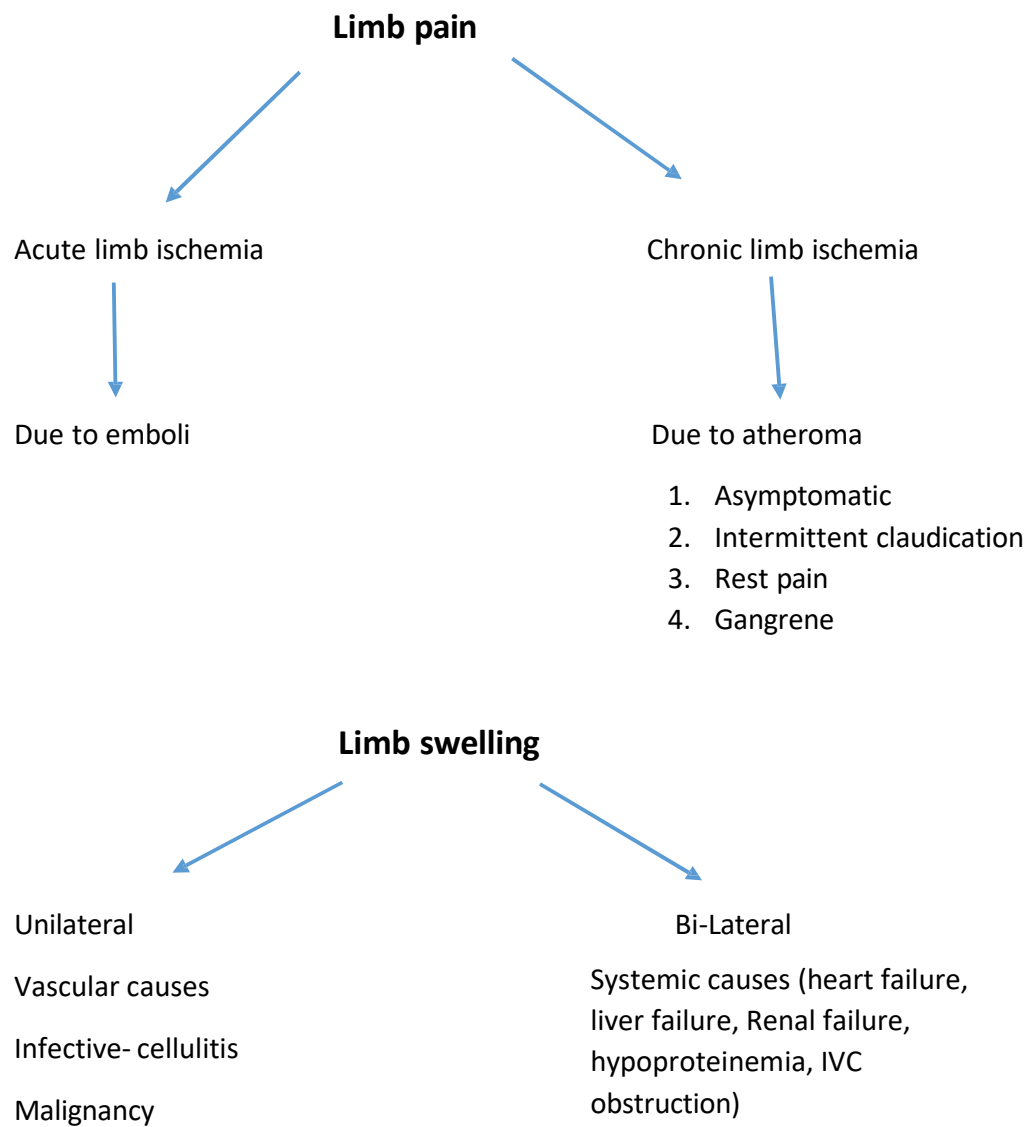
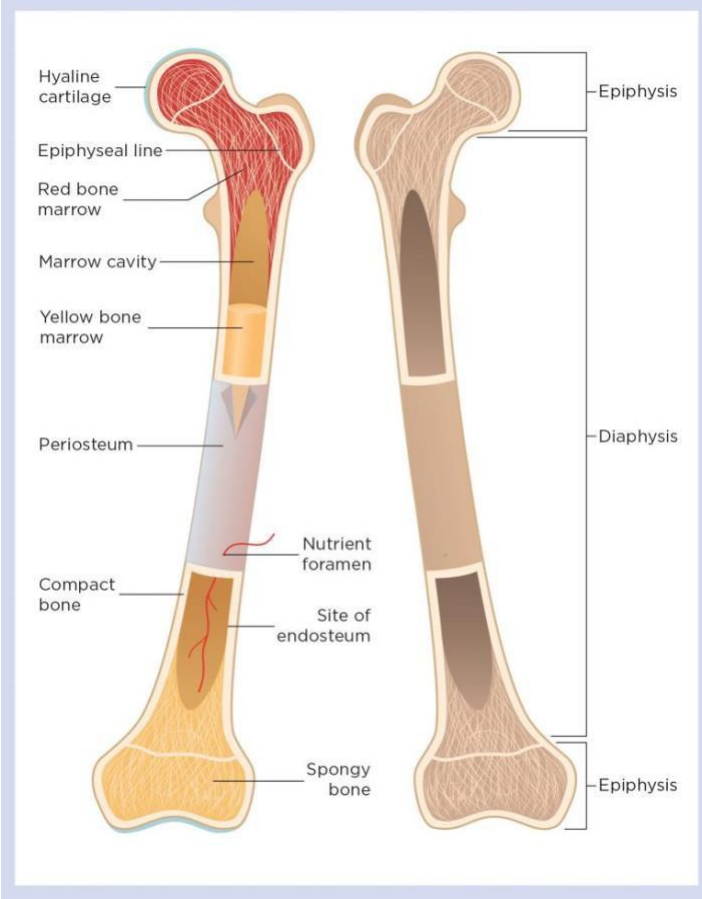


