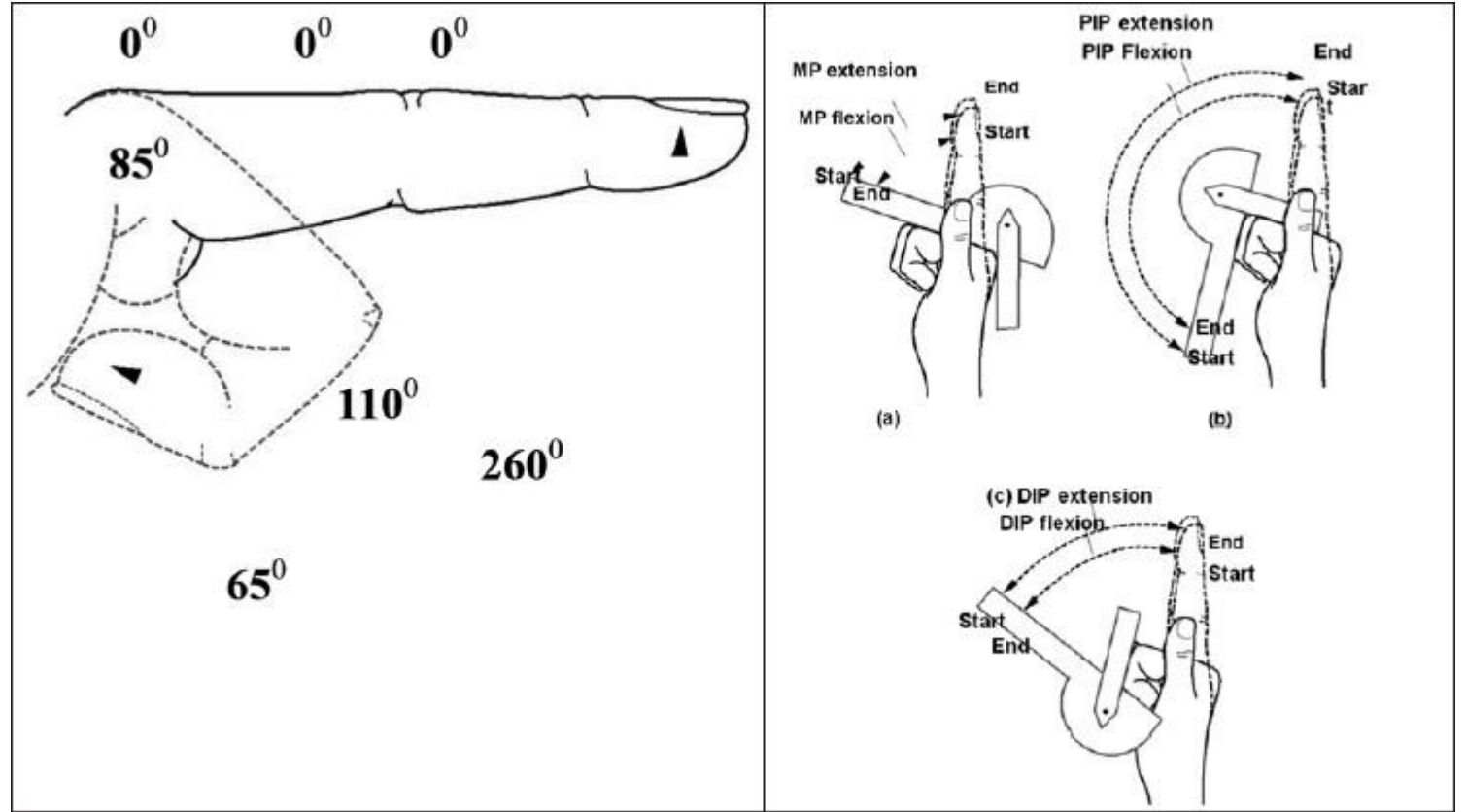
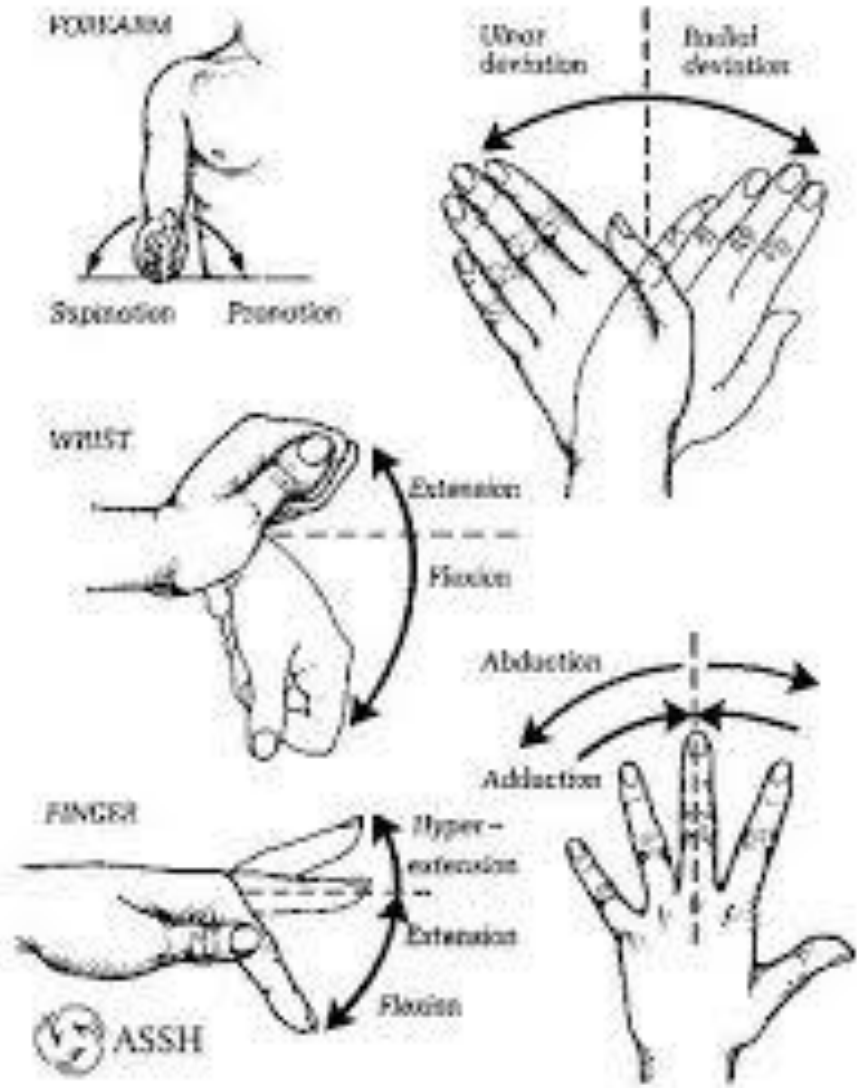


