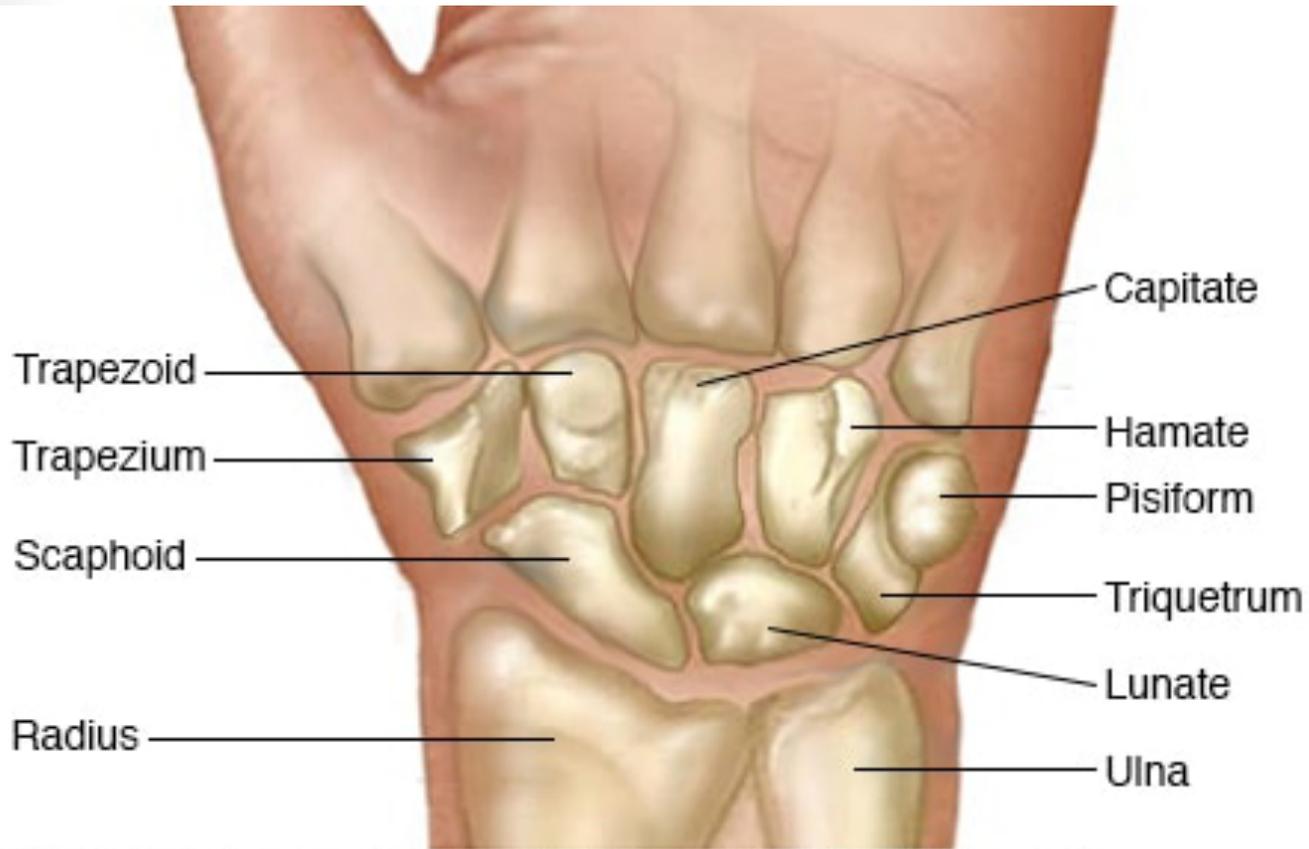


# WRIST DISORDERS

Done by momen alabadi

# Wrist disorder



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# Congenital & childhood deformity

## Carpal coalition (fusion)

- One of the **commonest** congenital wrist deformity.
- **Coalition of two or more of carpal bones.**
- Inherited as autosomal dominant.
- Lunotriquetral coalition, the most commonly fused carpal bones
- Seldom cause problems & no treatment is necessary because it doesn't cause functional disability.



# Radial dysplasia “radial club hand”

- The infant is born with the wrist in marked radial deviation. There is *absence of the whole or part of the radius, and usually also the thumb.*
- *½ the patients affected bilaterally.*

## **Treatment**

- in neonate: simple stretch and splint.
- in serious cases : Splinting or soft-tissue distraction

\*if the elbow joint is stiff, a radially deviated wrist can actually be advantageous, ( can reach mouth and perineum ) surgical correction can be disastrous.

- If function deteriorates, centralization of the carpus over the ulna is recommended, preferably before the age of 3 years.
- The main goal of centralization is to increase hand function by positioning the hand over the distal ulna, and stabilizing the wrist in straight position.



# Ulnar longitudinal deficiency (Ulnar hemimelia)

- Rare, ulnar deviation at birth due to partial or complete absence of the ulna.
- With age, The radial head may dislocate.

## Treatment:

- In first few months: gradual stretching & splintage to gradually stretch the contracted soft tissues
- In marked deformity: Excision of ulnar angle & osteotomy of radius .

- The radiograph shows absence of ulna, fixed flexion deformity of the elbow, only three metacarpals in the hand.



# *Madelung's deformity*

- bowing of the radial shaft with increased interosseous space and dorsal subluxation of the distal radioulnar joint.
- Rarely seen before 10 years age.
- Function is usually undisturbed.

