

## INJURIES OF THE WRIST & THE HAND

### Colles' Fracture:

**Definition:** The injury that Abraham Colles' described in 1814, it is transverse fracture of radius, just above the wrist joint, with dorsal displacement of distal fragment, most common of all fracture in older people (figure 8-1). **This mean its extraarticular fracture.**

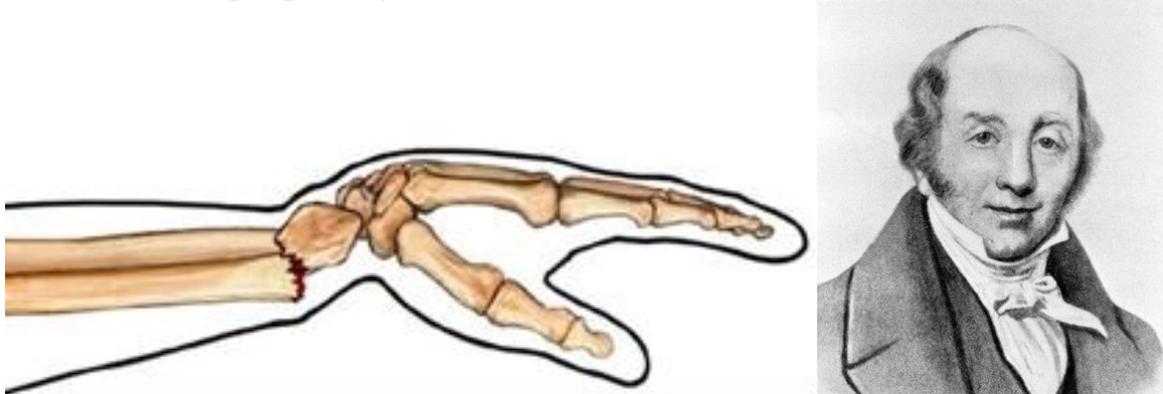


Figure 8-1: Abraham Colles 1773-1834

**Mechanism of injury:** Forced applied with extension wrist result in fracture at corticocancellous junction with distal fragment collapse into extension, dorsal displacement with, radially tilt and shorting (figure 8-2).

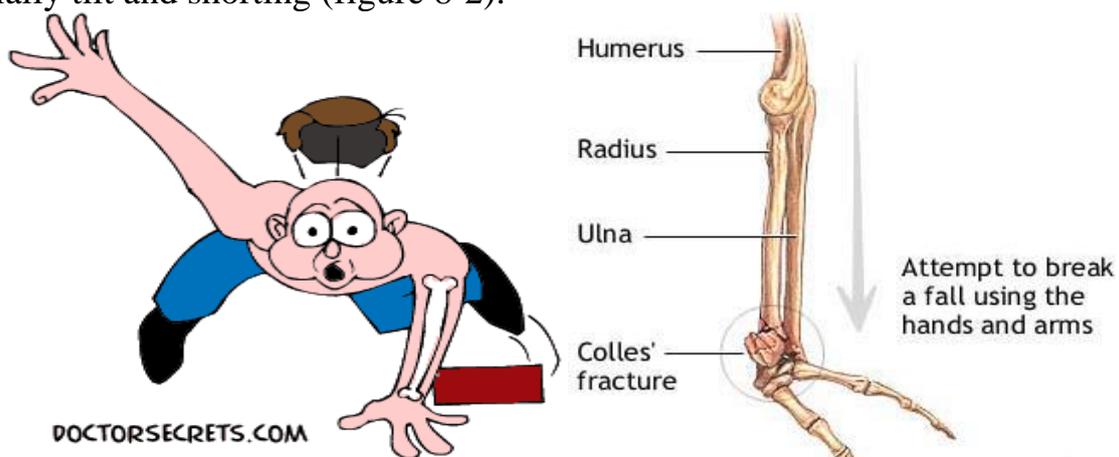


Figure 8-2: Mechanism of injury

**Clinically:** patient had pain, tenderness swelling at wrist joint with limitation of movement and dinner-fork deformity with prominence on the back of wrist and depression in front (figure 8-3).dont forget n.v examination mainly,radial artery,median nerve...