# Hand 3

## Range of Motion

- Active and passive
  - Finger
    - MCP: 0° extension to 85° of flexion
    - PIP: 0° extension to 110° of flexion
    - DIP: 0° extension to 65° of flexion
  - Wrist
    - 60° flexion
    - 60° extension
    - 50° radioulnar deviation arc



## Neurovascular Exam

- Sensation

- two-point discrimination

- Motor

- radial nerve: test thumb IP joint extension against resistance
- median nerve
  - recurrent motor branch: palmar abduction of thumb
  - anterior interosseous branch: flexion of thumb IP and index DIP ("A-OK sign")
- ulnar nerve: cross-fingers or abduct fingers against resistance

- Vascular

- radial pulse
- ulnar pulse
- Allen's test
- capillary refill



### Measurement

### Interpretation

2 mm to 5 mm

Normal

6 mm to 10 mm

Fair

11 mm to 15 mm

Poor

One point of perception

Protective

No point perceived

Anesthesia








Skin region	Men (in mm)	Women (in mm)
Upper lateral arm	38.1±1.1	42.3±1.1
Lower lateral arm	33.7±1	35.6±1
Upper medial arm	36.2±1.1	36.9±1
Mid medial arm	33.5±1	33.1±1.2
Lower medial arm	24.8±1	25.2±1.2
Upper posterior arm	35.6±1.2	35.2±1.3
Mid posterior arm	37.3±1	36.8±1.3
Lower posterior arm	28.9±1	26.1±1.5
Mid lateral forearm	29.1±1	28.3±1
Mid medial forearm	27.4±1	24.5±1
Mid posterior forearm	28.2±1	24.3±1.1
1 <sup>st</sup> dorsal interosseous	14.5±1	13.1±0.8
surface of distal phalanx thumb	3.1±0.1	3.3±0.3
surface of distal phalanx middle finger	3.2±0.1	2.7±0.1
surface of distal phalanx little finger	3.1±0.1	2.0±0.1

