

Commonly Encountered Fractures

Traumatology
RHS 231
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Lecture 6

Fractures of the phalanges or metacarpals

- Accurate anatomical reduction and fixation is essential
- Immobilization should be as short as possible for good functional outcome



Following reduction of dislocation/fracture in the distal interphalangeal joint. The finger should be immobilized in a splint for 3 weeks. This is followed by strapping of the joint to minimize edema. The same splint can be used for **fractures of the middle and distal phalanges**, after manipulation under anaesthetic if necessary. Internal fixation is rarely necessary.



In dislocations of the proximal interphalangeal joint, **fractures of the proximal phalanx, and of the distal metacarpal**, the splint should extend into the palm as shown. It is left for 3 weeks.

Severe bruising and swelling over the dorsum of the hand due to a **fracture of the metacarpals.**



This **oblique fracture of the mid shaft of the 3rd metacarpal** is being adequately splinted by the other metacarpals.





Fractures of the neck of the metacarpal usually have an anterior angulation of 30 degrees or less. They require a simple aluminium splint extending into the palm for 3 weeks.



Severe fractures of the metacarpals with displacement, should be treated, if possible, with internal fixation with small plates or intramedullary nails.

Bennett's fracture

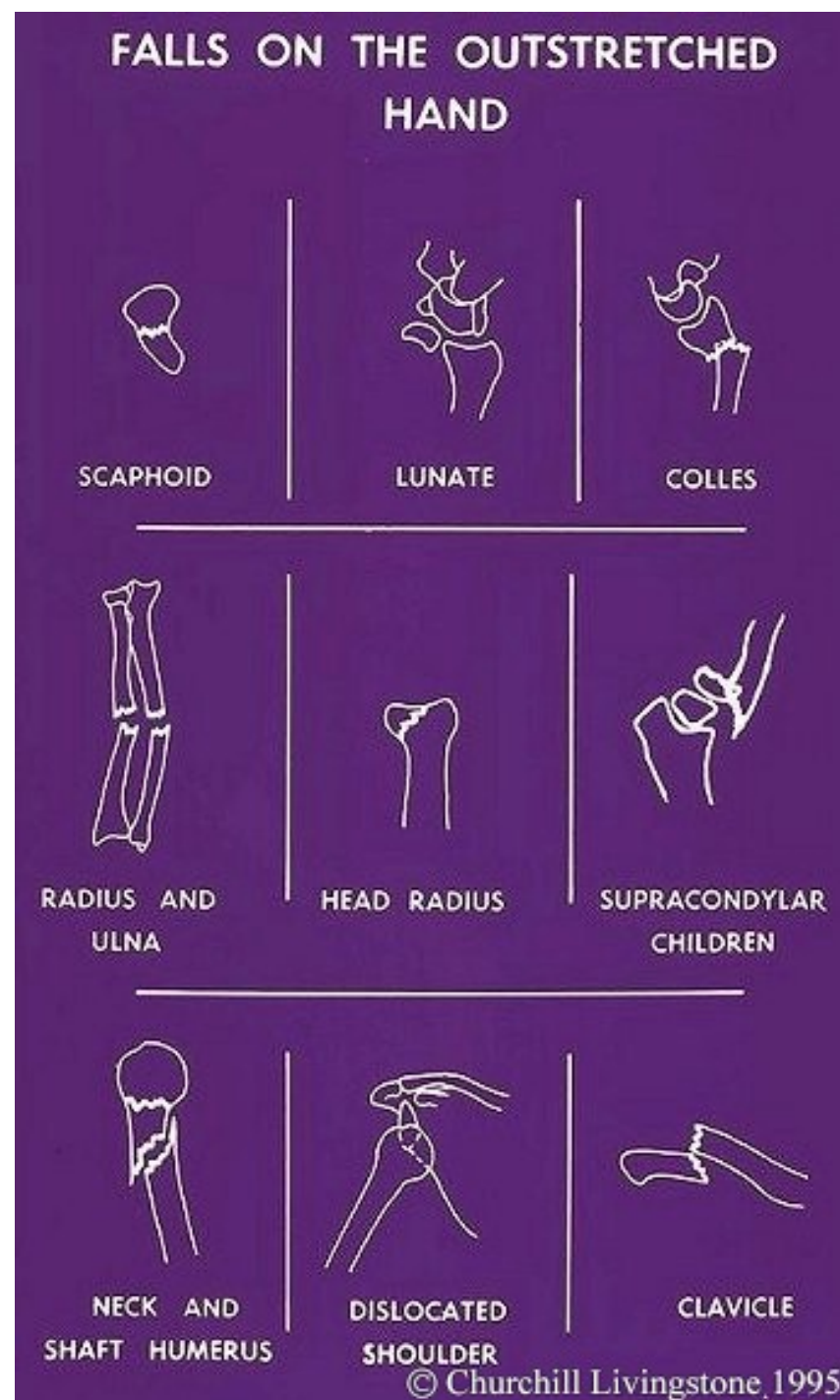
- A fracture dislocation affecting the carpometacarpal joint of the thumb



Bennett's fracture

The joint must be accurately reduced, then held in a plaster with the thumb fully adducted and the plaster extending up to the interphalangeal joint. If perfect reduction cannot be obtained by closed reduction, the fracture should be accurately internally fixed with either a wire or a screw.

