



U P P E R L I M B
F R A C T U R E S

PART 2

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CARPAL INJURIES



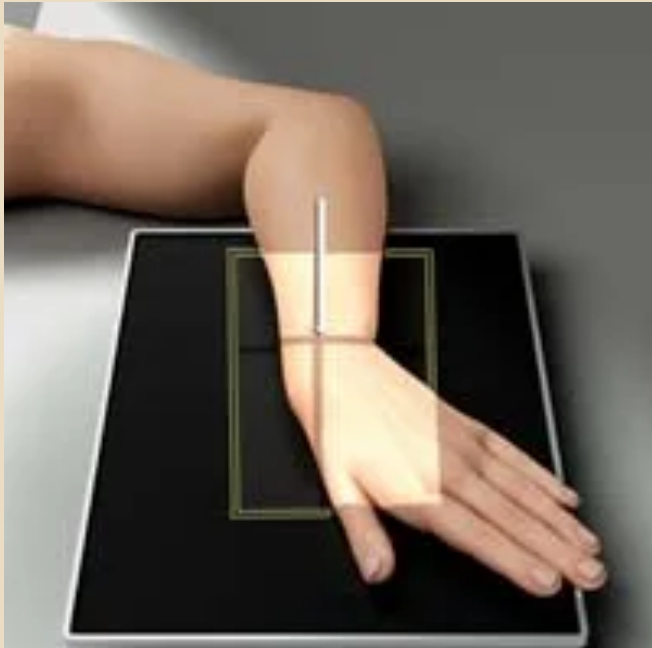
CARPAL INJURIES

- ? Most carpal bone fractures occur in the **proximal carpal row**
- ? The **scaphoid is the carpal bone most commonly fractured.**
- ? Carpal bone fractures usually occur in **younger people**, often from high-energy falls on an outstretched wrist such as may occur while skiing.

PRINCIPLE OF MANAGEMENT

- -X-rays are the key to diagnose, and there are golden rules to follow:
 1. Accept only high-quality films.
 2. Initially 3 standard views are obtained: -Anteroposterior. -lateral with the wrist neutral. - oblique 'scaphoid' view.
 3. If the initial X-rays are 'normal', treat by clinical diagnosis, THEN repeat the X-ray 2 weeks later.

SCAPHOID VIEW

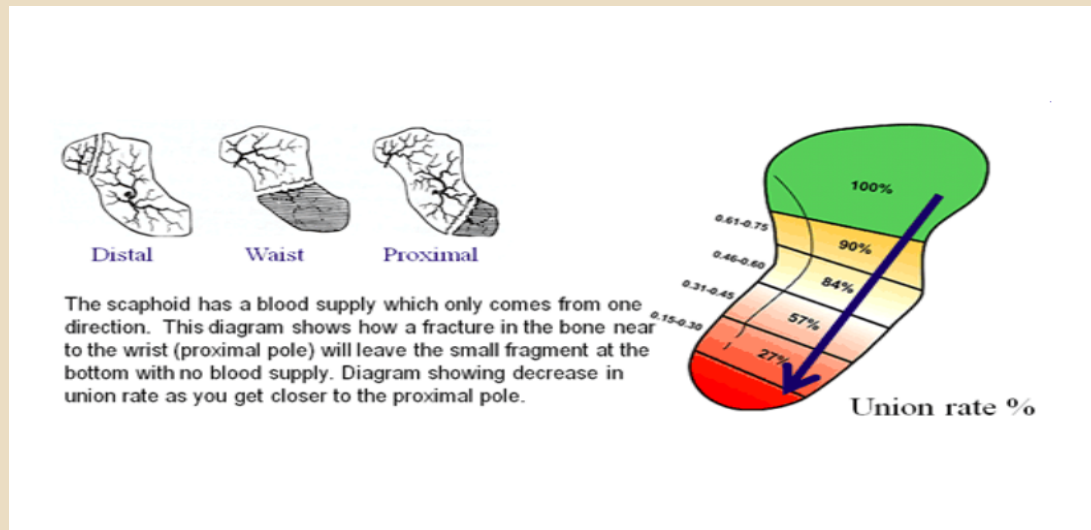


SCAPHOID FRACTURE

- Scaphoid fractures account for 75 % of all carpal fractures although they are rare in the elderly and children.
- Most of them are stable. But with unstable fractures there may also be disruption of the scapho-lunate ligaments and dorsal rotation of the lunate.