# - Student's t test





# Assessment of Neurological Status in Upper Limb Injuries

Nerve	Median	Radial	Ulnar	AIN (Anterior Interosseous)
Paediatric fractures associated with neurological deficit <sup>1</sup> :	Supracondylar (4%) Radius & Ulna	Supracondylar (4-6%) Humeral Shaft	Supracondylar (2%) Radius & Ulna	Supracondylar (5%) Radius & Ulna (Diaphyseal)
Motor Assessment	 Finger flexion	 Extension of wrist & MCP joint	 Small muscles of hand (finger abduction & adduction)	 Thumb flexion at IP joint & flexion of index finger at DIP joint
Sensory Assessment				N/A

Documentation of Neurological Status should **ALWAYS** include which nerves have been examined.

eg. Neurovascularly Intact (Radial ✓ Ulnar ✓ Median ✓ AIN ✓)

1. Babal et al. Nerve Injuries Associated with Paediatric Supracondylar Humeral Fractures: A Meta-Analysis. *Journal of Paediatric Orthopaedics* 2010

2. Davidson AW. Rock-Paper-Scissors: Injury. *International Journal of Care of Injured*. 2003; 34:61-63.





Straight thumb up, a test of median nerve function.  
 Keep the wrist slightly back (extended) during this test.

Ask the patient to move his thumb up. Make sure that the thumb base is *fully* across and out and that the thumb is straight.



If he can do this, resist the movement at the *side* of the thumb (not the back where the nail is).



### Anterior interosseous syndrome

Normal



Abnormal



Hand posture in anterior interosseous syndrome due to paresis of flexor digitorum profundis and flexor pollicis longus mm.

# Special Tests

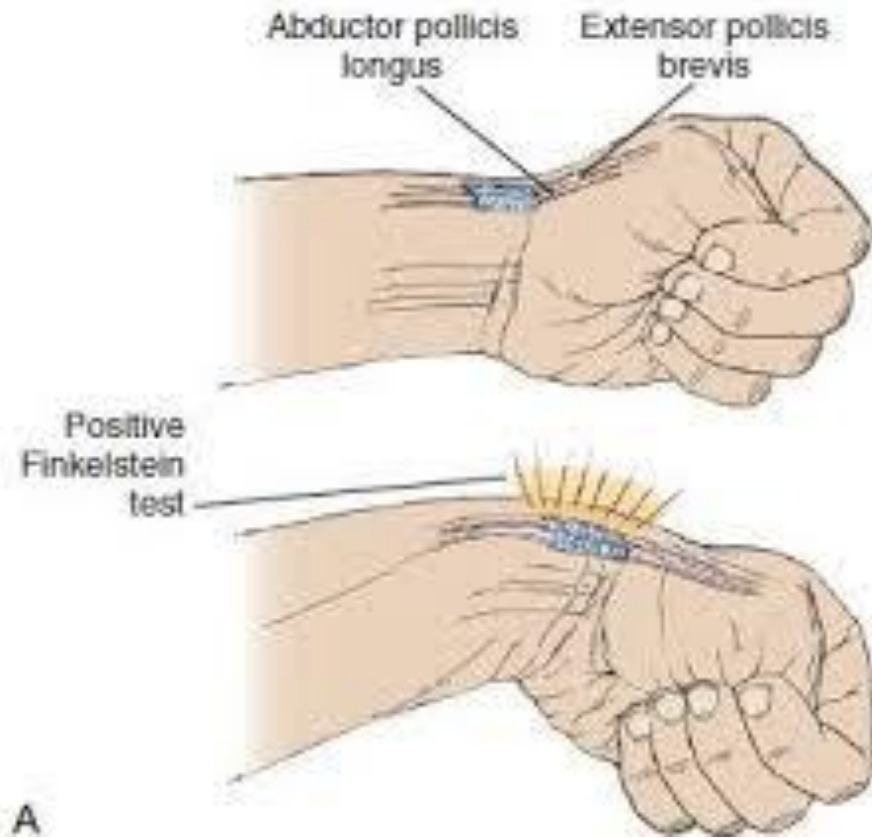
- grind test:

## Thumb CMC joint grind test

- used to test for pathology at the thumb carpometacarpal joint (CMC)
- examiners applies axial load to first metacarpal and rotates or "grinds" it
- positive findings: pain, crepitus, instability



- Finkelstein's test
  - used to test for DeQuervain's tenosynovitis
  - patient makes fist with fingers overlying thumb
  - examiner gently ulnarly deviates the wrist
  - positive findings: pain along the 1st compartment



- flexor profundus
  - used to test continuity of FDP tendons
  - MCP + PIP joints held in extension while patient asked to flex FDP, thereby isolating FDP (from FDS) as the only tendon capable of flexing the finger
- flexor sublimus
  - used to test for continuity of FDS tendon
  - MCP, PIP and DIP of all fingers held in extension with hand flat and palm up; the finger to be tested is then allowed to flex at PIP joint.