- Supracondylar fractures are common in children
- Fractures of the neck of the humerus are common in elderly patients
- Anterior dislocation of the shoulder, and fracture of the clavicle are commoner in younger patients



Falls on the outstretched hand

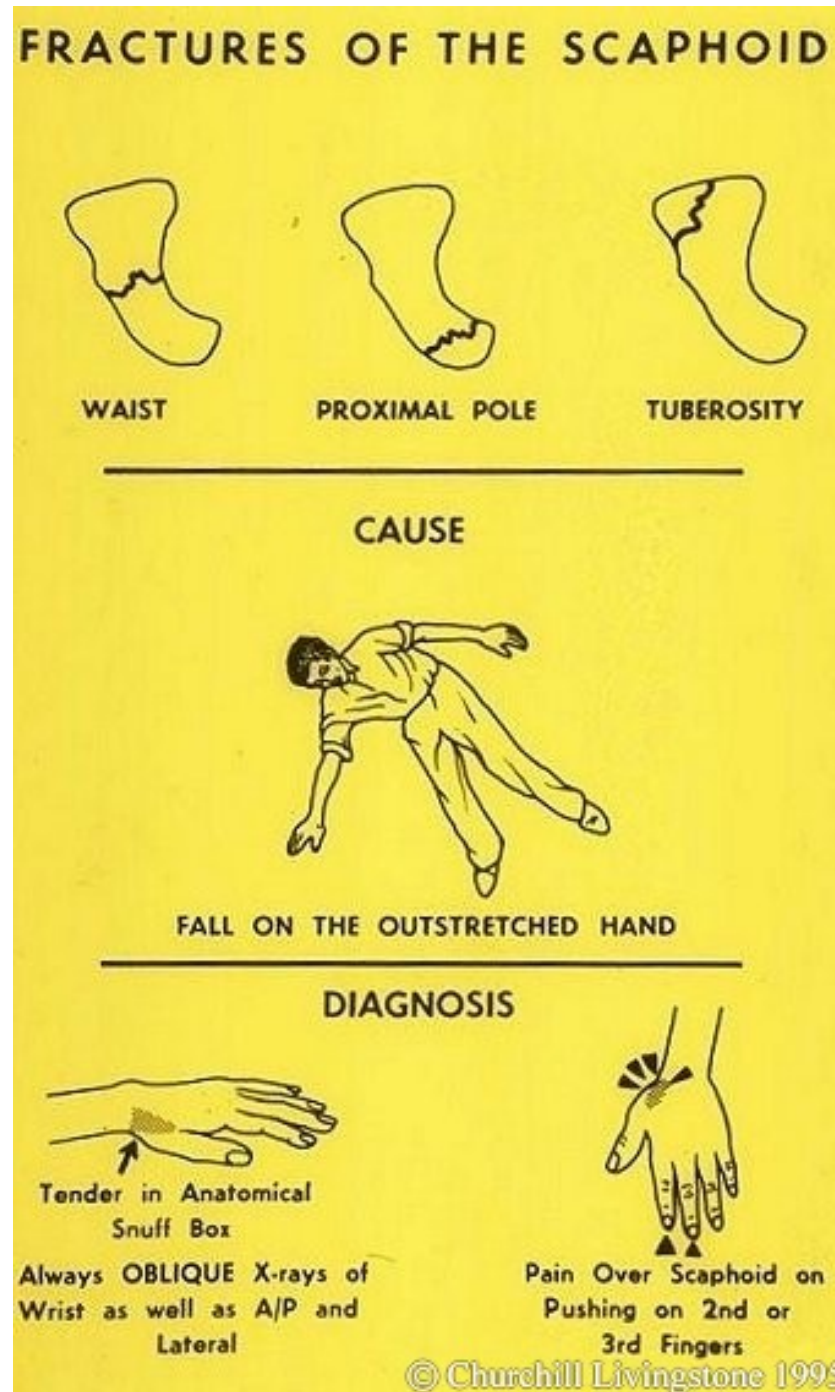
- May cause a variety of injuries:
 - Fractures of the **scaphoid** and anterior dislocation of the **lunate**
 - **Colles' fracture**
 - Fractures of the shaft of the radius and ulna, and of the head of the radius

Fracture of the scaphoid

- Common in young adults
- As the result of falls on the outstretched hand
- May be overlooked because:
 - The person considers it to be a strain
 - Or the fracture may not be visible in the initial X-ray
- Healing is slow and there may be non-union (can be prevented by early diagnosis and immobilization)

Fractures of the waist and proximal pole of the scaphoid are particularly liable to progress to non-union or *avascular necrosis*.

The patient should be examined for tenderness in the anatomical snuffbox, and for tenderness on proximal pressure on the 2nd and 3rd metacarpals.





Standard complete wrap **scaphoid plaster of Paris**. The wrist and thumb are held in the position that they would normally take in writing with a pen. This support is usually left in place for 8 to 12 weeks.



Scaphoid skelecast is a much lighter method of holding a scaphoid fracture.

Fractures unite more quickly in a skelecast than when immobilized by complete encasement in Plaster of Paris.

Colles' fracture

- Fracture of the distal end of radius
- Common in the elderly (following osteoporosis)
- The commonest fracture in elderly women
- Caused by a fall on the outstretched hand
- May result in the typical **dinner-fork deformity** (due to the displacement of the distal fragment toward the dorsum side)



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Dinner fork deformity of a Colles' fracture



This shows a plaster back slab used to hold the reduction of a **Colles' fracture**.