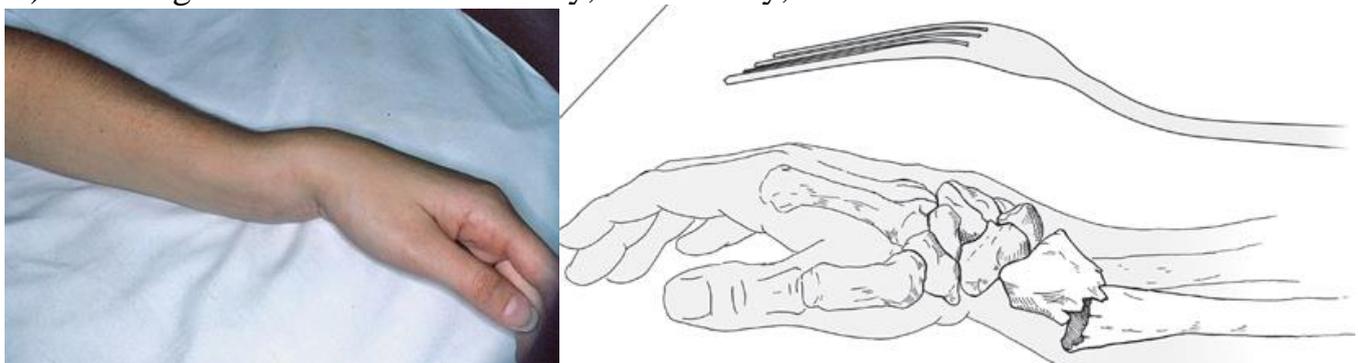


Figure 8-3: dinner-fork deformity of Colles' fracture

**Radiograph:** transverse fracture at corticocancellous junction of distal radius, ulna styloid process is broken. Some time there is severely comminuted and crushed. The radial fragment is impacted into radial and backward tilt (figure 8-4).



Figure 8-4: Radiological image of Colles' fracture

**Treatment:**

1. Undisplaced fracture: dorsal splint for 2 days then cast for 4 weeks.
2. Displaced fracture: reduction done by traction in length of bone with extension of wrist for dis-impaction of fragment, distal fragment is then pushed into place by pressing on the dorsum while manipulation wrist into flexion, ulnar deviation and pronation splint just below elbow to the metacarpal neck for 7-10 days. Re-displacement is common, so check x-ray is need, then splint for 6 weeks (figure 8-5).
3. Comminuted fracture: POP with supplemented by percutaneous K-wire for 5 weeks, and severe comminuted by external fixation