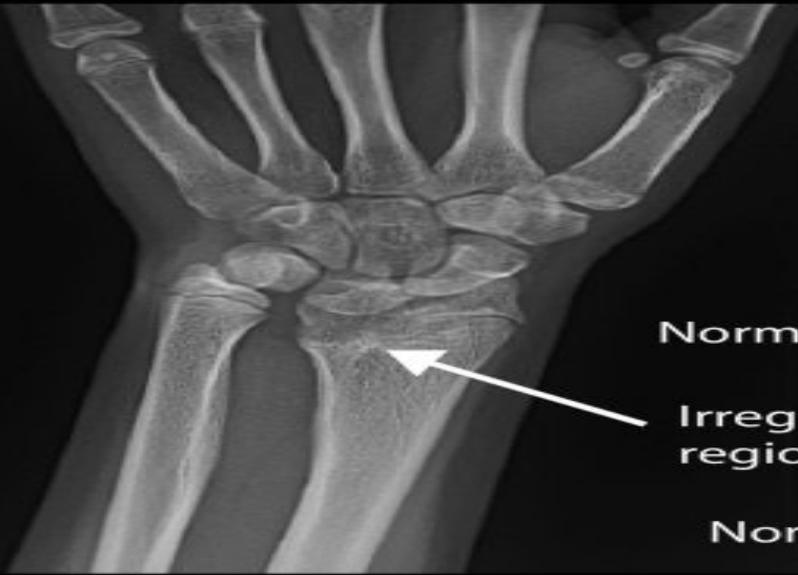
**Treatment** is not necessary unless the deformity is severe – the lower part of the ulna can be shortened with osteotomy of the radius.

Most movement affected: pronation and supination  
because it is restricted by increased interosseous space  
and radial bowing

-distal radioulnar joint affected

View of Madelung wrist from front

View of normal wrist from front



Normal radius bone

Irregular growth region of radius

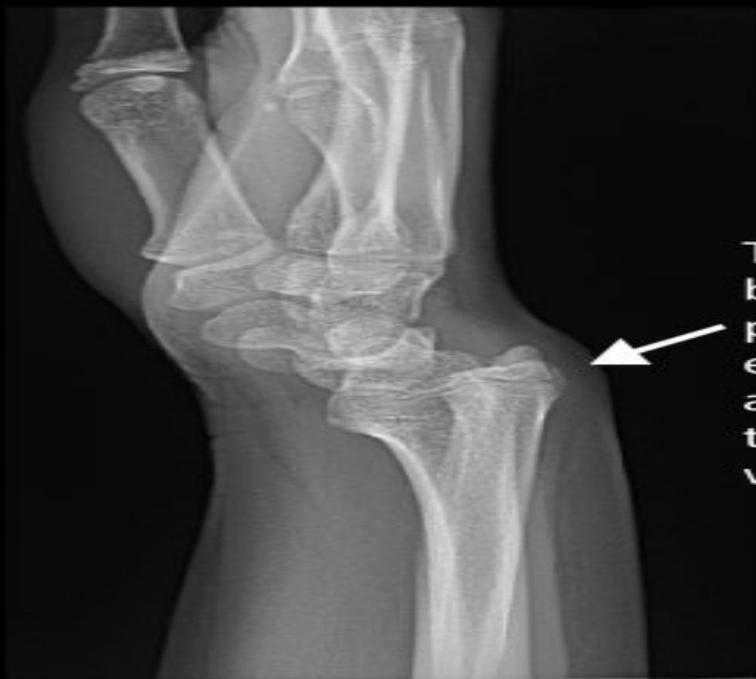
Normal ulna bone



R  
MF

View of Madelung wrist from side

View of normal wrist from side



The end of the ulna bone does not fit properly with the end of the radius, and protrudes on the backside of the wrist



M

# Arthrogryposis multiplex congenita

- Multiple, non progressive joint contracture at birth.
- Cause is unknown, there is an underlying neuropathy & myopathy.
- Limb is atrophic, skin lacking normal joint creases
- The elbow is extended, wrist is flexed, ulna is deviated, thumb adducted & fingers flexed.
- Treatment: difficult
- serial splintage, capsulotomy
- severe wrist deformity require soft tissue release, proximal row carpectomy or fusion.