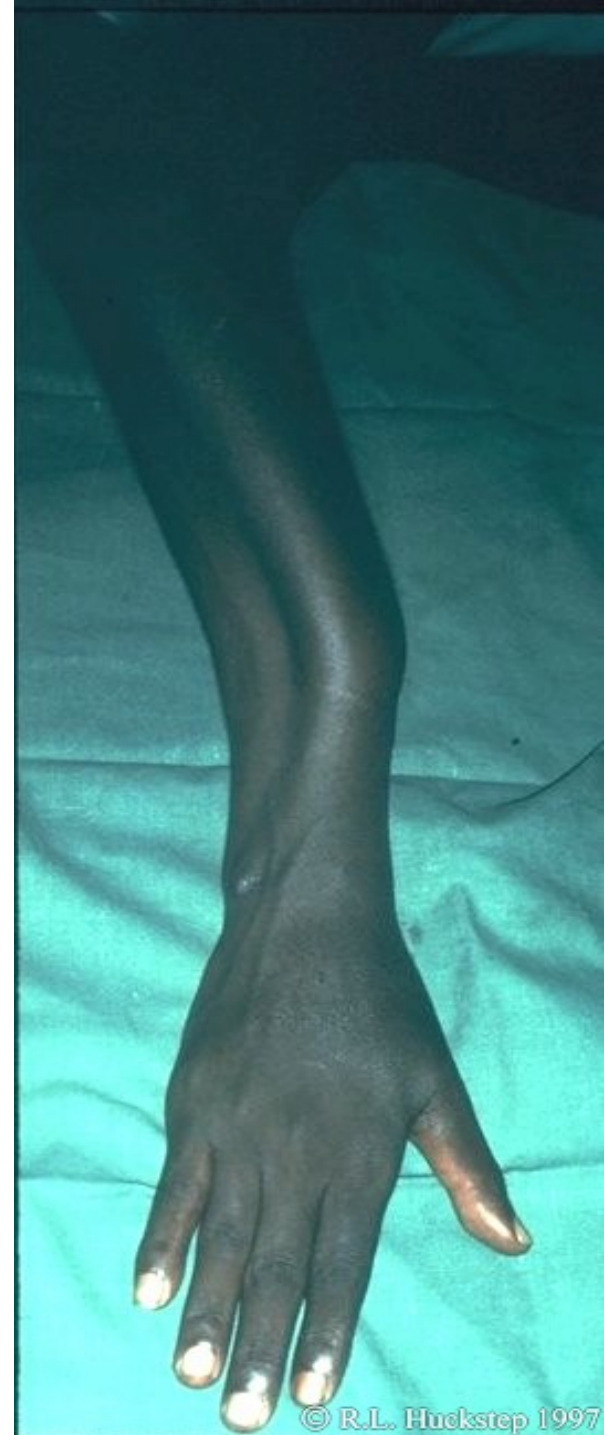
Fractures of the radius & ulna

- Common
- Untreated residual angulation will result in limitation of rotation of the forearm

Fractures of the radius & ulna

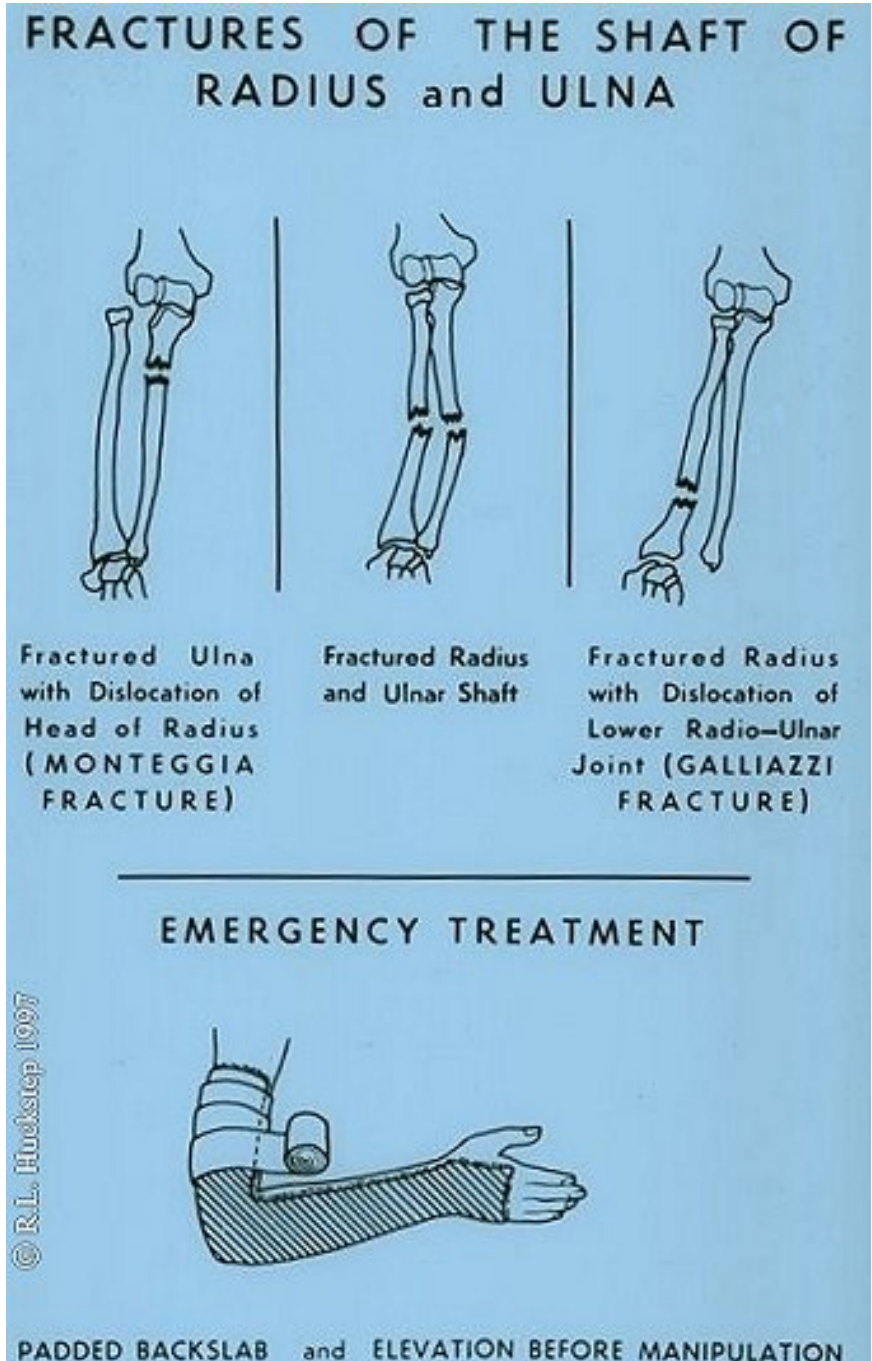
- **In children:** most cases should be treated with an *above elbow plaster* after manipulation. Internal fixation is avoided if possible due to possible damage to the epiphyses.
- **In adults:** *internal fixation* by plates or nails is usually required unless a good position of the fractures can be obtained by manipulation and plaster.