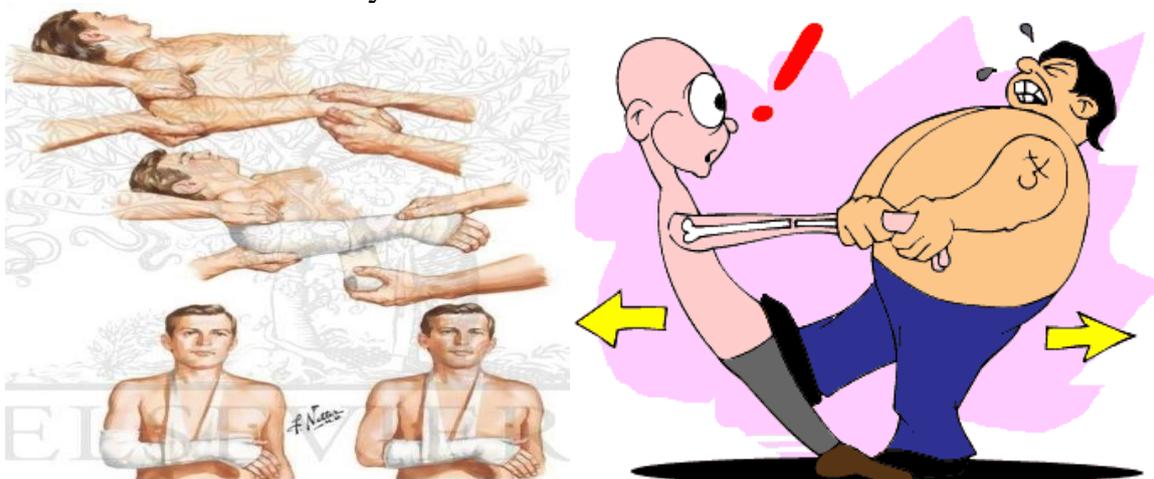


Figure 8-5: Reduction of Colles' fracture

**Complication.**

1. Circulation and medial nerve compression may occurs by tight bandage, so can avoided while if persistent can treated by surgical release
2. Reflex sympathetic dystrophy, as stiff hand with vasomotor instability, usually subsided and rarely progress to full picture of Sudeck's atrophy, 5% of cases after removed splint, can be avoided by analgesia and early exercise.
3. Malunion is common either not reduced or redisplayed, result to loss of rotation and weak hand. At young age with sever deformity may corrected by radial osteotomy.

4. Stiff shoulder, elbow and fingers may result from long splint.
5. Rupture of extensor tendon this occurs after few week, this treated by surgery.

### **Smith Fracture:**

**Definition:** This similar to Colles fracture, but distal fragment is displaced anteriorly, so called reverse Colles (figure 8-6).