Only muscle that flexes at DIP joints



**B** Flexor digitorum profundus (FDP)  
muscle test

Flexes at PIP joints



**A** Flexor digitorum superficialis (FDS)  
muscle test

A



B





- Bunnel's test

examiner passively flexes PIPJ twice

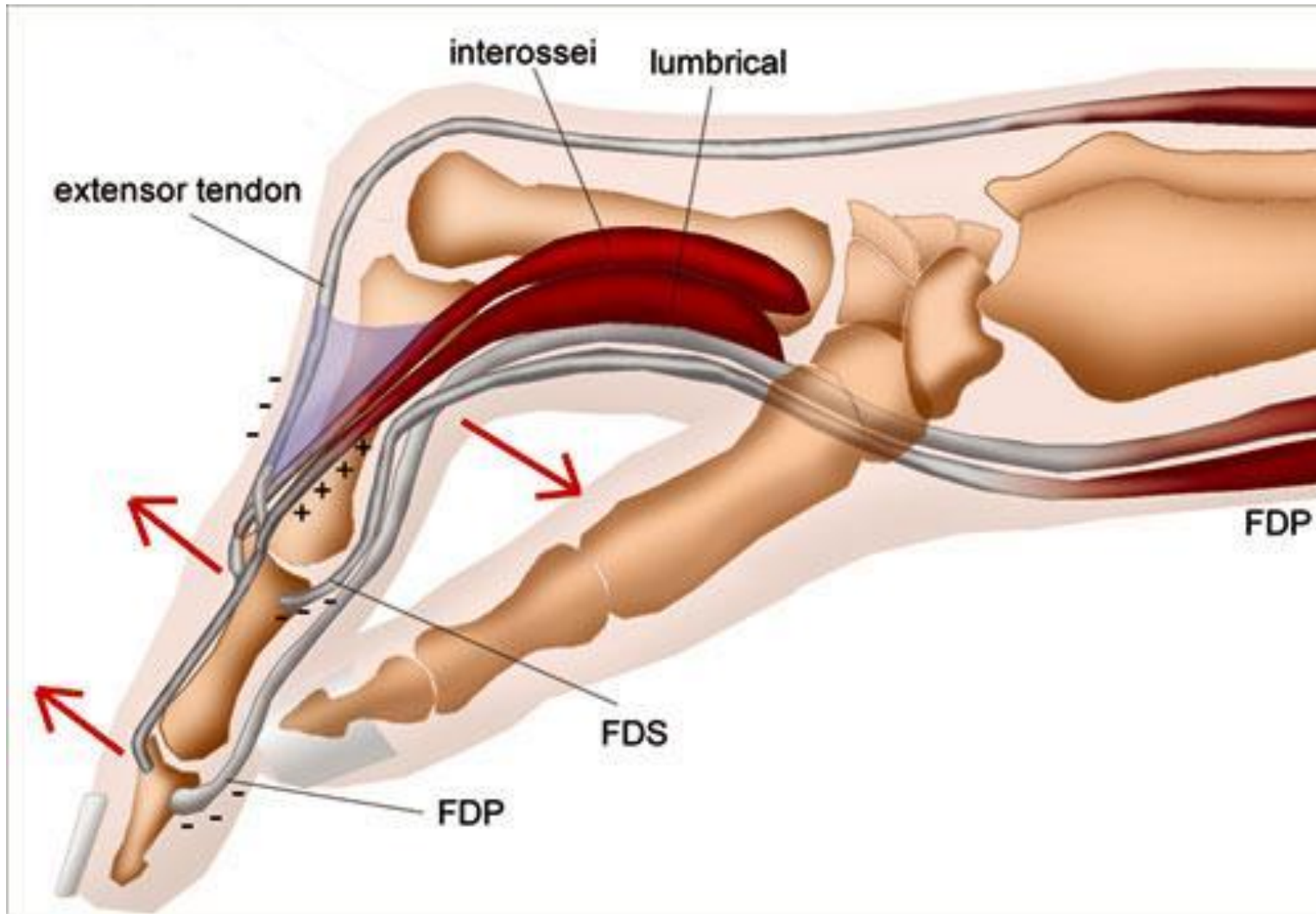
- first with MCP in extension
- next with MCP held in flexion
- **intrinsic tightness** present if PIP can be flexed easily when MCP is flexed but NOT when MCP is extended
- **extrinsic tightness** present if PIP can be flexed easily when MCP is extended but NOT when MCP is flexed