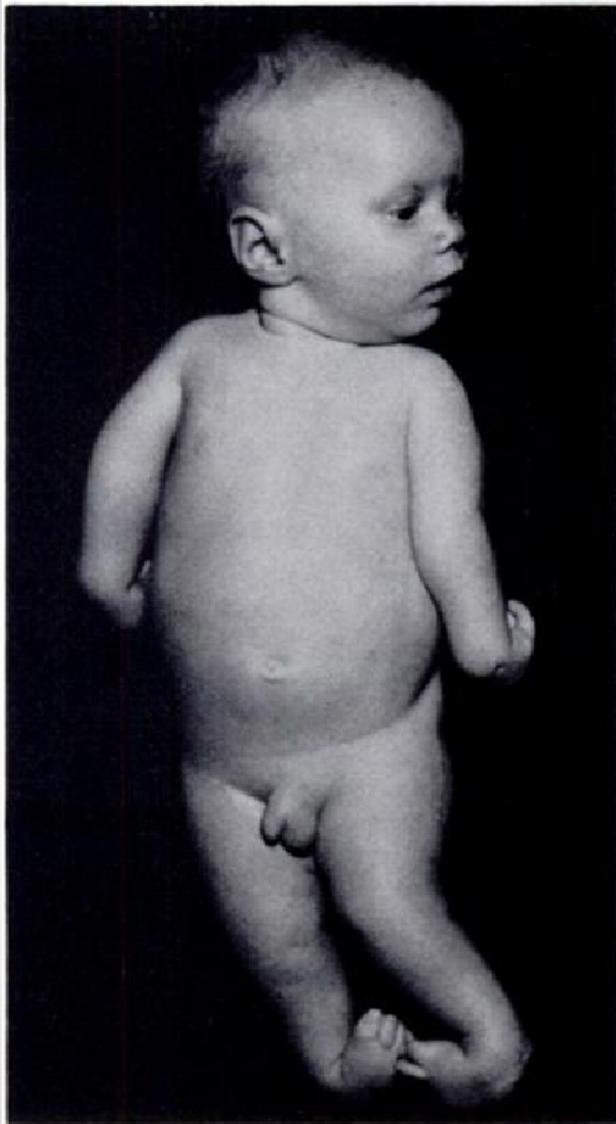


Fig. 1



Fig. 2



Fig. 3

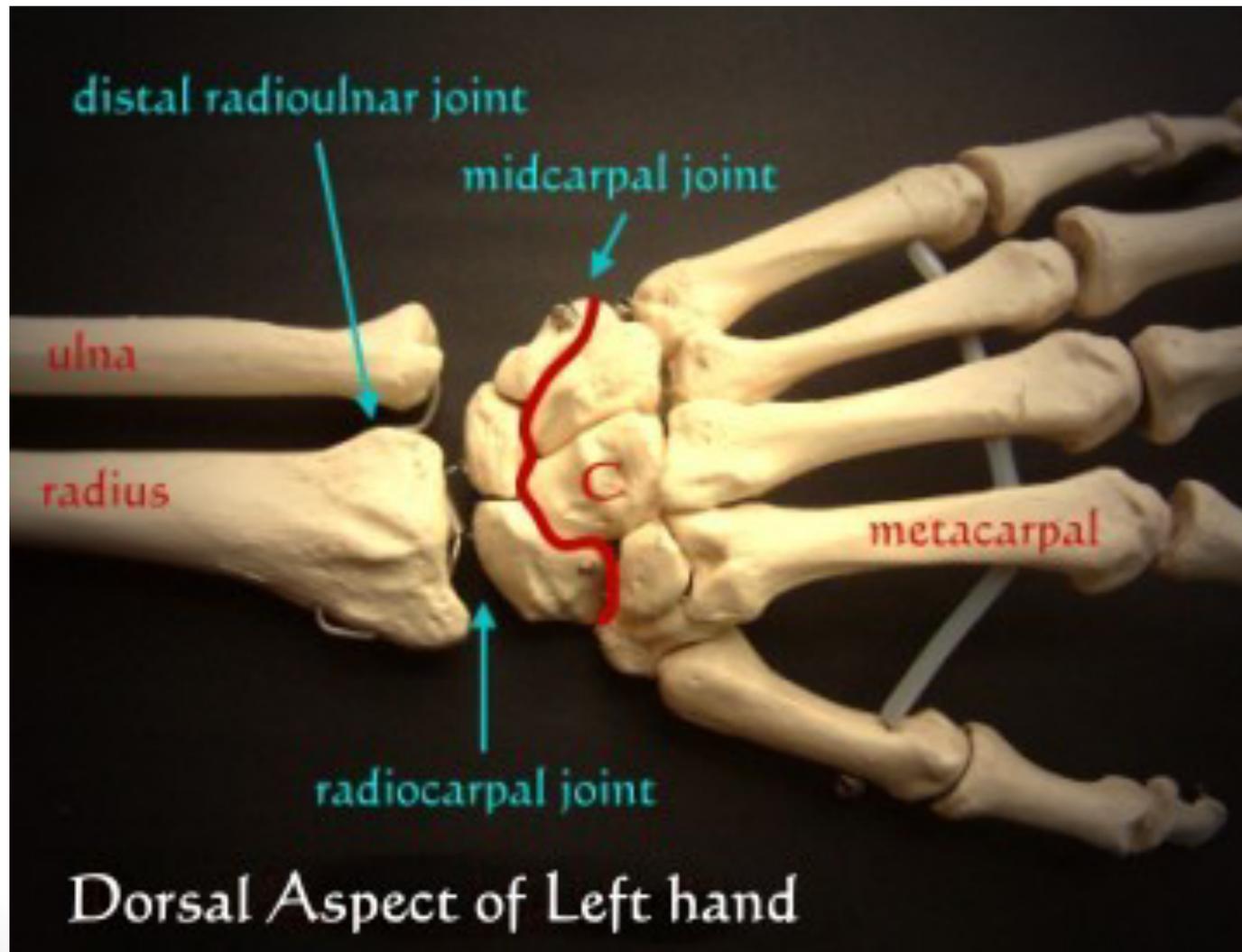
Photographs of patients suffering from osteopetrosis multiplex congenita in infancy, childhood and as an adult. The adult patient did not present

# Acquired deformities

- Physeal **injury** can result in malunited fractures or subluxation of distal radioulnar joint .
- Treatment:
- osteotomy of the radius or stabilization of ulna.
- **Non traumatic** as in RA and cerebral palsy



# Articulations of the wrist



# CHRONIC CARPAL INSTABILITY

- an injury where there is a loss of normal alignment of the carpal bones or the radioulnar joint.
- A traumatic event is often at the origin of carpal injury: the trauma causes ligamentous injuries that lead to misalignments of the joint surfaces, or badly healed fractures with consequent articular incongruence.
- **Diagnosis:** There are no defining clinical features. The diagnosis hinges on the x-ray appearances. There may also be features of previous disorders, such as Kienbock's disease or osteoarthritis.