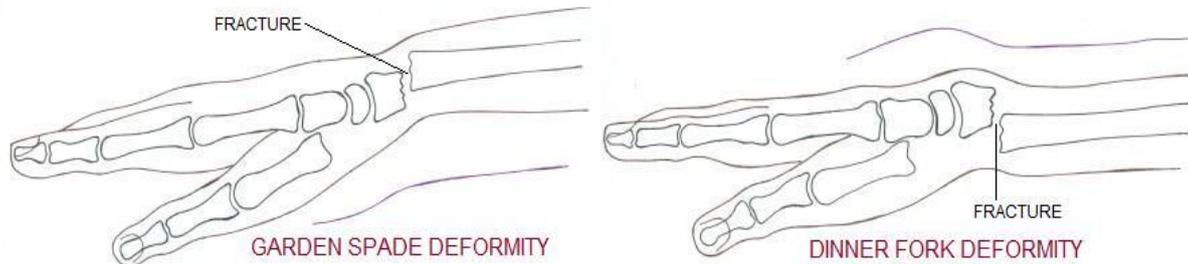


Figure 8-6: Smith fracture

**Mechanism of Injury:** It is caused by fall on the back of the hand (figure 8-7).

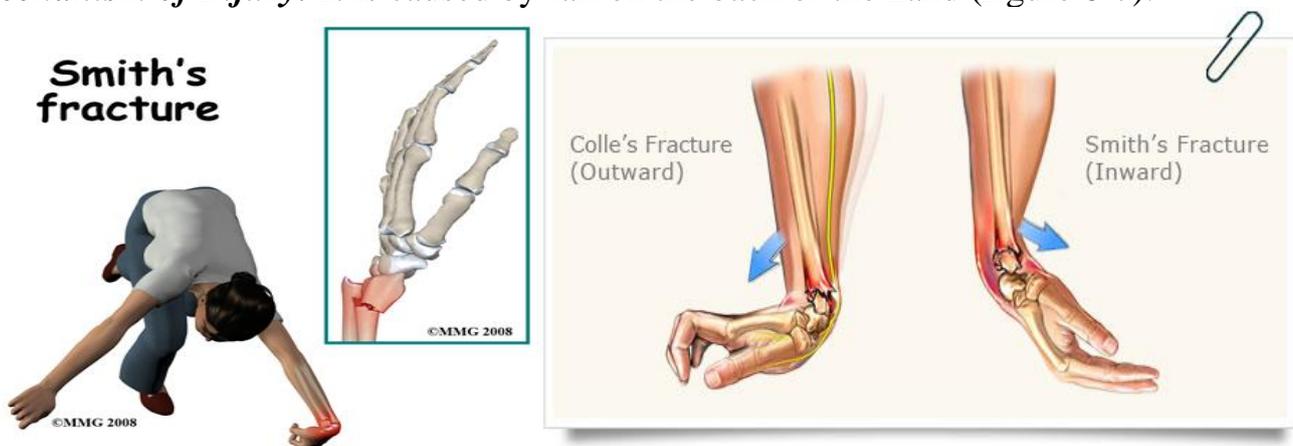


Figure 8-7: Mechanism of injury of Smith fracture

**Clinically:** Pain and tenderness at wrist joint with prominent at volar side. The deformity called Garden spade deformity (figure 8-8).



Figure 8-8: Garden spade deformity of Smith fracture

**Radiograph:**Fracture at distal radial metaphysis, lateral view show displace and tilt anteriorly could be associated with oblique fracture at volar or dorsal rim of radius (figure 8-9).



Figure 8-9: X-Ray of Smith fracture

**Treatment:** this fracture treated by traction and extension of the wrist, and forearm is splint for 6 weeks if failed nonoperative treatment need closed or open reduction and internal fixation..

### **Fractured Radial Styloid:**

This fracture caused by forced radial deviation of the wrist and may occur after a fall or as hand kickback, so called *chauffeur* fracture.

**Radiograph:** Transvers fracture of extending laterally from articular line of radius. Often undisplaced, but if it is extended more laterally, sully displaced by brachioradialis muscle (Figure 8-10).

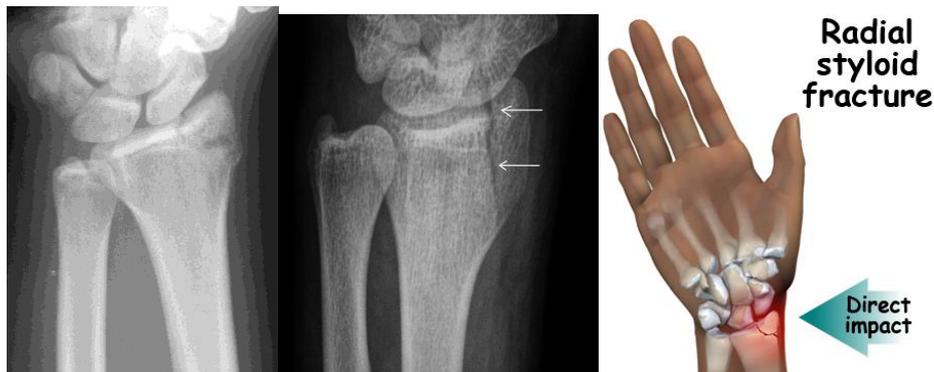


Figure 8-10: X-Ray of Radial Styloid fracture.

**Treatment:** Usually treated by splint in ulnar deviation for undisplaced, while for displaced one treated by screwed or k-wire.

### **Barton Fracture:**

It is an fracture at the volar lip of lower radius with volar subluxation of carpus, its unstable because its small and unsupported fragment (figure 8-11).its intrarticular fracture may be volar or dorsal....



Figure 8-11: Types of Barton Fracture (Dorsal and Volar).

**Radiograph**: fracture line runs obliquely across the volar lip of radius into the wrist joint. With distal fragment is displaced anteriorly. Carrying with its carpus bone (figure 8-12).

**Treatment**: this fracture can easily reduce but its liable for displacement so the treatment is ORIF using buttress plate is recommended (figure 8-12).