# Bunnell test

Extend MCP joint  
and assess passive  
flexion of IP joints

Compare IP joint  
ROM with MCP  
joint flexed

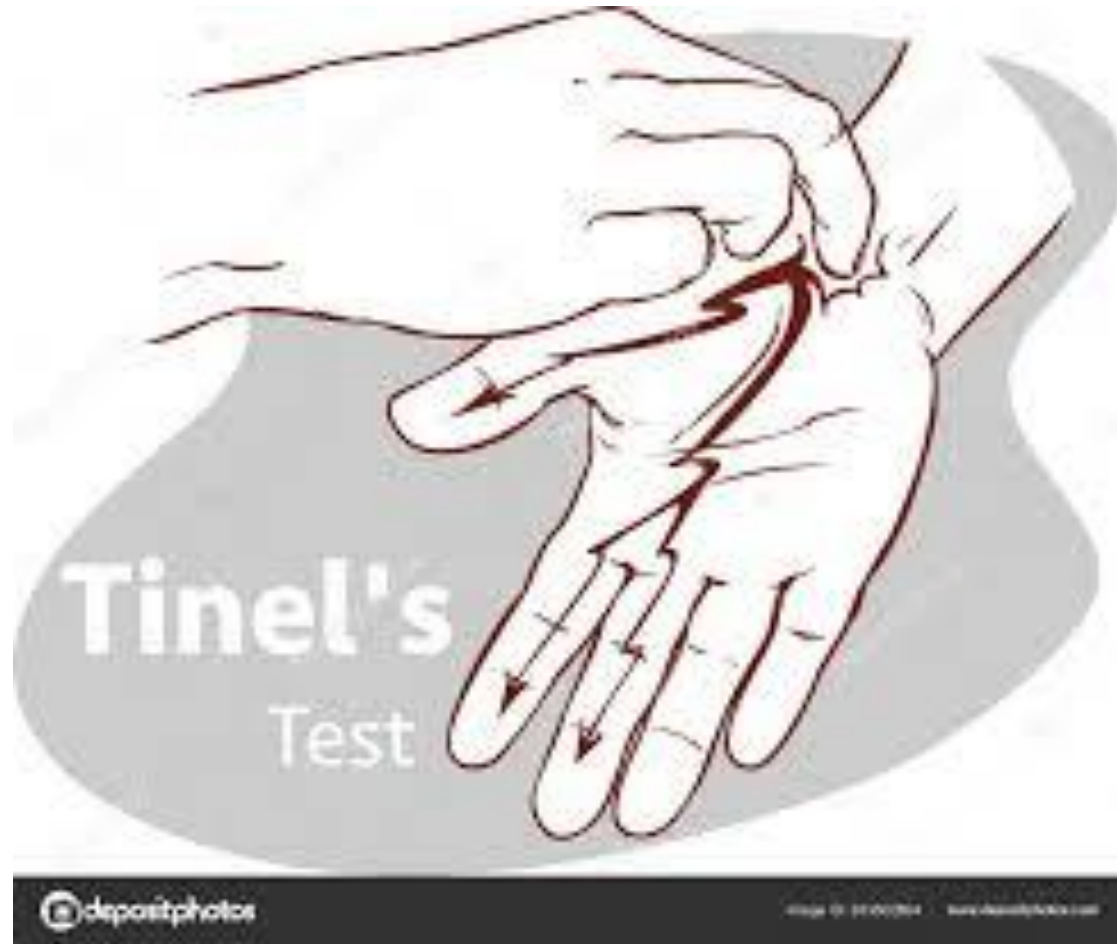




# Nerve assessment

## o **Tinel's**

- tests for carpal tunnel syndrome
- examiner percusses with two fingers over distal palmar crease in the midline
- positive if patient reports paresthesias in median nerve distribution



## o **Phalen's**

- tests for carpal tunnel syndrome
- with the hands pointed up, the patient's wrist is allowed to flex by gravity in palmar flexion for 2 minutes maximum
- positive if patient reports paresthesias in median nerve distribution