## scapholunate dissociation

**X-ray**: widening of scapho-lunate interval more than 3mm (terry thomas sign)

- Best method for demonstrating instability .....> arthroscope.



# Instability of the distal radio ulnar joint

- May result from trauma, RA, excision of the distal end of ulna.
- Painful supination & pronation, tenderness.
- Piano key sign: the unstable ulna can be balloted by holding the pt. forearm pronated & pushing sharply upon the prominent head of ulna.
- Most effective way for Diagnosis is ~~CT~~.
- reconstruction

\* Gold Standard is → MRI  
or Arthroscope Not

CT bec its mostly

Ligament injury

94



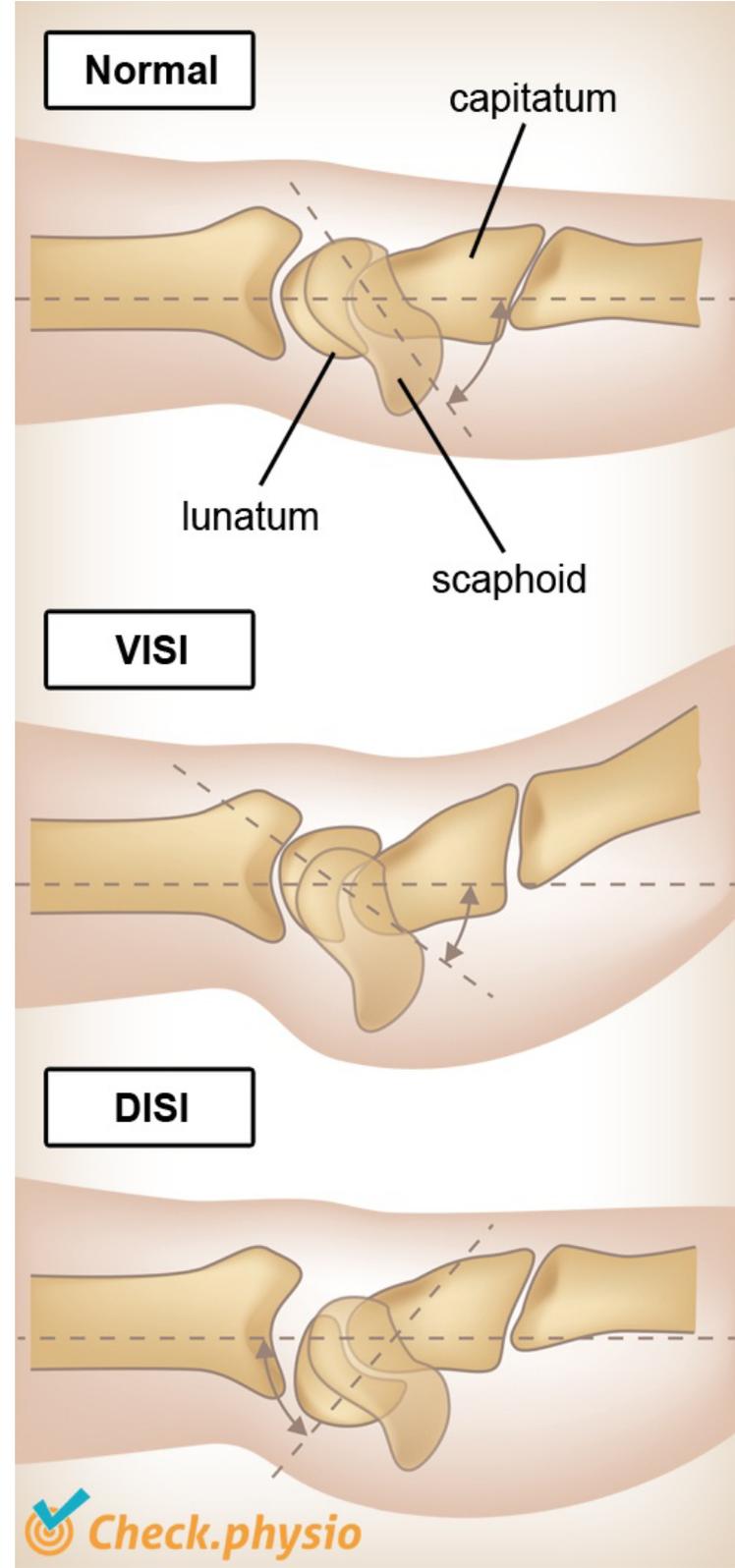
- **examination of the radio-ulnar joint stability:**
- 1. Piano key sign; the head of ulna is palpated downwards, usually it moves few millimeters and then returns to the normal position, in patients with instability the ulna may not return to the normal position quickly (difference in mobility and pain compared to unaffected side).
- 2. The ulnar head should not be mobile in full pronation or full supination because the ligaments are tight in those positions, any movement in those positions means instability of the ligaments.
- 3. Painful or limitation of pronation or supination.