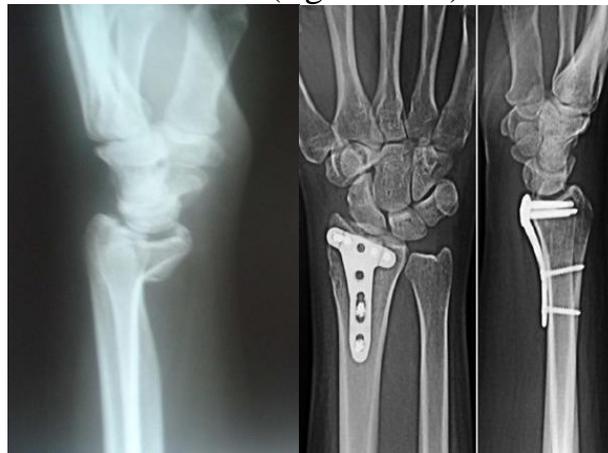


Figure 8-12: X-Ray and treatment of Barton Fracture.

### **Comminuted Intra-Articular Fracture:**

This is a comminuted fracture of radio-carpal region (motor cycle accident). It is intraarticular fracture, high-energy injury. Poor outcome will result unless intra-articular congruity, and length restored and movement start as soon as possible.

**X-Ray**: Comminuted fracture extended to radio-carpal joint

**Treatment**: Include manipulation and cast; but if we cannot get anatomical reduction, then we need open reduction and fixation.

### **Fractures of the Scaphoid:**

It account for almost 75% of all carpal fracture it is rare in elderly & children.

**Mechanism of injury**: The Scaphoid lies obliquely across the two rows of the carpal bones & in the line of loading between the thumb & forearm (figure 8-13). The combination of forced carpal movement & compression, as in a fall on the dorsi-flexed hand this will lead to fracture.

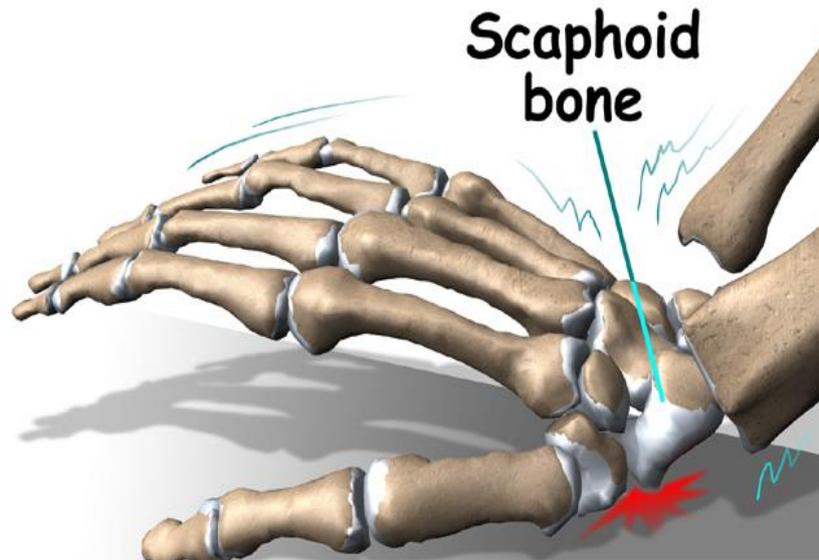


Figure 8-13: Mechanism of Scaphoid Fracture.

***Clinical Features:*** There may be slight fullness in the anatomical snuffbox with localized tenderness in the same place (figure 8-14). Scaphoid can be palpated from the front & back of the wrist & it may be tender. Proximal pressure along the axis of the thumb may be painful. Also there will be painful fist.



Figure 8-14: Site of tenderness in Scaphoid Fracture.

***Radiograph:*** AP, lateral & oblique views are all essential, even then the fracture may be not seen in the first few days after the injury. Two weeks later, the break will be much clearer. It is usually transverse fracture through the narrowest part (the waist), or through the proximal or distal pole or it may involve the tubercle (figure 8-15).