If a fracture of the radius and ulna is not adequately reduced, **angulation** may occur. This will considerably limit rotation of the forearm.



Monteggia fracture
(proximal) = fractured ulna
with dislocation of head of
radius

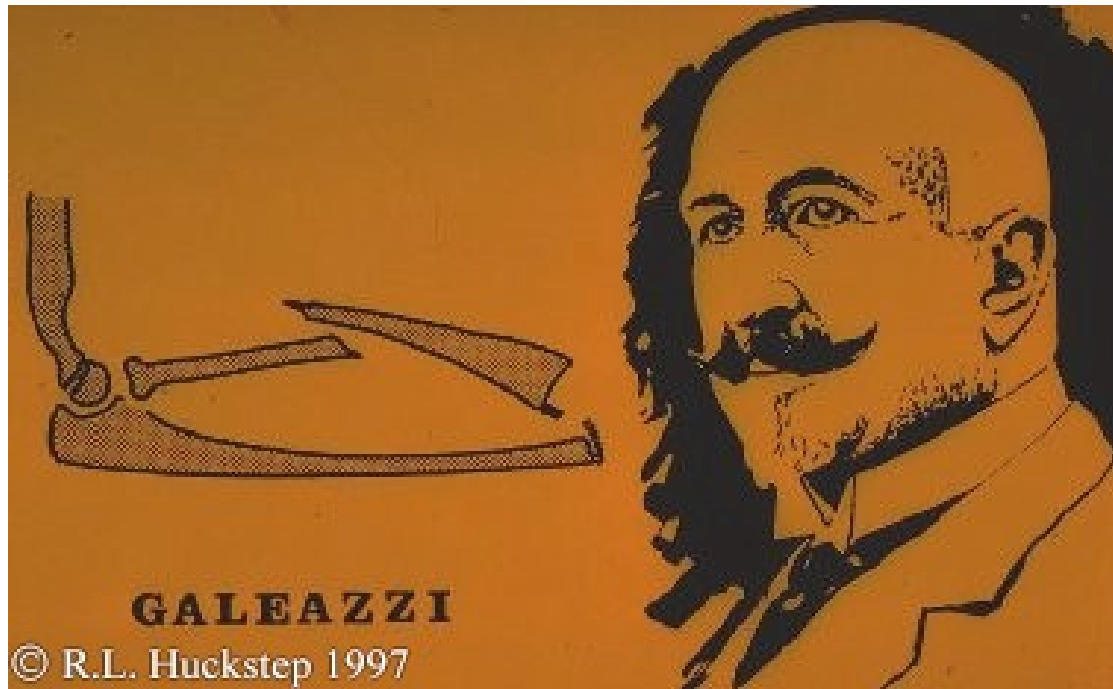
Galleazzi fracture (distal) =
fractured radius with
dislocation of lower radio-
ulnar joint





Monteggia fracture dislocation = a fracture of the upper ulna, with a dislocation of the head of the radius.

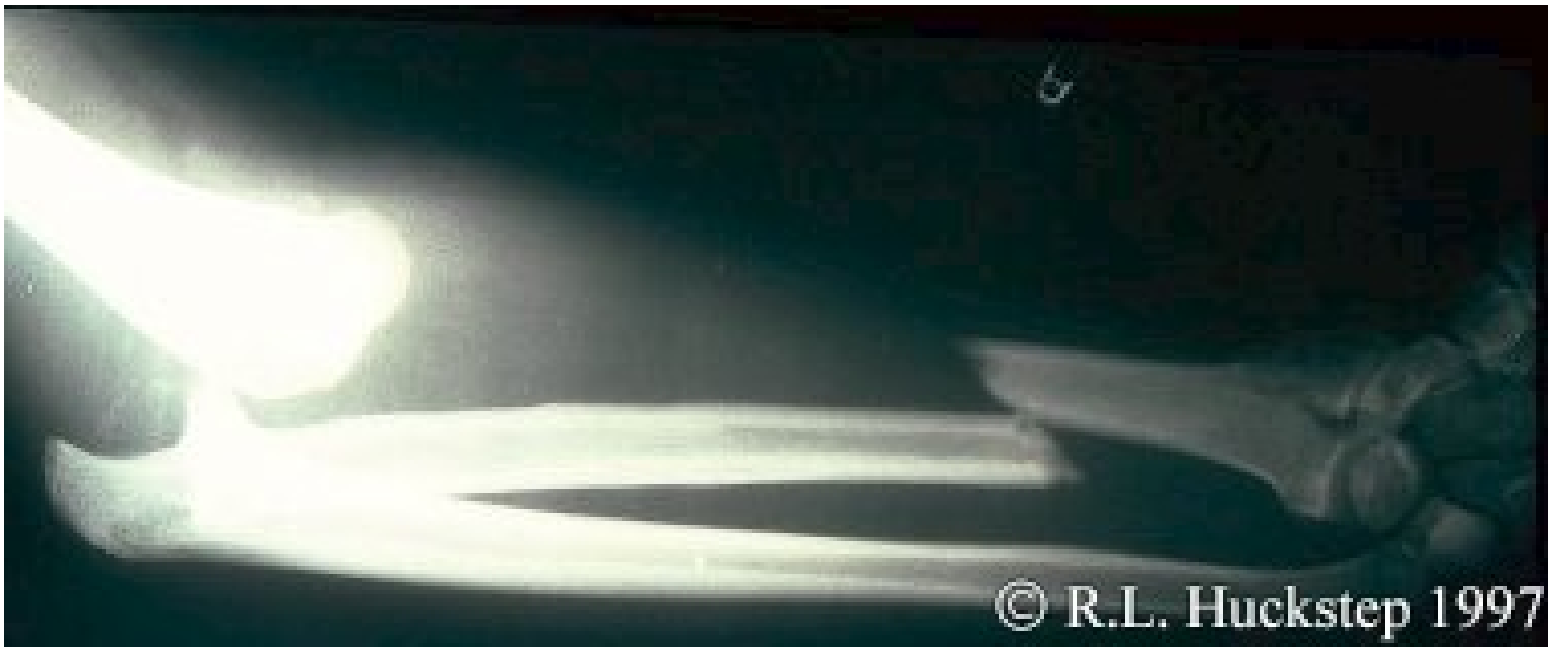
The usual displacement of the head of the radius is anterior.