# Radiocarpal & intercarpal joint

- Causes: wrist sprain with ligament injury, subluxation, dislocation, fracture of wrist bones, RA.

## Patterns of carpal instability:

- 1-DISI (*dorsal intercalated segmental instability*)
- 2-VISI (*Volar intercalated segmental instability*)
  - more severe
- While most DISI is abnormal, in many cases VISI is a normal variant, especially if the wrist is very lax.



- Surrounding the lunate are two ligaments; scapho-lunate and luno-triquetrum ligaments; these ligaments create a linkage between the proximal row to create one intercalated segment. The mechanical force on these is tremendous so any rupture in these ligament can create a damage that is not able to be restored surgically; any breakage of those ligaments will push the bones away from each other.
- The direction of the lunate relative to the axis of the radius determines whether DISI or VISI is present. For example, if the lunate is extended (dorsiflexed), then there is DISI.
- **Dorsal intercalated segment instability**; caused by injury to the scapho-lunate ligament which pushes the lunate dorsally.
- It is much more common.
- It causes incongruity of the normal articular surfaces which later on can cause osteoarthritis between the carpal bones.
- Any deviation in the long axis of the lunate dorsally is diagnostic for DISI.
- **Volar intercalated segment instability**; caused by injury to the luno-triquetrum ligament which pushes the lunate in a volar direction

- DISI and VISI:
- Cause: trauma on outstretched hand (wrist extension) with radial or ulnar deviation.
- If with Radial deviation: shear force at triquetrum, mostly avulsion/rupture of LT ligament and Fracture (compression) in scaphoid.
- If with Ulnar deviation: shear force at scapholunate ligament causing avulsion/rupture of it, in addition to fracture (compression) of triquetrum.

Clinical features: pain, weakness of wrist

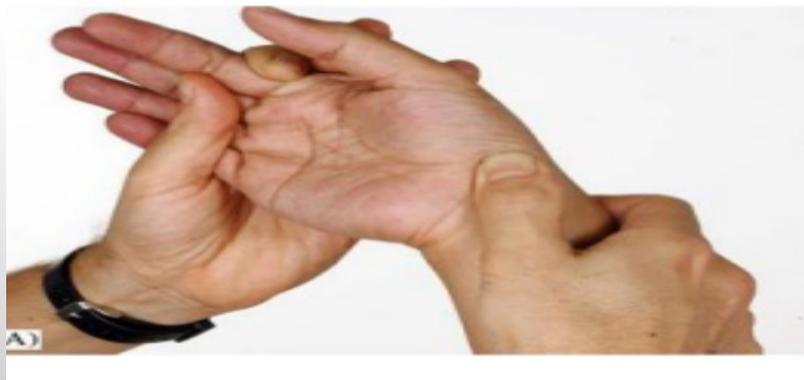
O/E: tenderness, grip strength is reduced.

Provocative tests:

1- **watson test** for scapho-lunate instability: thumb pressure is applied to the volar aspect of wrist over distal pole of scaphoid. Move from ulnar to radial deviation.

-Painful clunk is positive.

## Watson test



Palpable clunk



- **2- Luno-triquetral ballotment:**
- the second most common ligamentous cause of carpal instability
- the examiner grasp & stabilize the lunate, and ballot from volar aspect
- Positive: pain, crepitus, laxity
  
- **3-Pivot shift test:** compress the wrist axially while moving it towards ulnar and radial deviation
- painfull clunk.....> midcarpal instabilty.



# RHEUMATOID ARTHRITIS

- the wrist is the second most common site of RA.

## Clinical features

- **Pain, swelling** and **tenderness** may at first be localized to the radioulnar joint, or to common extensor tendon.
- Sooner or later the whole wrist becomes involved and tenderness is much more ill defined.
- In late cases the wrist is **deformed and gradually unstable.**
- Extensor tendons may rupture causing one or more of the fingers to drop into flexion .

## X-rays

- **X-rays show the characteristic features of osteoporosis and bony erosions.**

## Treatment

- early stage: consists of splintage and local injection of corticosteroids, combined with systemic treatment.
- Persistent synovitis may call for synovectomy and excision of the distal end of the ulnar head.
- late stage, In the late stage, tendon ruptures at the wrist, joint destruction, instability and deformity may require reconstructive surgery, including either arthroplasty or arthrodesis



severe osteopenia with soft tissue swelling around the wrists, erosion of the distal radius and ulna, severe narrowing of the radiocarpal joint with carpal ankylosis and destruction of the intercarpal articulations.

# OSTEOARTHRITIS

- Osteoarthritis of the wrist can be idiopathic, but it is mostly seen as a post-traumatic condition. **Scapholunate advanced collapse (SLAC)** is the most common form.
- **SLAC: OA secondary to trauma**
- The patient may have forgotten the old injury, but some years later they begin to complain of **pain** brought on by activity , **progressive loss of movement and weakness of grip**. The appearance is usually normal, but the wrist is **tender** and **movements are restricted and painful**
- The wrist is an uncommon site for primary osteoarthritis.
- The most common joint to be involved in osteoarthritis is 1st Carpometacarpal joints followed by DIP and PIP joints.