Figure 8-15: X-ray show Scaphoid Fracture.

### Treatment:

1. If the clinical features are suggestive of a fracture but the X-ray looks normal, then we should treat as a fracture & to be seen after 2wk later.
2. Fracture of the tubercle need no splintage & should be treated as a wrist sprain by crepe bandage & movement encouraged.
3. Undisplaced fracture treated in POP cast extending from the proximal forearm to just short of the metacarpophalangeal joint but incorporating the proximal phalanx of the thumb, the wrist is held dorsi-flexed & the thumb forward in the glass-holding position (the so called Scaphoid plaster) (figure 8-16). The cast retained for 6wk then after the plaster is removed & the wrist examined clinically & radiologically: if there is no tenderness & the x-ray shows signs of union, the wrist is left free. If the Scaphoid is tender or the fracture still visible on x-ray, the cast is re-applied for another 6wk. at that stage one of the two pictures may emerge:
  - The wrist is painless & the fracture has healed the cast can be discarded.
  - The x-ray shows signs of delayed union then treated by ORIF+BG.
4. Displaced fractures need ORIF (figure 8-16).



Figure 8-16: Conservative & Operative treatments of Scaphoid Fracture.

### Complications:

1. Avascular necrosis: blood supply of the Scaphoid is decrease proximally this account for the fact that 1% of distal 1/3 fracture, 20% of middle 1/3 fracture & 40% of the proximal 1/3 fracture, result in nonunion or avascular necrosis of the proximal fragment. X-ray will show increase density of the avascular fragment.
2. Nonunion: in young treated by ORIF + BG. In elderly need no treatment/ most common complication...
3. Osteoarthritis and treated according to stage and affected part...

### **Fractured Metacarpal Bones:**

The metacarpal bones are vulnerable to blows & fall upon the hand or the force of a boxer's (boxer fracture) punch. The bone may be fracture at their base, shaft or through the neck. In the mid-shaft angular deformity is usually not marked, & even if it persist it does not interfere much with function. Rotational deformity is serious & may result in malposition of the entire ray when the hand is closed in a fist.

#### ***Treatments:***

1. Undisplaced fractures: crepe bandage for 2 – 3wk + exercise.
2. Displaced fractures of the shaft: ORIF.
3. Displaced fractures of the neck: up to 40° in the 4<sup>th</sup> & 5<sup>th</sup> metacarpal & 20° in the 2<sup>nd</sup> & 3<sup>rd</sup> metacarpal can be accepted. More than these need ORIF.

### **Fractured Phalanges:**

Usually result from direct trauma & therefore any part of the bone may be broken. Sometime the flexor tendon sheath is also damaged as well.

#### ***Treatment:***

- Open fractures: wounds should be treated first, skin must be preserved & carefully sutured & wound healing must not be jeopardized by the treatment of the fracture.
- Undisplaced fractures: strapping the finger to its uninjured neighbor (buddy strapping) for 2wk then exercise.
- Displaced fractures: need closed reduction & buddy strapping, if fail ORIF.

### **Bennett's Fracture\Subluxation:**

It is fracture of the base of the thumb metacarpal with extension in to the MPJ. The smaller fragment remains in contact with the trapezium while the major portion of the metacarpal subluxed proximally.

#### ***Treatments:***

Closed reduction is effective by pulling on the thumb, abducting it & extending it the hold reduction by POP cast for 4wk. if failed or unable to hold reduction need ORIF.

### **Mallet Finger:**

Deformity in which there is inability to extend the distal interphalangeal joint fully & occur due to either avulsion fracture or rupture of the extensor tendon or even stretching of the central slip of extensor hood by chronic swelling of DIPJ (figure 8-17). In case of pure soft tissue injury (tendon injury) can be treated by splint the distal joint in extension for 8wk.



**Figure 8-17:** Clinical and x-ray of Mallet finger.