BLOOD SUPPLY

- Scaphoid blood supply: primarily from the palmar and dorsal branches of the radial artery.
- These provide an "abundant" supply to middle and distal bone, but neglects the proximal portion, which relies on retrograde flow.
- - So in this injury, the blood supply of the scaphoid diminishes proximally leading to AVN + nonunion



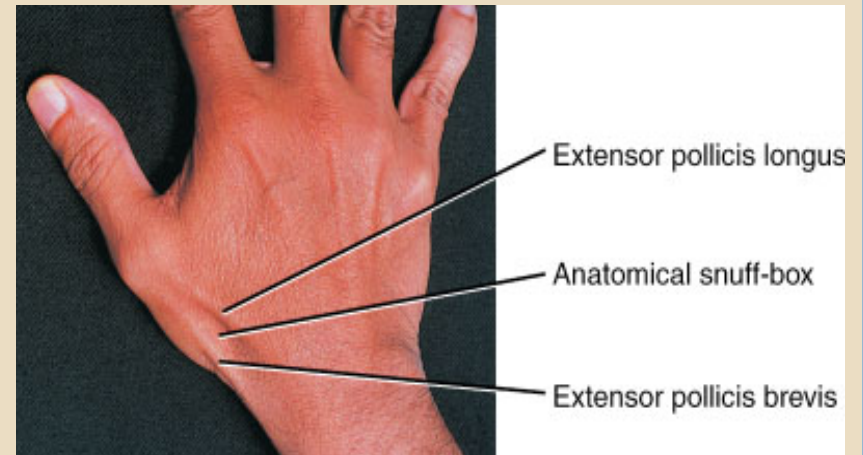
MECHANISM

- The scaphoid lies obliquely across the two rows of carpal bones, and is also in the line of loading between the thumb and forearm.
- So, falling on an outstretched hand may lead to severe compression and stress on the scaphoid which will result in fracture.

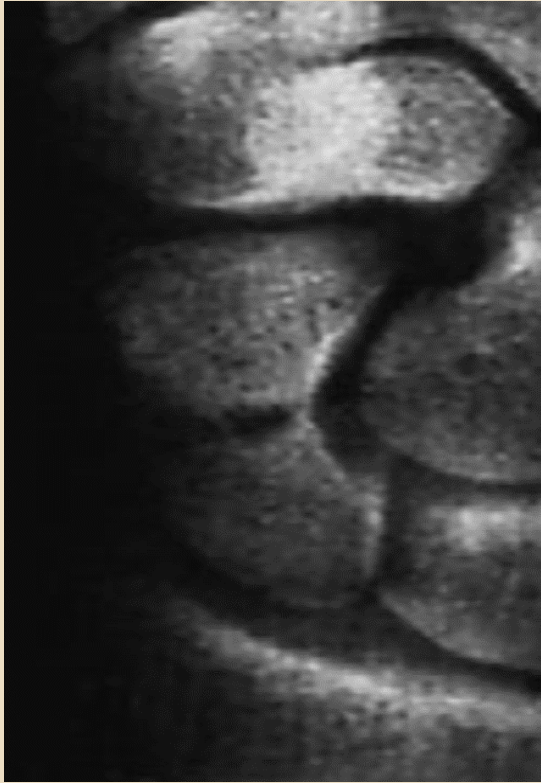


CLINICAL FEATURES

- The patient may present with wrist pain and swelling.
- The appearance may be normal, but the observer can usually detect slight fullness and tenderness in the anatomical snuffbox; which is an important diagnostic sign.