## X-rays

- X-ray features are narrowing of the radiocarpal joint (<2mm), bone sclerosis and irregularity of one or more of the proximal carpal bones

## Treatment

- Rest, in a polythene splint.
- excision of the radial styloid process.
- Widespread OA may require more extensive surgery.( replacement or arthrodesis )

Severe osteoarthritis and osteopenia of the carpal joint and 1st carpometacarpal joint.

- joint-space narrowing,
- sclerosis
- osteophyte formation.

The arrow doesn't indicate the joint affected, its above it.



# Osteoarthritis of the First carpometacarpal joint

- Osteoarthritis of the thumb carpometacarpal joint is common in postmenopausal women .
- The carpal bone affected: between 1<sup>st</sup> metacarpal joint and trapezium
- The patient complains of pain and swelling around the proximal end of the thumb metacarpal.
- Careful examination will show that tenderness is sharply localized to the carpometacarpal joint, about 1 cm distal to the radial styloid process.
- [often bilateral]
- In late cases, fixed adduction of the first metacarpal produces a characteristic deformity.

## **Treatment**

- Local injection of corticosteroid usually relieves pain, and movements may improve.
- If this fails, operation may be advisable.
  - Excise the trapezium ✖
  - Joint replacement
  - Joint arthrodesis

# Distal radio – ulnar arthritis

- Progressive destruction is a characteristic feature of RA.
- Lesser degenerative changes are seen in secondary OA.
- If pain & loss of function not controlled conservatively, resection of distal ulna, Or fuse the distal ulna with the radius.

# KIENBOCK'S DISEASE

- also known as avascular necrosis of the lunate, is a condition in which the lunate bone, loses its blood supply, leading to death of the bone.
- trauma and short ulna are risk factors.
- pain, stiffness, tenderness directly over the lunate bone, and sometimes arthritis of the wrist if some time has passed.
- most common in men between the ages of 20 and 40 and rarely affects both wrists.



## Imaging

- The **earliest** signs of osteonecrosis can be detected only by **MRI**. (evidence show at stage 1 and 2)
- Typical x-ray signs are increased density in the lunate and, later, flattening and irregularity of the bone. Ultimately there may be features of OA of the wrist.



For x ray to show evidence of sclerosis of lunate, it mostly reached stage 3, So late. MRI is preferred.

## Treatment

During the early stage, while the shape of the lunate is more or less normal, **osteotomy** of the distal end of the radius may reduce pressure on the bone and thereby protect it from collapsing.

Microsurgical **revascularization** of the bone is also worth considering if the necessary expertise is available.

In late cases, partial wrist arthrodesis or proximal row excision or even joint replacement are considered.

## Tears of the triangular fibrocartilage

- The TFCC fans out from the base of the ulnar styloid process to the medial edge of the distal radius, acting somewhat like a meniscus in the wrist joint (stability).
- In patients whose ulna is longer than the radius, the TFCC is usually thinner and more likely to tear.
- Chronic pain in the ulnar sided wrist
- may be related to an old 'sprain' in which a more serious injury to the TFCC was overlooked.
- In addition to pain, there may be loss of grip strength and clicking on supination of the forearm.
- Arthroscopy is the gold standard for diagnosis.