Galeazzi fracture dislocation = a fracture of the lower radius with a dislocation of the lower radioulnar joint (the exact opposite to a Monteggia fracture dislocation)



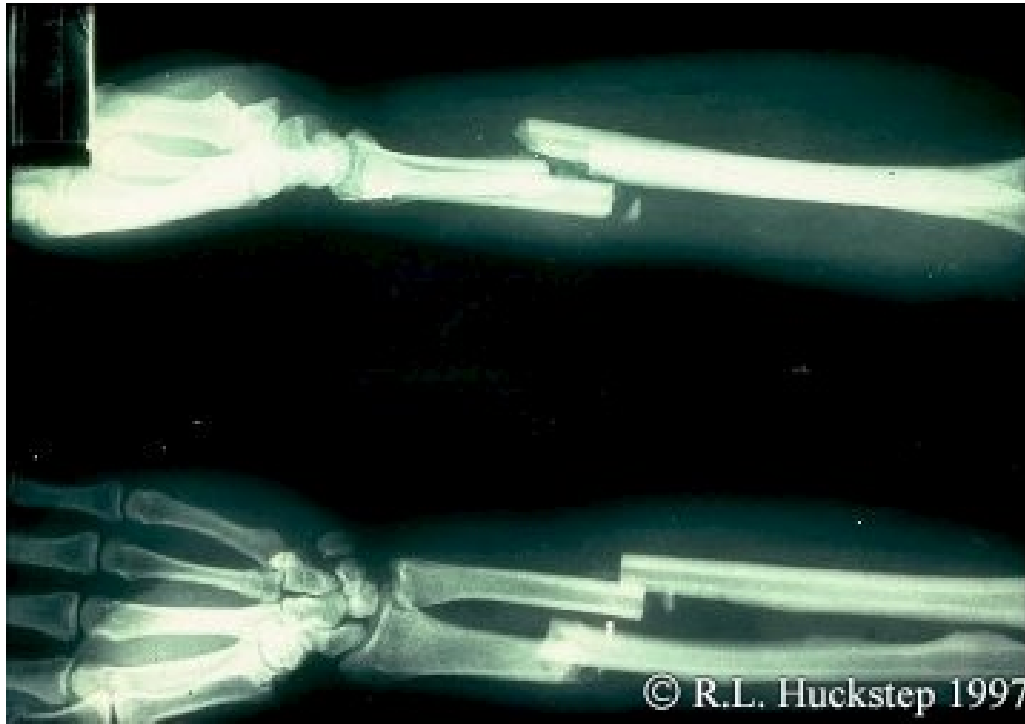
Monteggia fracture dislocation



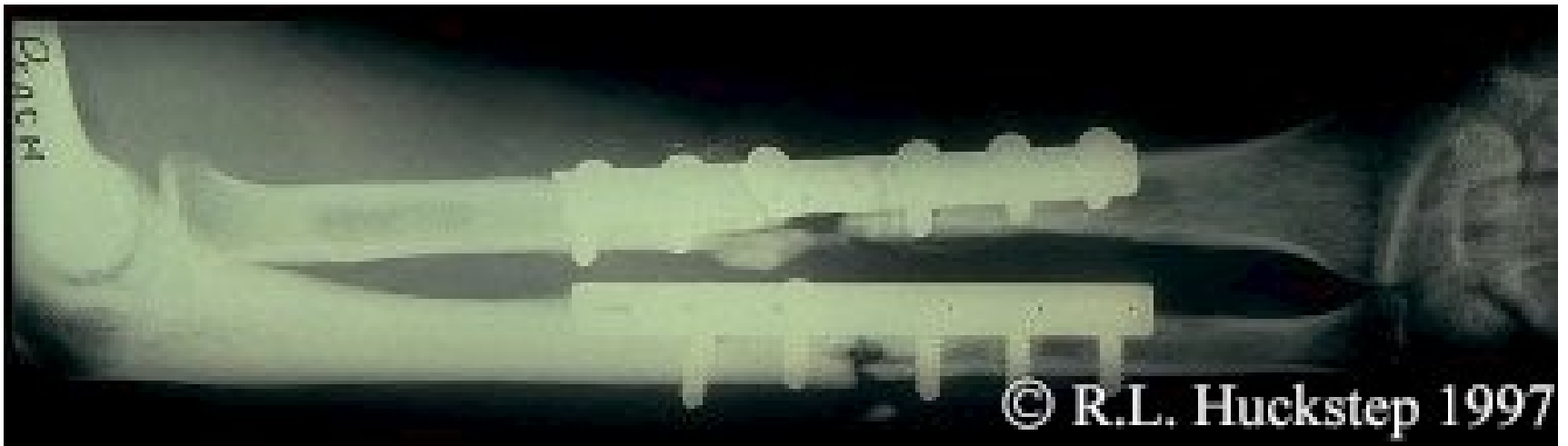
This X-ray shows a dislocated elbow as well as a fracture of the lower radius extending into the wrist joint, called **Barton's fracture**.