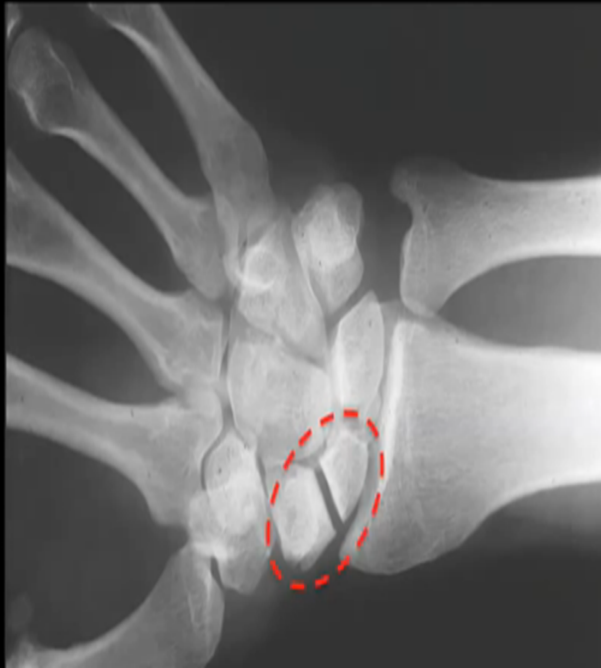


IMAGING



- If union is delayed, cavitation appears on either side of the break.
- Old, un-united fractures have 'hard' borders, making it seem as if there is an extra carpal bone.
- Relative sclerosis of the proximal fragment is pathognomonic of avascular necrosis (dense appearance on X ray.)

X-RAY OF A SCAPHOID NON-UNION



MANAGEMENT

- Fracture of the scaphoid tubercle don't need splintage and should be treated as a wrist sprain.
- Undisplaced fractures don't need reduction * Treated in plaster; 90 % of wrist fractures should heal.
- The cast is applied from the upper forearm to the metacarpophalangeal joints of the fingers, but incorporating the proximal phalanx of the thumb. ☐ The wrist is held dorsiflexed and the thumb forwards in the 'glass-holding' position.. for 8 weeks.



MANAGEMENT

- Displaced fractures can also be treated in plaster, but the outcome is less predictable. - It is better to reduce the fracture openly and to fix it.
 - After 8 weeks the plaster is removed and the wrist examined clinically and radiologically..
- - If there is no tenderness and the x-ray shows signs of healing ☐ * The wrist is left free.
- - If the scaphoid is tender, or the fracture still visible on x-ray ☐ The cast is reapplied for a further 4 weeks.

MANAGEMENT

- At that stage, one of two pictures may emerge:
 1. The wrist is painless and the fracture has healed => the cast can be removed.
 2. The x-ray shows signs of delayed healing (bone resorption and cavitation around the fracture) => Managed by bone grafting and internal fixation.
- - CT scan is the most reliable means of confirming union if in doubt.

LUNATE FRACTURE

- Fractures of the lunate are rare and follow a hyperextension injury of the wrist.
- There is a real risk of nonunion.

It has a slight blood supply and can also develop avascular necrosis, which is known as Kienböck's disease