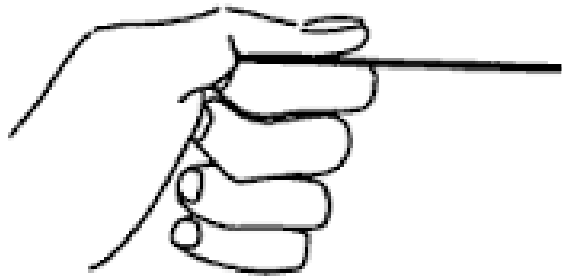


## o **Froment's sign**

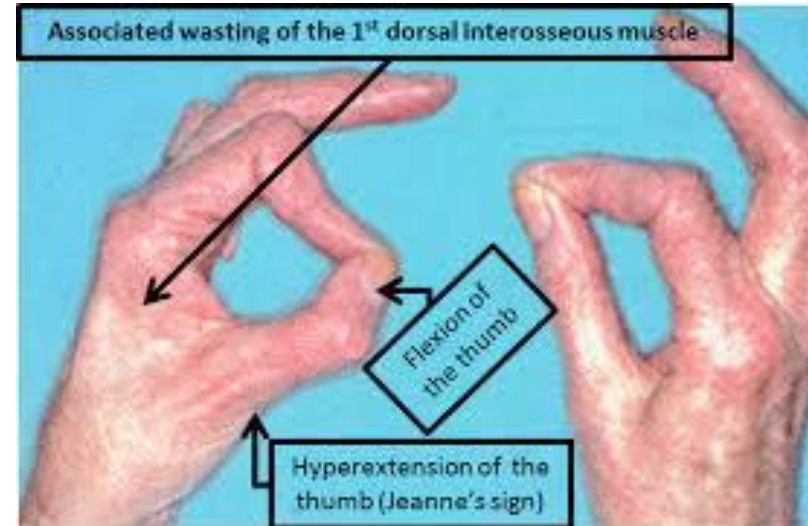
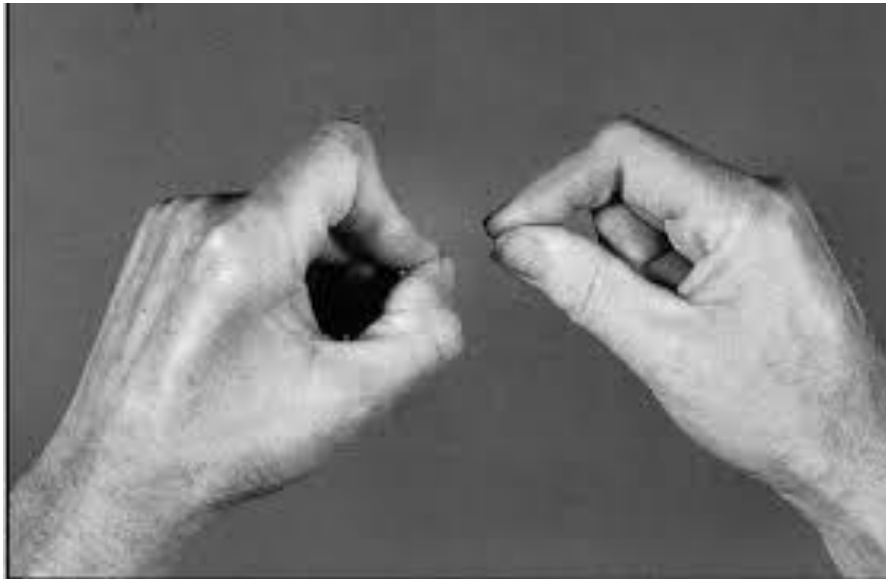
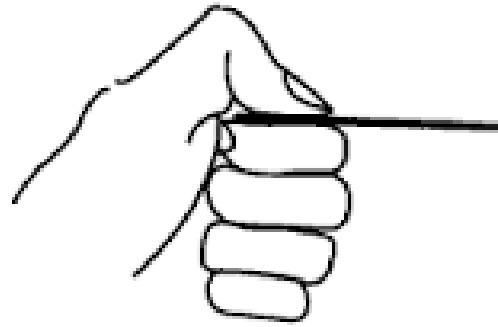
- tests for ulnar nerve motor weakness
- patient asked to hold a piece of paper between thumb and radial side of index
- positive if as the paper is pulled away by the examiner the patient flexes the thumb IP joint in an attempt to hold on to paper



Normal



Froment's positive



## o **Wartenberg's sign**

- tests ulnar nerve motor weakness
- patient asked to hold fingers fully adducted with MCP, PIP, and DIP joints fully extended
- positive if small finger drifts away from others into abduction



## o **Jeanne's sign**

- tests for ulnar nerve motor weakness
- ask patient to demonstrate key pinch
- positive finding if patient's first MCP joint is hyperextended



# Stability assessment

- o scaphoid shift test (Watson's test)
  - ❖ tests for scapholunate ligament tear
  - ❖ examiner places thumb on distal pole of scaphoid on palmar side of wrist and applies constant pressure as the wrist is radially and ulnarly deviated
  - ❖ dorsal wrist pain or "clunk" may indicate instability