## Treatment:

### 1-Non-surgical Treatment Options

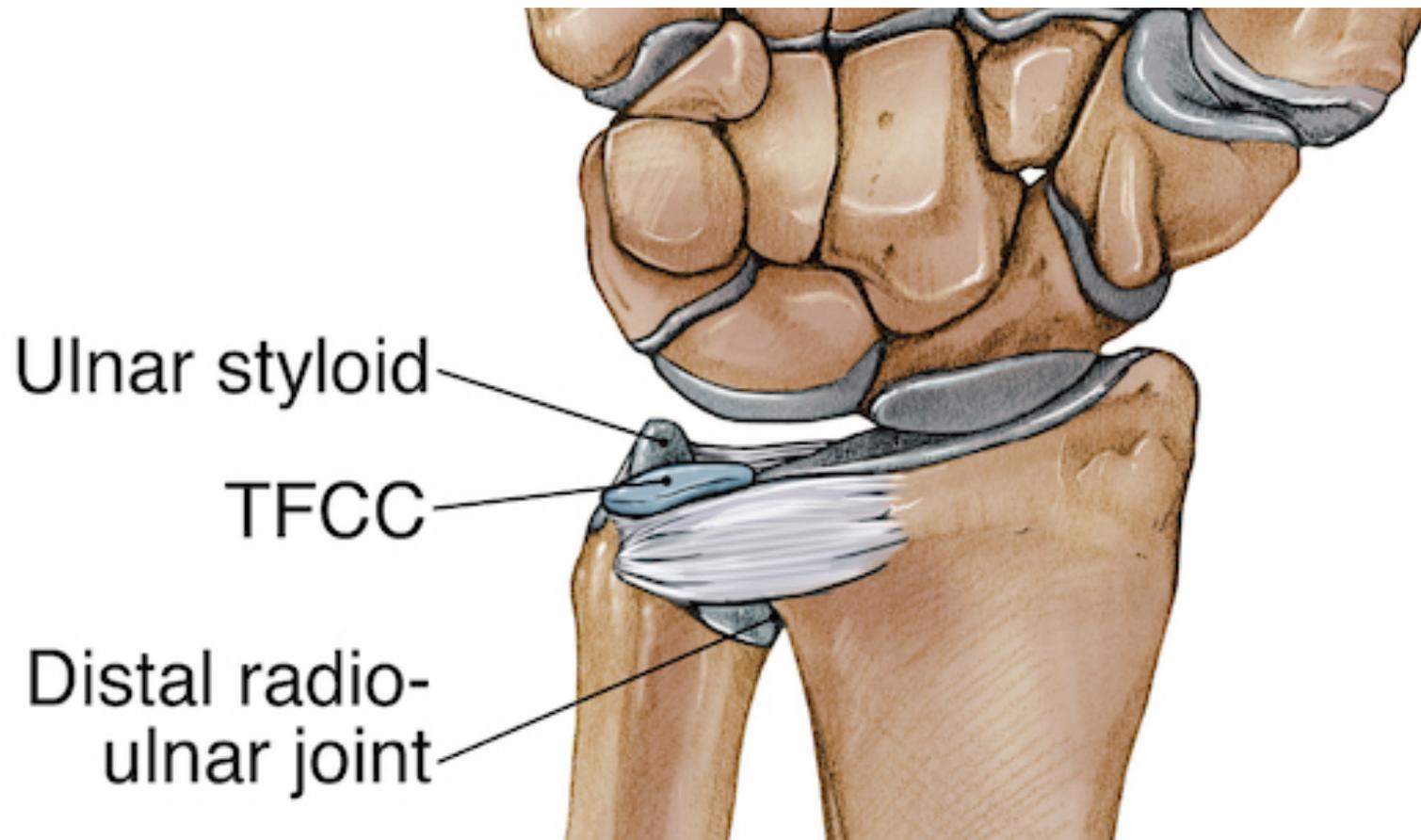
Splint or cast

Cortisone injection

### 2-Surgical Treatment Options: in unresponsive patients

-arthroscopically

-debriding or directly repaired using sutures

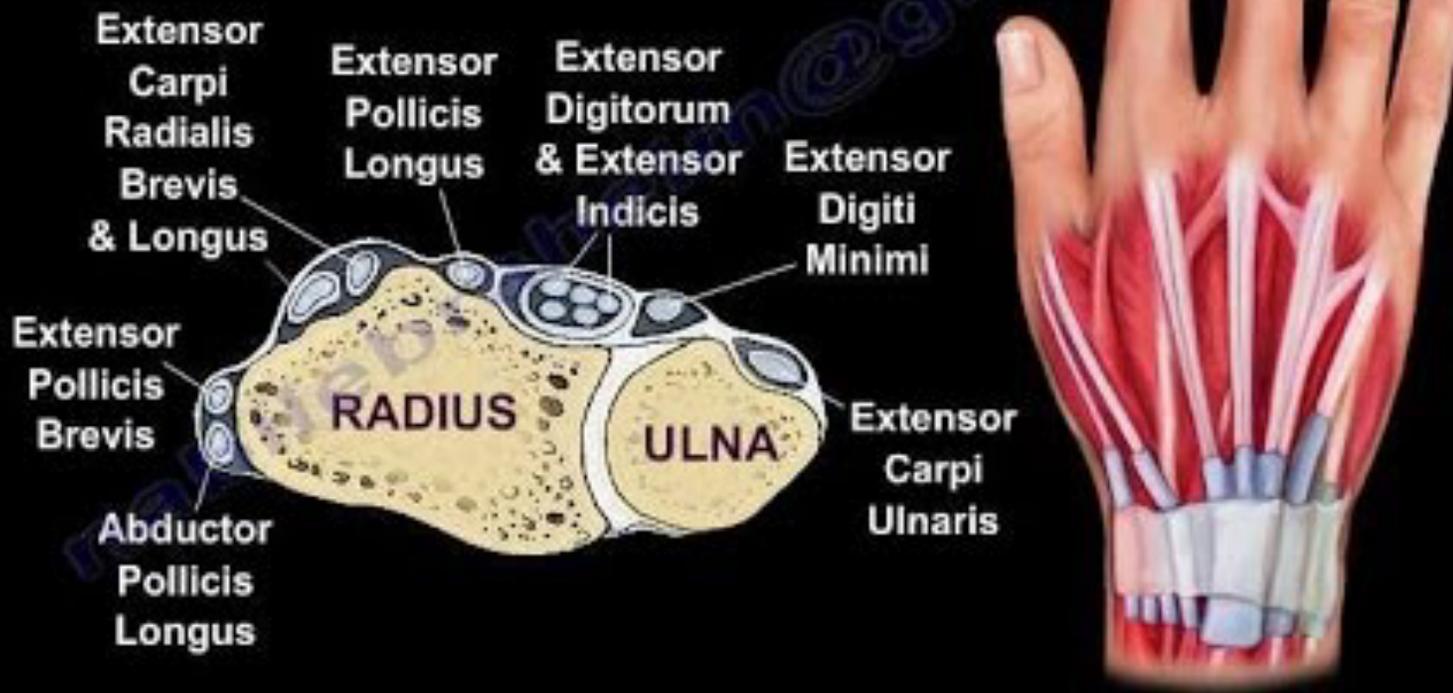


# TENOSYNOVITIS AND TENOVAGINITIS

- The extensor retinaculum contains six compartments which transmit tendons lined with synovium.
- Tenosynovitis can be caused by over-use or repetitive minor trauma; sometimes it occurs spontaneously.
- The resulting synovial inflammation causes secondary thickening of the sheath and stenosis of the compartment, which further compromises the tendon.
- Early treatment: including rest, anti inflammatory medication and injection of corticosteroids.
- The first dorsal compartment (enclosing abductor pollicis longus and extensor pollicis brevis) and the second dorsal compartment (extensor carpi radialis longus and brevis) are the ones most commonly affected.