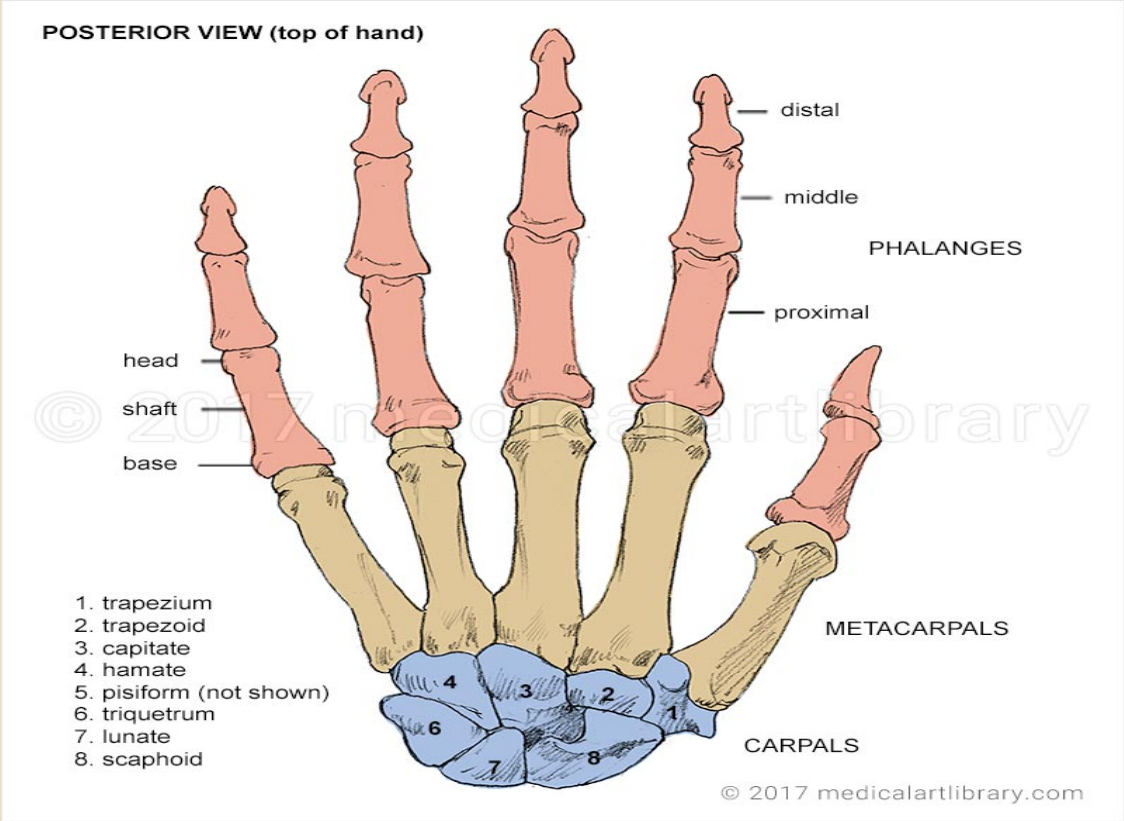
- If undisplaced fractures, it should be immobilized in a cast for 6 weeks.

But if it is a displaced fracture, it should be reduced and fixed with a screw.

AVN OF LUNATE



HAND INJURIES



GENERAL PRINCIPLES

- X-rays should include at least three views (posteroanterior, lateral and oblique), and with finger injuries the individual digit must be x-rayed.

- Fractures of the metacarpals and phalanges should not be immobilized for more than 3 weeks except under unusual circumstances.

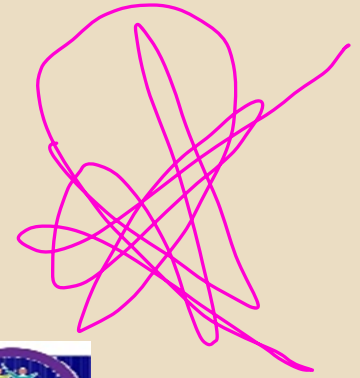
Assessment of neurovascular status of the hand and digits must be done to rule out other injuries, including tendon injury.

Fractures of the small bones of the hand heal more rapidly than fractures of larger bones

GENERAL PRINCIPLES

- Incorrect splintage is a potent cause of stiffness: If a finger has to be splinted, it may be possible simply to tape it to its neighbor so that both move as one, and it must be kept to a minimum length of time.
- If the entire hand needs splinting, this must always be in the 'position of safety'

POSITION OF SAFE IMMOBILIZATION



What is the POSI?