Limb pain and swelling (atraumatic) workup



Traumatic Upper Limb and Lower Limb Injuries

Fig 1. Bone structure



Checklist for evaluating plain films for fracture

- Check identity and date
- Minimum of two images AP and lateral, at right angles to each other
- Soft tissues
- Cortical outline
- Medullary cavities
- Joint space width and congruity
- Correlate abnormal findings with the site of symptoms

Open fractures

Open (or compound) fractures occur when there is a breach of the skin overlying the fracture. They may result from sharp bone edges piercing the skin from the inside out, or from trauma to the overlying skin and subcutaneous structures. Those that are open from 'outside in' are at greater risk of infection and tend to have greater damage to other structures, such as muscles, nerves, and blood vessels.

Open Fracture Management

- Management should follow ATLS principles.
- Dramatic limb-threatening injuries must not distract you from 'ABCDE' management.
- Haemorrhage control should be dealt with in 'C' by the use of **direct pressure, elevation, and splinting**. If this is unsuccessful, **wound packing and/or indirect pressure at arterial pressure points** (e.g. brachial artery) may be necessary.
- If these steps do not control haemorrhage, and the *bleeding is life-threatening*, a **tourniquet may be required**.
- Fluid resuscitation should be guided by the patient's haemodynamic status.
- Intravenous morphine should be provided for analgesia.
- A photograph should be taken of the wound to avoid repeated undressing and examination before surgery.
- Any obvious contamination (e.g. large lumps of debris) should be removed.
- The wound should be irrigated with saline and then covered with a sterile moist dressing.
- Distal pulses should be marked and their presence recorded in the notes. A Doppler ultrasound probe should be used if pulses are impalpable.
- Sensation should be assessed and documented. Neurovascular status should be reassessed frequently.
- The limb should be immobilized in plaster or an appropriate splint.
- Broad-spectrum intravenous antibiotics should be given.
- Tetanus status should be established and a booster/immunoglobulin given if indicated

Compartment syndrome

Clinical features of compartment syndrome

The six 'P's of compartment syndrome

- Pain out of proportion to the injury and on passive stretch
- Paresthesia (late sign)
- Pallor
- Paralysis (late sign)
- Pulseless (late sign)
- Poikilothermic

Investigations for compartment syndrome

- X-ray—if the mechanism of injury suggests a possible fracture.
- Urine—should be tested for myoglobin. Laboratory results can take several days, however, myoglobin on a urinary dipstick tests positive for blood.
- CK and renal function—due to the high risk of rhabdomyolysis and renal failure.
- Coagulation screen—if disseminated intravascular coagulation is suspected.
- Intra-compartmental pressure measurement—may be helpful if the diagnosis is uncertain. If the difference between the intra-compartment and the diastolic pressure is <30 mmHg, then a fasciotomy is required.

Emergency department management of compartment syndrome

- High index of suspicion.
- Remove any restrictive dressings, casts, or splints.
- Intravenous morphine for analgesia.
- Avoid any nerve blocks which may mask symptoms.
- Urgent orthopaedic referral.