## Conditions Affecting the Dorsal Wrist Compartments

### Anatomy - Compartments



- Important to memorize components of each compartment.
- extensor carpi ulnaris: most commonly affected in RA, it ruptures causing deformity at the wrist.

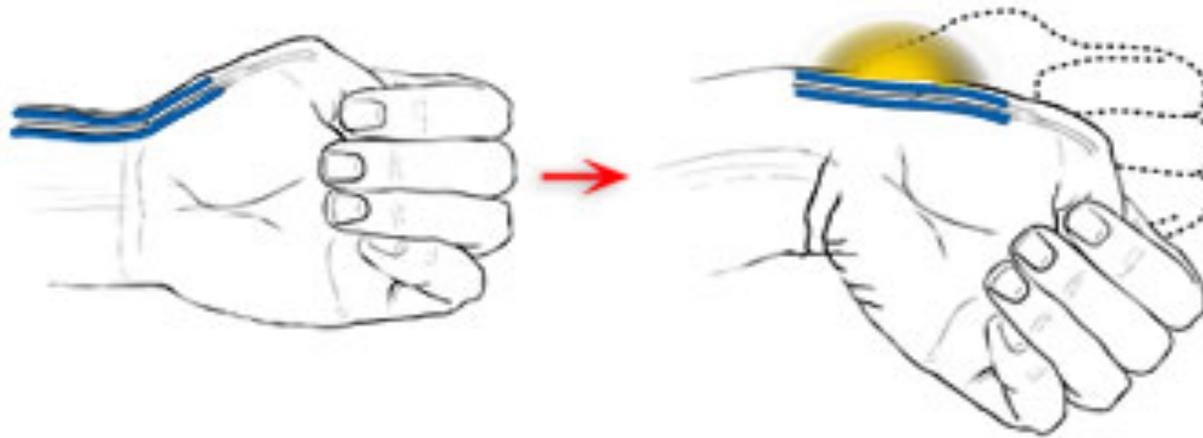
## DE QUERVAIN'S DISEASE

De Quervain's tenosynovitis is a stenosing tenosynovitis of the first extensor compartment of the wrist and leads to pain on the radial side of the wrist and impaired function of the wrist and hand .

More common in pregnant women (30-50).

### Clinical features

- patient presents with pain, tenderness and swelling over the radial side of the wrist and difficulty gripping.
- The tenderness is most acute over the tip of the radial styloid.
- The tendon sheath feels thick and hard.
- **The pathognomonic sign** is elicited by ***Finkelstein's test***. Hold the patient's hand firmly, keeping the thumb tucked in close to the palm, then turn the wrist sharply towards the ulnar side.
  - A stab of pain over the radial styloid is a positive sign.
  - Repeating the movement with the thumb left free is relatively painless.



## Treatment

- In early cases, symptoms can be relieved by corticosteroid injection into the tendon sheath, sometimes combined with splintage of the wrist.
- Rare resistant cases need an operation, which consists of slitting the thickened tendon sheath.

This test ( Finkelstein) diagnoses two diseases:

1-tenosynovitis of 1<sup>st</sup> compartment: tenderness at radial styloid (wrist joint)

2-tenosynovitis of 2<sup>nd</sup> compartment (intersection syndrome): (tenderness 5cm proximal to wrist joint)

5cm proximal to styloid ? Intersection syndrome  
Intersection between 1st and 2nd compartment

## **OTHER SITES OF EXTENSOR TENOSYNOVITIS**

- Over-use tenosynovitis of *extensor carpi radialis brevis* (the most powerful extensor of the wrist) or *extensor carpi ulnaris* may cause pain and point tenderness just medial to the anatomical snuffbox or immediately distal to the head of the ulna, respectively. Splintage and corticosteroid injections are usually effective.

## GANGLION cyst

- Is the most common swelling in the wrist ....
- Arise from leakage of synovial fluid from a joint or tendon sheath and contains viscous fluid.
- young adult
- painless lump, usually on the back of the wrist( dorsal surface of the scapho-lunate ligament).
- The lump is well defined, cystic and non tender. It may be attached to one of the tendons.

### Treatment

- often disappears after some months spontaneously
- it can be aspirated; if it recurs, excision is justified,
- Up to 50% risk of recurrence, even after careful surgery.

\* to Document the extent of injury on vascular supply

- **Allen test** used to test wrist vascularity.
- Carried out for both Volar and Dorsal.
- Vascular injury is more common in volar ganglion cyst because its very close to radial artery.
- So its more dangerous and important to test before surgery.
- However, test is carried out in both volar and dorsal.
- Dorsal is more common.
- Most common complication of ganglion cyst is recurrence.

Everything You Need To Know - Dr. Nabil Ebraheim

The patient then makes a tight fist and the hand is opened and closed several times.

The hand should appear blanch at this time because arterial blood supply (ulnar and radial arteries) has been temporarily occluded.



\* How to know where is  
the Ulnar Artery?

Ganglion cyst

☞ Flexion of test with wrist towards ulnar  
side → find Flexor carpi Ulnaris  
then put your hand radial to the  
carpi Ulnaris (lateral) you'll find  
the Artery

**THANK YOU**