MCP flexion 60-90°

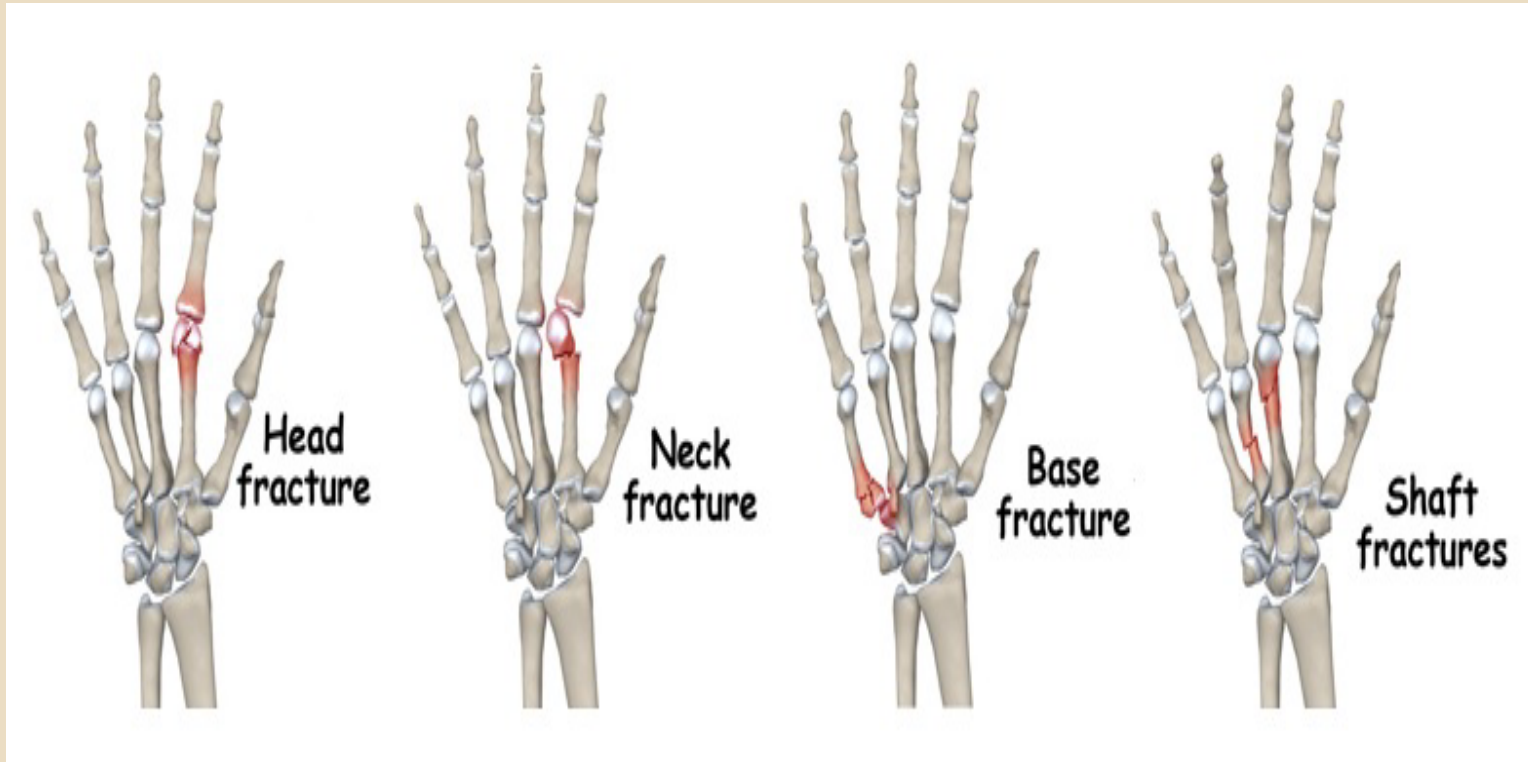
Wrist extension 10-45°

PIP in full extension

DIP in full extension

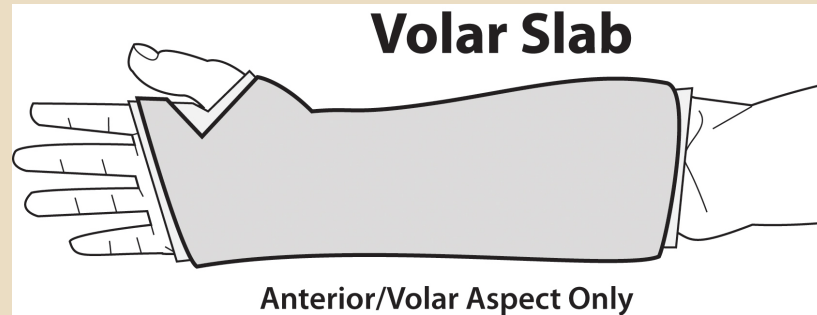
Occupational Therapy
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Metacarpal fractures



METACARPAL BASE FRACTURE

- Base of 2nd & 3rd metacarpal: - Usually it is a Stable injury unless there is angular deformity, so ensuring that rotation is correct and then => Apply a volar slab extending from the forearm to the proximal finger joint.



- Base of 4th & 5th metacarpal: - more mobile so more painful causing marked incongruity. The fracture should be reduced by => Traction on the little finger and then held with a compression screw.

THUMB METACARPAL BASE FRACTURE

- 1- Impacted fracture:
 - * A boxer may while punching, sustain a fracture on the base of the first metacarpal.
 - * if angulation <30 : A plaster cast extending from the forearm to the interphalangeal thumb joint with the thumb fully abducted and extended.
 - * If >30 : open reduction





THUMB METACARPAL BASE FRACTURE

2-) Bennett's fracture-dislocation:

- * The fracture is unstable, and obliquely extends into the CMC joint.
- Commonly due to punching.
- * Management => easy to reduce by traction but difficult to keep in position.
- * It can be held in a plaster cast but it usually slips, so it is best to fix the fracture with a simple percutaneous wire or screw.

BENNETTE'S FRACTURE



Bennett's Fracture



THUMB METACARPAL BASE FRACTURE

3- Rolando`s fracture:

- An intra-articular comminuted fracture of the base of the first metacarpal bone with a T or Y configuration.
- * Management => Closed reduction and K-wiring or open reduction and plate fixation can be used.
- * With more severe comminution, external fixation is needed.



ROLANDO FRACTURE



METACARPAL SHAFT FRACTURE

- Transverse, one or several fractured shafts, associated with skin damage.
- May come as oblique fracture.
- Mostly due to direct blow force.



MANAGEMENT

- Oblique or transverse fractures with slight displacement => crepe bandage with active movement.
- Transverse fractures with considerable displacement => reduction by traction & pressure, plaster slab from the forearm to the damaged fingers. However these fracture are unstable so surgical fixation may be needed (compression plates or percutaneous K-wires).
- Spiral fractures liable to rotate so must be perfectly reduced (screws & plate or percutaneous wire).

METACARPAL NECK FRACTURE

- Metacarpal neck fractures can occur in all of the metacarpals but most commonly in the fifth metacarpal bone, called "boxer's fracture"
- X-ray shows an impacted transverse fracture with volar angulation of the distal fragment

BOXER'S FRACTURE



METACARPAL HEAD FRACTURE

- * These fractures occur after a direct blow.
- * They are often quite comminuted and sometimes 'open'.
- * Management:
Operative reduction is usually required and fixation with small headless buried screws is ideal.
- Occasionally the joint is so badly damaged that primary replacement is considered.