An above elbow plaster of Paris complete wrap should be used initially to hold a **fracture of the radius and ulna**. Once the fracture has become stable and started to unite, further immobilization of the radius and ulna in a lightweight waterproof skelecast as shown, is much more comfortable for the patient.



A double **fracture of the radius and ulna** with overlap, will be almost impossible to reduce accurately by manipulation alone, and will require internal fixation.



Fracture of the radius and ulna reduced
with metal bone plates

FRACTURES OF THE HUMERUS

FIRST AID TREATMENT

UPPER and
LOWER END



Sling

SHAFT



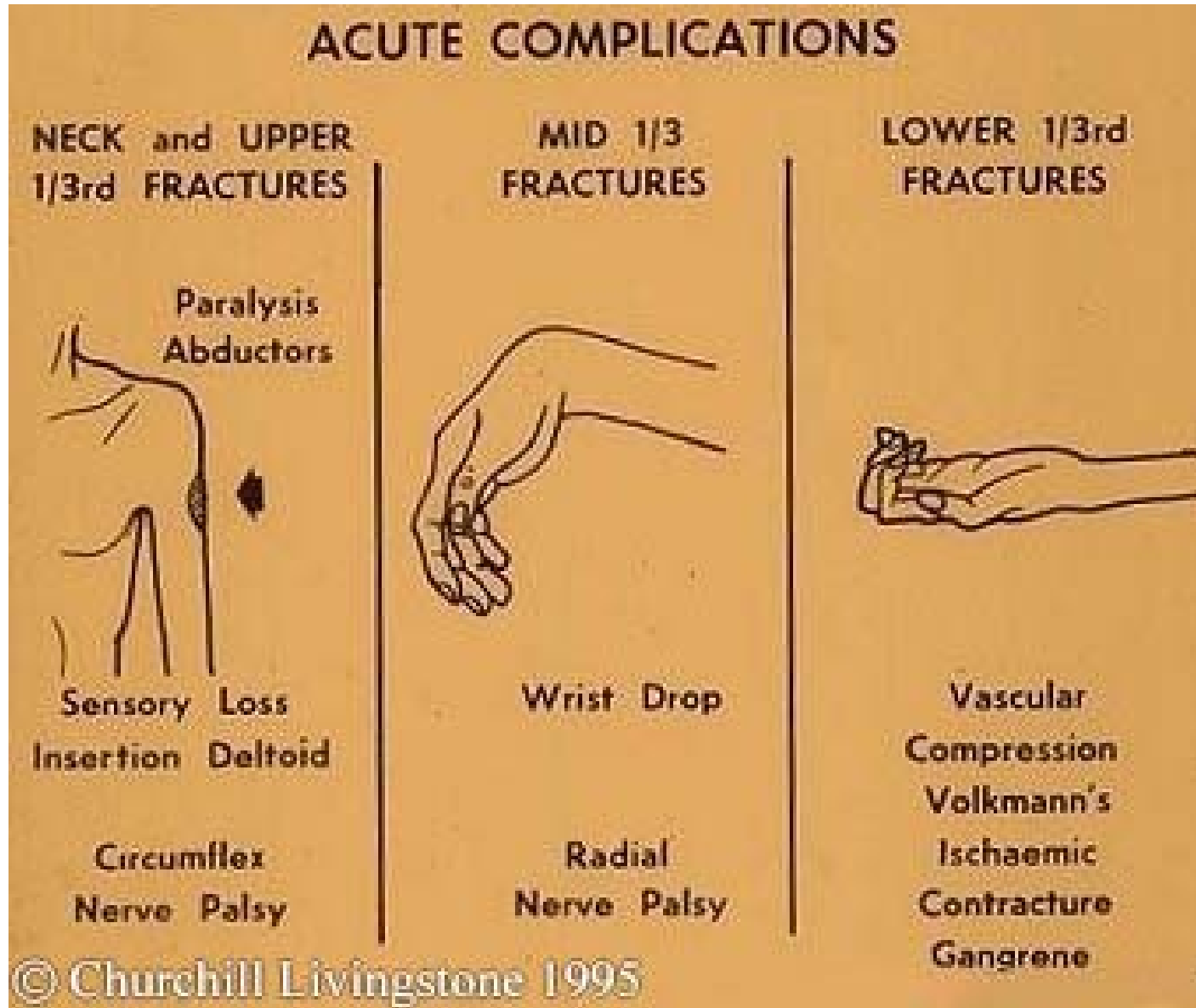
Collar and Cuff

TRAVELLING
A DISTANCE



Arm Bandaged
to Side

Fractures of the Humerus



Fracture of the **neck** of humerus

- Occur in the elderly as a result of fall on the outstretched hand
- The fragments may be impacted (one bone fragment is driven into the other)



Fracture of the **neck** of humerus

- A triangular sling is the optimum treatment
- Displaced fractures are not usually reduced surgically because:
 - Lack of good alignment does not affect union
 - To avoid surgery in the elderly
 - Early movement is important to prevent stiff shoulder

Fracture of the **neck** of humerus

- Complication: *axillary nerve palsy*.
 - diagnosed by numbness over the insertion of the deltoid
 - paralysis, and later wasting of the deltoid

Fracture of the **shaft** of humerus

- Usually occur in the middle third of the shaft due to direct or indirect trauma
- ***Direct*** trauma 
transverse or oblique fracture (sometimes comminuted fracture)
- ***Indirect*** trauma (rotational force) 
spiral fracture

Fracture of the **shaft** of humerus

- Displacement may occur as a result of muscle pull (e.g., if the fracture is below the insertion of the deltoid, the upper fragment will be abducted)
- The common complication: *radial nerve palsy* (most radial nerve palsies in closed fractures will recover without operation)

Fracture of the shaft of humerus

- If not treated with a collar and cuff will cause shortening of the humerus due to the pull of the muscles.
- The radial nerve in the spiral groove is at risk.
- Symptomatic treatment with a cock up splint to compensate for a wrist drop, or a splint to support the fingers is all that is normally required.