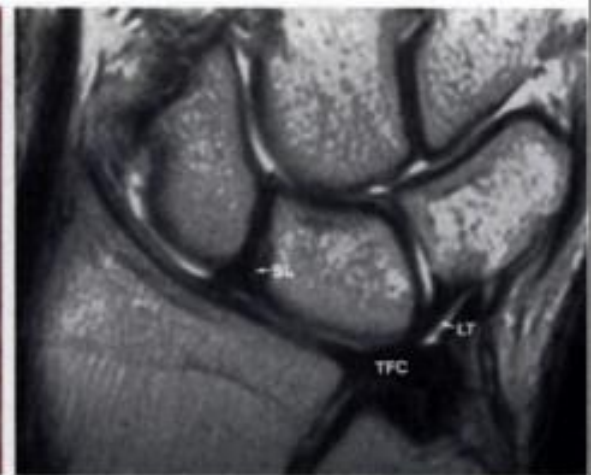
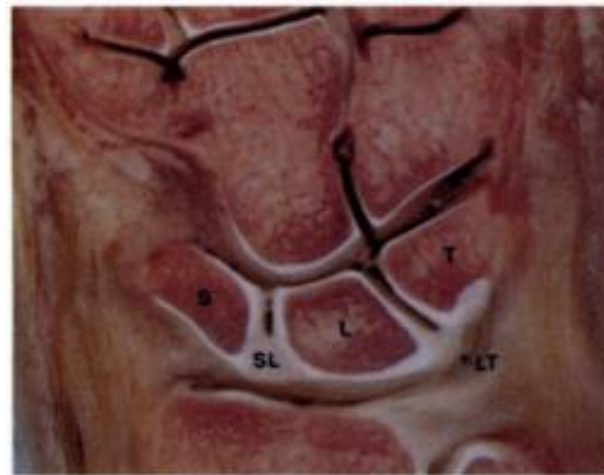
# Watson's Test



## o lunotriquetral ballottement

- ❖ tests for lunotriquetral ligament tear
- ❖ examiner secures the pisotriquetral unit with the thumb and index finger of one hand and the lunate with the other hand
- ❖ anterior and posterior stresses are placed on the LT joint
- ❖ positive findings are increased laxity and accompanying pain





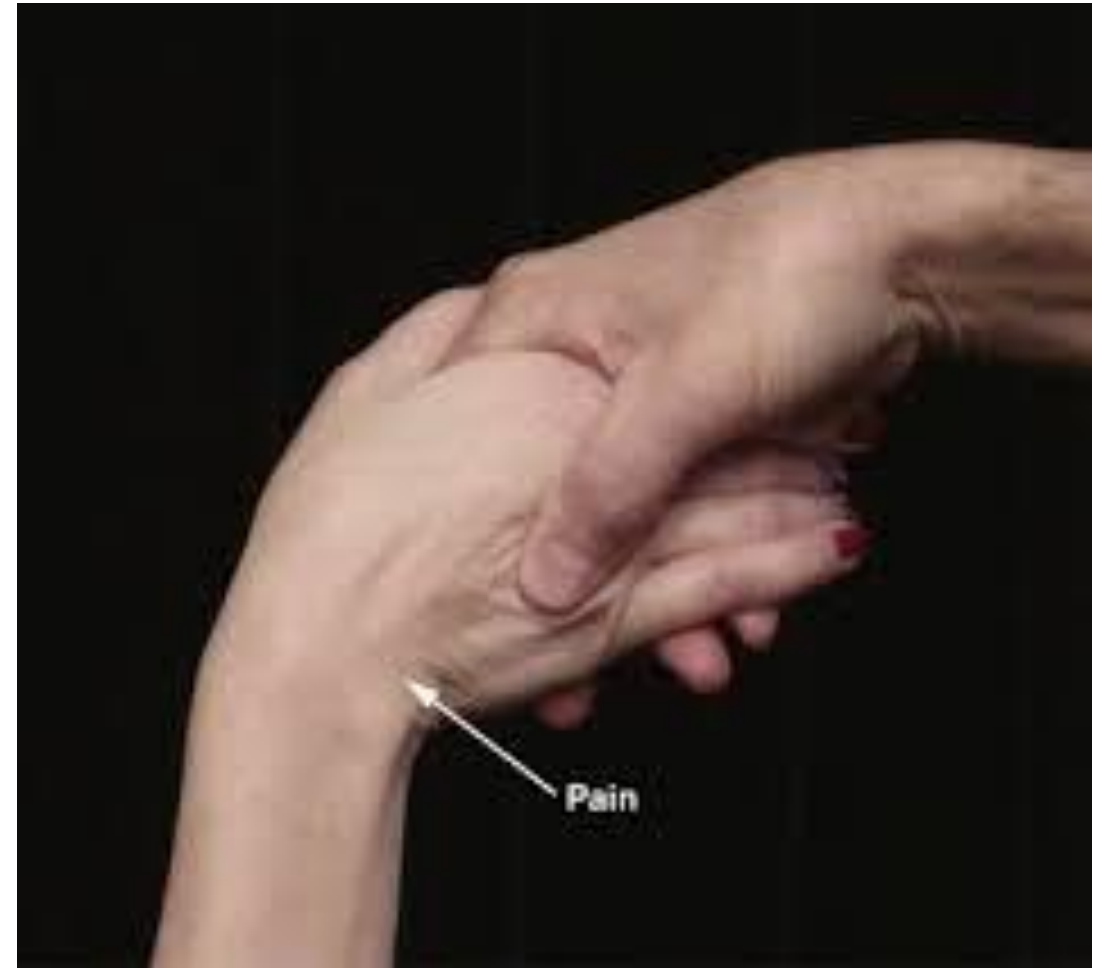
- o midcarpal instability
  - ❖ examiner stabilizes distal radius and ulna with non-dominant hand and moves patients wrist from radial deviation to ulnar deviation, whilst applying an axial load
  - ❖ a positive test occurs when a clunk is felt when the wrist is ulnarly deviated