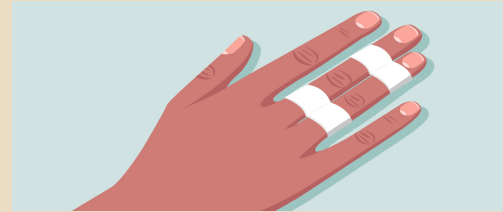
PHALANGES FRACTURE

❓ Proximal & middle phalanges shafts fracture:

- - Transverse fracture of the shaft, often with forward angulation.
- - Spiral fracture of the shaft, from a twisting injury.
- - Comminuted fracture, usually due to a crush injury.
- - Avulsion of a small fragment of bone.
- - Metaphyseal fracture at the base of the proximal phalanx, commonly seen in osteopaenic bone.
- Intra-articular fractures:
 - *at the distal end of the phalanx, the entire head may rotate or, more commonly, one condyle rotates through a longitudinal midline fracture into the joint.
 - *At the proximal end, displacement tends to lead to an angular deformity.

MANAGEMENT

- Undisplaced fracture: can be treated by 'functional splintage'. The finger is strapped to its neighbor 'buddy strapping' and movements are encouraged from the outset.



- Displaced fracture should be straightened and reduced under local anesthesia. • carefully avoiding malrotation.

TERMINAL PHALANX FRACTURE

1. Fracture of the tuft:

- Caused by a hammer blow or trapped in a door, so the bone is shattered.
- Treatment is focused on controlling swelling and regaining movement.
- The painful hematoma beneath the finger nail should be drained by piercing the nail with a hot paper clip.
- If the nail bed is shattered then cosmesis is important, it should be repaired under magnification.



A fracture of the tuft

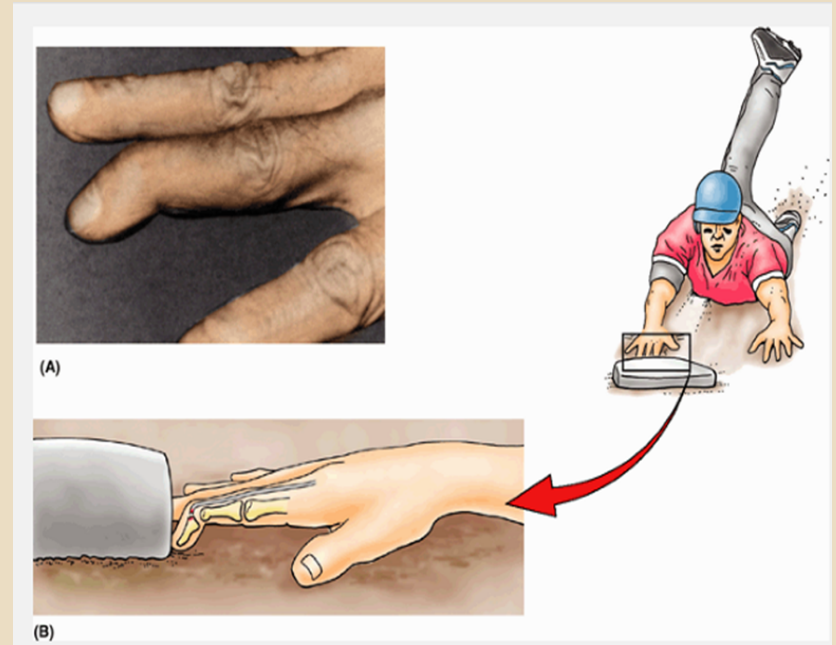


subungual hematoma

Prick!

