	Increased uric acid reabsorption
Immunosuppressant drugs	Increase uric acid reabsorption
Ticagrelor	Increased synthesis and decreased secretion

(Perry, 2019)

Food rich in purines	
High Purine content	***Moderate Purine content***
Offal	Meat
Game	Poultry
Oily fish	Beans & legumes
Meat & yeast extracts	Certain veg eg cauliflower, spinach, asparagus
Seafood	Whole grains

Gout treatment- NICE (2018)

TREATMENT

- 1st Line NSAIDS : Naproxen & PPI
- Colchicine
  - 2nd line tx: 20% will get side effects (GI):
- If unable to tolerate Colchine and NSAIDS :
  - Intra articular corticosteroids
  - Oral corticosteroids 30-40mg OD for 5-7 days
- Elevation
- Ice packs
- Life style advise (if applicable)

FOLLOW UP

-Allopurinol for repeat attack – GP (4-6 weeks after acute attack)

Any questions?

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