Test 1



Test 2

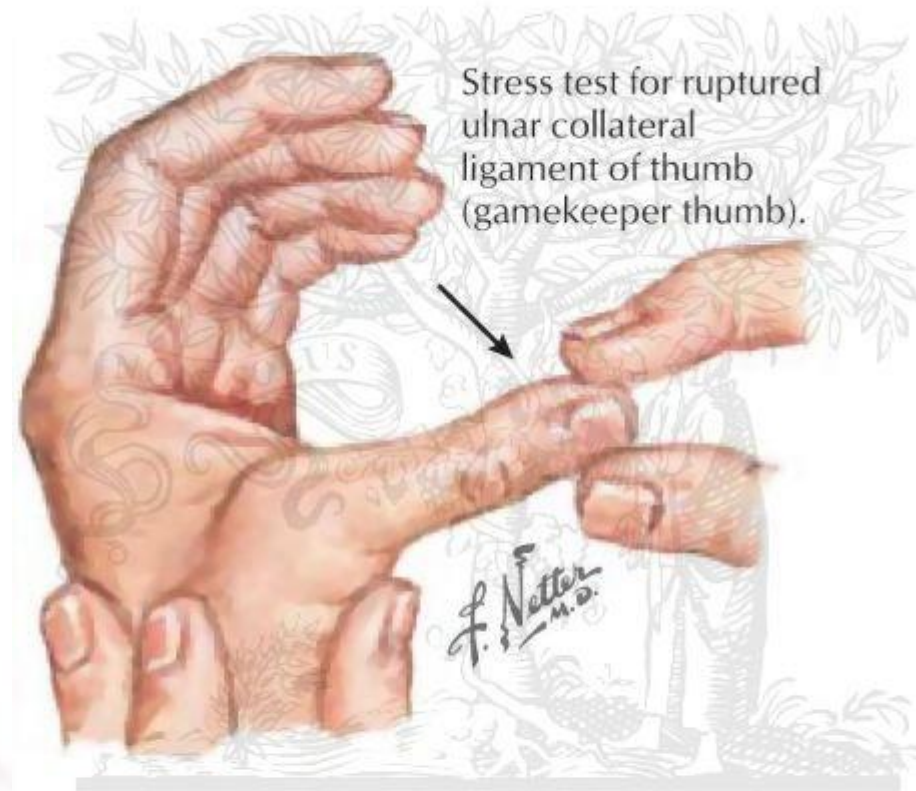
- o ulnar carpal abutement
  - ❖ tests for TFCC tear or ulnar-carpal impingement
  - ❖ examiner ulnarly deviates wrist with axial compression
  - ❖ positive if test reproduces pain or a 'pop' or 'click' is heard



## o Gamekeeper's

- ❖ tests for ulnar collateral ligament tear at MCP of thumb
- ❖ examiner stresses first MCPJ into radial deviation with MCPJ in fully flexed and extended positions
- ❖ positive test if > 30 degrees of laxity in both positions (or gross laxity compared to other side)

## Game Keeper's Thumb



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