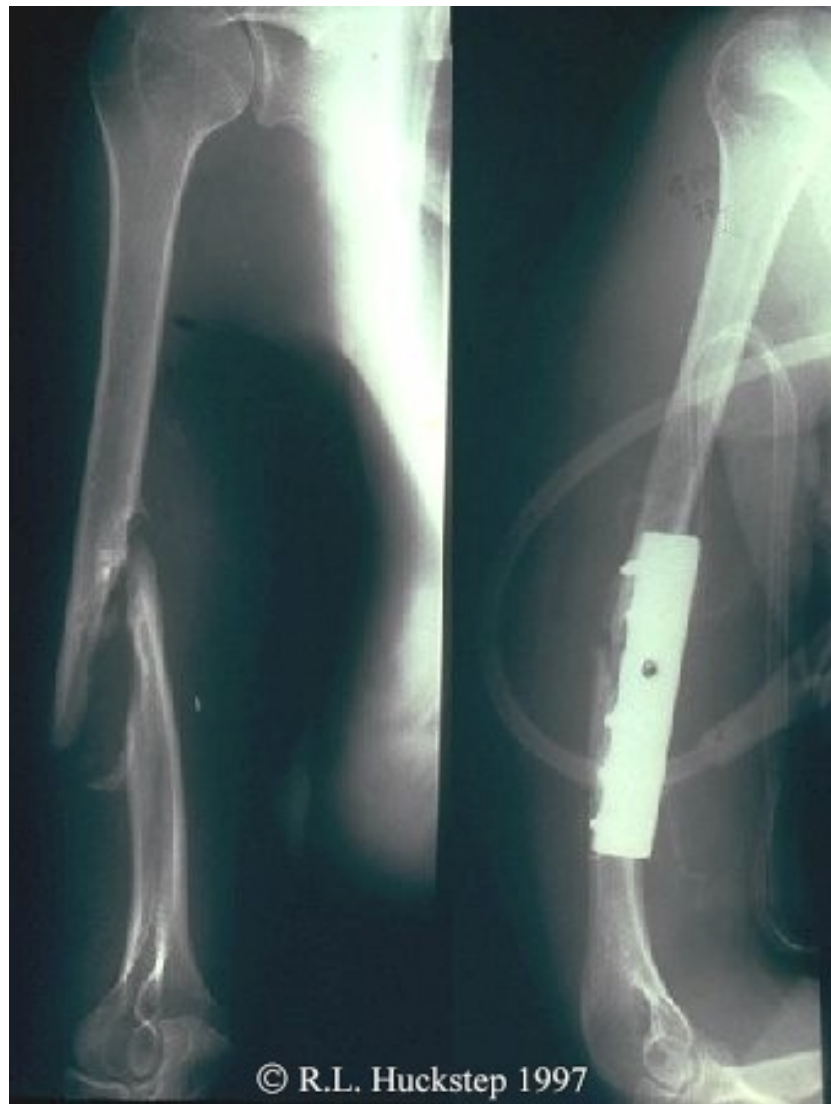
Fracture of the **shaft** of humerus

- Should be initially treated with a collar and cuff sling to distract the humerus and to reduce the fracture
- This is then followed by a U slab or plaster encircling the humeral shaft



Fracture of the **shaft** of humerus

A U slab plaster plus a collar and cuff sling allow the fracture ends to align due to the weight of the support on the arm.



An established non-union of the mid shaft of the humerus held by a bone plate plus cancellous bone graft.

Fracture of the **condyles** of humerus (distal end)

- Common in children following a fall
- Supracondylar fracture is the most common type
- May extend to the articular surfaces causing more problems

Fracture of the **condyles** of humerus (distal end)

- May damage the **brachial artery** at the elbow and cause bleeding in the flexor compartment of the forearm
- This can lead to oedema in the forearm, death of the flexor muscles, and a *Volkman's ischaemic contracture* if not urgently treated and the flexor compartment decompressed

Fracture of the **condyles** of humerus (distal end)

- ***Volkman's ischaemic contracture***: the end result of muscle necrosis caused by occlusion of the circulation
- Fibrous tissue replaces the necrotic muscles in the flexor compartment of the forearm. The fibrous tissue will then contract producing wrist and fingers flexion. May be disabling.

A severely comminuted fracture of the lower end of the humerus which required internal fixation with wires.

There is a great risk of a Volkmann's ischaemic contracture due to bleeding into the flexor compartment of the forearm and death of the flexor muscles.



Complications of fractures

- **Nerve injuries:**

- Example: radial nerve palsy following fracture of the mid-shaft humerus
- If a plaster is too tight, it may cause nerve injury (e.g., common peroneal nerve injury if a plaster cast is moulded too tight around the fibular head, resulting in foot drop: tibialis anterior muscle?)

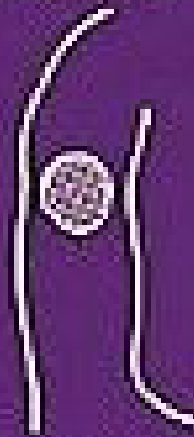
PERIPHERAL NERVE INJURIES

Dislocation
or Fracture
Shoulder



AXILLARY

Paralysis
Deltoid



Sensory Loss

Fracture
Shaft Humerus



RADIAL

Wrist
Drop

Sensory Loss

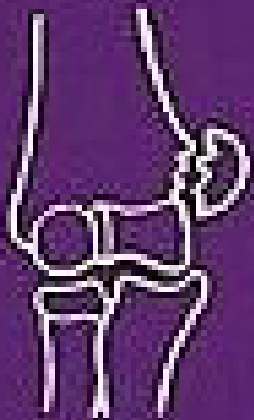


Inability to
Extend Thumb

Damage to the **axillary nerve** from fractures of the neck of the humerus and dislocations of the shoulder.

Fractures of the mid shaft of the humerus may cause a **radial nerve** palsy.