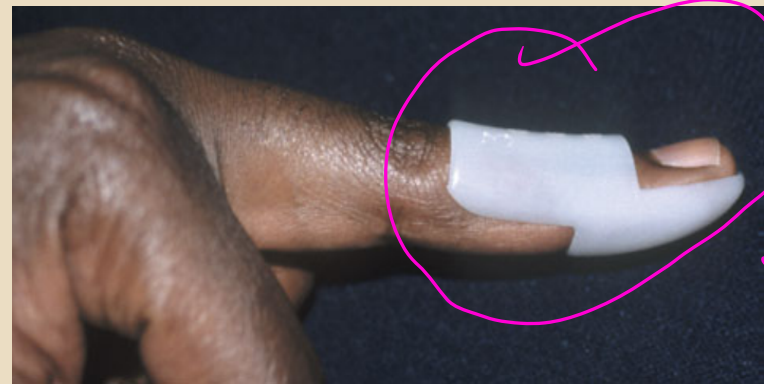
TERMINAL PHALANX FRACTURE

- 2- Mallet finger injury:
- After a sudden flexion injury, the terminal phalanx droops and cannot be straightened actively.
- Three types of injury are recognized:
 - 1-) Avulsion of the most distal part of the extensor tendon.
 - 2-) Avulsion of a small flake of bone from the base of the terminal phalanx.
 - 3-) avulsion of a large dorsal bone fragment, sometimes with subluxation of the terminal interphalangeal (TIP) joint.



MANAGEMENT

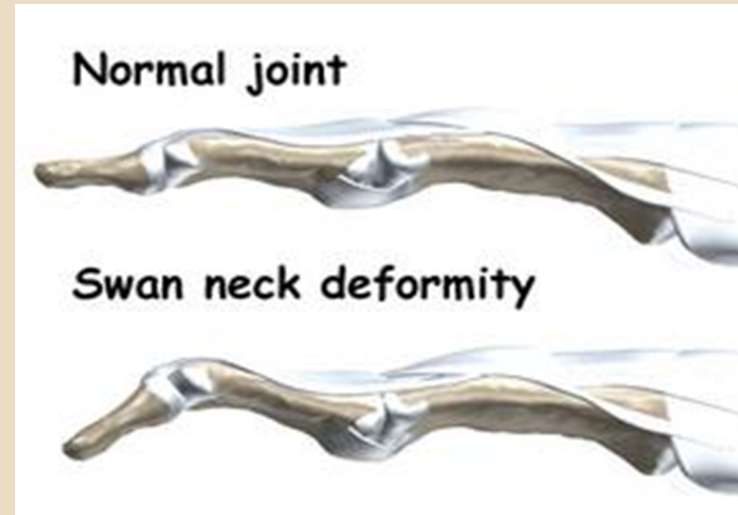
- The TIP joint should be immobilized in slight hyperextension, using a special mallet-finger splint which fixes the distal joint but leaves the proximal joints free.
- - If tendinous avulsion (painless): for 8 weeks continuously, then only at night for 4 weeks.
- - If bone avulsion: for 6 weeks as bone heals quicker than tendon.



mallet splint

COMPLICATIONS

- *Non-union
- *Persistent droop
- *Swan neck deformity (Imbalance of the extensor mechanism can cause this in lax-jointed individuals).



JOINT INJURIES

- 1- Carpo- metacarpal dislocation
- The thumb is most frequently affected and clinically the injury then resembles a Bennett's fracture- dislocation.
- The displacement is easily reduced by traction and hyper pronation, but reduction is unstable and can be held only by a K-wire.

CARPO- METACARPAL DISLOCATION



JOINT INJURIES

2- Metacarpophalangeal dislocation

- The entire finger is suddenly forced into hyperextension and the capsule and muscle insertions in front of the joint may be torn.
- Usually the thumb is affected

METACARPOPHALANGEAL DISLOCATION



JOINT INJURIES

- 3- Interphalangeal joint dislocation
- Proximal joint dislocation is more common
- The dislocation is easily reduced by pulling.
- The patient must be warned that it can take many months (and sometimes forever) for the spindle like swelling of the joint to settle and for full extension to recover.

INTERPHALANGEAL JOINT DISLOCATION

Interphalangeal dislocations are easily reduced (and easily missed if not x-rayed!).





THANK YOU