Upper Limb Injuries

Shoulder dislocations

Shoulder dislocations are a common injury presenting to the emergency department (ED). Anterior dislocations are the most common type; however, shoulders can also dislocate posteriorly or inferiorly.

- Anterior dislocation—forced external rotation/abduction of the shoulder.
- Posterior dislocation—blow to the anterior aspect of the shoulder; fall onto an internally rotated arm; strong muscular contractions during a seizure or electric shock.

Fractures of the distal radius

Colles' fracture

A Colles' fracture involves the distal radius with dorsal angulation. The X-ray appearances include:

- Posterior and radial displacement of the distal fragment.
- Dorsal angulation of the distal fragment (normally the articular surface of the distal radius has a 5° volar tilt on the lateral view).
- Radial angulation of the distal fragment (normally the articular surface of the distal radius has a 22° tilt in the ulnar direction on the AP view).
- Impaction, resulting in shortening of the radius relative to the ulna.

Such injuries are usually reduced in the ED under a haematoma block or Bier's block.

Smith's fracture

A Smith's fracture is a fracture of the distal radius with volar displacement and angulation. This is an unstable injury which usually requires operative fixation.

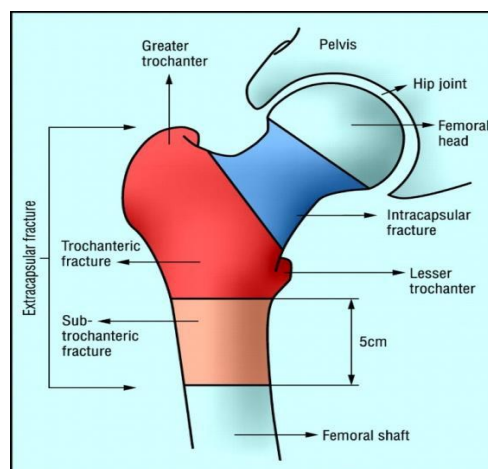
Lower limb injuries

Hip fractures

Neck of femur fractures are a common injury in the elderly, often resulting from low-energy falls in patients with pre-existing osteoporosis. Fractures in younger patients are usually the result of high-energy injuries.

The blood supply to the femoral head is derived principally from an arterial ring at the base of the neck. Fractures of the neck of the femur may lead to avascular necrosis of the femoral head, especially if they are intracapsular.

Level of fracture:



- Intracapsular
 - Subcapital
 - Transcervical
- Extracapsular
 - Basicervical/intertrochanteric
 - Pertrochanteric

Patients attending the ED with a suspected hip fracture should have the following management instigated:

- Adequate pain relief.
- Consideration of nerve block (such as fascia iliaca) if pain is poorly controlled with paracetamol and opioid analgesia
- Early radiology. If there is doubt regarding the diagnosis, MRI is the investigation of choice, although CT is a more readily available alternative.
- Fluid and electrolyte abnormalities measured and corrected.
- Anaemia identified and corrected.
- Any co-existing medical conditions optimized (e.g. uncontrolled diabetes, uncontrolled heart failure, acute chest infection, exacerbation of chronic chest condition, correctable arrhythmias, or ischaemia).
- Pressure sore prevention. Use of soft surfaces to protect the heels and sacrum. Those judged to be at very high risk should be nursed on an alternating-pressure air mattress.
- Fast tracking: Patients should be transferred to the ward within two hours of their arrival in the ED.

Ottawa knee and ankle rules

The Ottawa knee and ankle rules are well-recognized clinical decision rules used in the ED to determine which injuries require an X-ray. They have been extensively validated and shown to apply to children as well.

Ottawa knee rules

A knee X-ray series is only required for patients with knee injuries and any of the following findings:

- Age 55 years or older
- Isolated patella tenderness
- Tenderness of the head of fibula
- Inability to weight bear both immediately and in the ED (4 steps)

Ottawa ankle rules

An ankle X-ray series is only required if there is pain in the malleolar zone and any of the following findings:

- Bone tenderness over the posterior margin of the distal 6 cm of the lateral malleolus
- Bone tenderness over the posterior margin of the distal 6 cm of the medial malleolus
- Inability to weight bear both immediately and in the ED (4 steps)

A foot X-ray series is only required if there is pain in the mid-foot zone and any of the following findings:

- Bone tenderness at the base of the fifth metatarsal
- Bone tenderness over the navicular
- Inability to weight bear both immediately and in the ED