Medial
Epicondyle



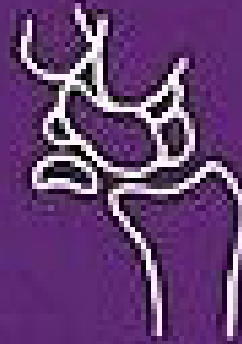
ULNA

Inability to
Abduct
Little Finger



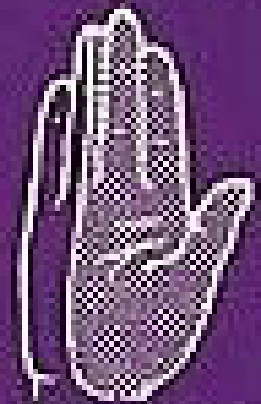
PARALYSIS
INTEROSSEI
+ Sensory Loss

Dislocated
Lunate



MEDIAN

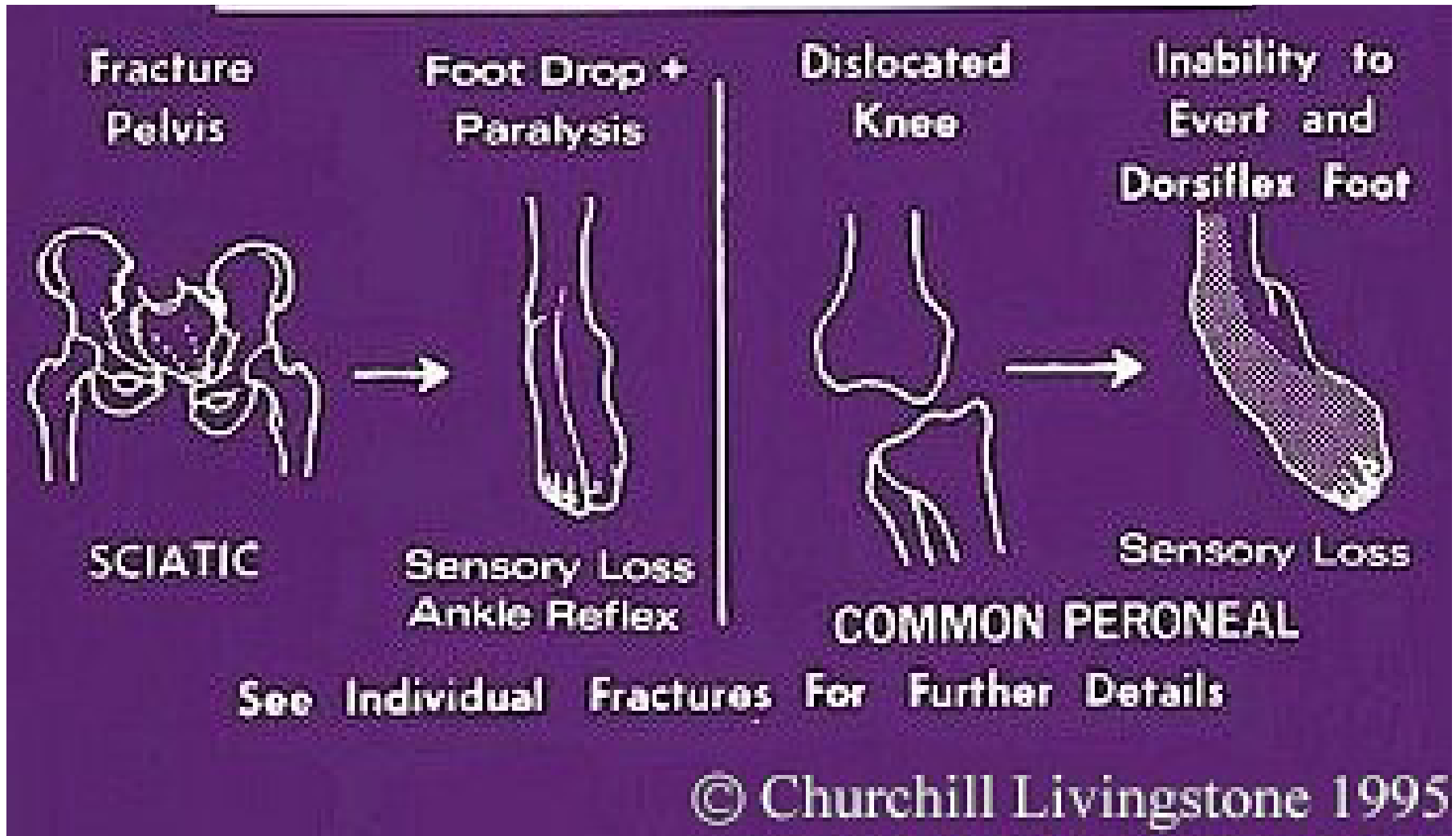
Paralysis
Abduction
Thumb



Sensory
Loss

Fractures of the medial epicondyle causing an **ulnar nerve** paralysis.

Dislocation of the lunate causing a **median nerve** palsy.



Posterior dislocation of the hip, and a vertical force fracture dislocation of the pelvis may cause a **sciatic nerve** palsy.

Dislocated knee may damage the **common peroneal nerve** as well as the popliteal vessels.

Complications of fractures

- **Vascular injuries:**
 - Thrombosis of veins may occur in the area surrounding the fracture (sudden development of a cramp-like pain in the limb, increased swelling, tenderness along the line of the vein)

Complications of fractures

- **Vascular injuries:**

- If a large artery is occluded in a way that cuts off the blood supply to the limb → *gangrene* will develop

- If there is partial occlusion → ischaemic contracture may develop

Complications of fractures

- **Vascular injuries:**

- Vascular injuries due to ***supracondylar injuries*** of the humerus and femur may cause damage to the ***brachial and popliteal vessels*** and gangrene of the hand and foot
- Tight plaster may also constrict the blood supply to the limbs