



## Examination of the Elbow

- The elbow is a complex modified hinge joint
- The humero-ulnar joint is a hinge joint allowing flexion and extension
- The radio-ulnar joint allows for pronation and supination of the forearm

## Elbow Examination

- Follows the same pattern as any other joint
- Visual assessment followed by active assessment
- Rom, power, ligaments, nerve supply, circulation

## Structures to Examine

- Muscles
  - biceps and triceps
  - Common flexor origin
  - Common extensor origin
- Ligaments
  - Medial and Lateral collateral ligaments
  - Annular ligament

## Active Range of Motion



- Quick screens of flexion and extension can show problems which can be further investigated

## Active Range of Motion



- Quick bilateral screens of pronation and supination should be carried out

## Palpation of the Region



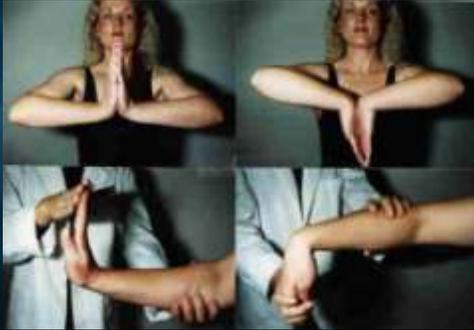
- Each important structure in the elbow region should be palpated and the elicited response noted

## Elbow Stability – Ligament Tests



- Varus and valgus stress tests (as in the knee) check the integrity of the lateral and medial ligamentous restraints

## Assessing the Forearm Muscles



## Assessing Radial and Ulnar Deviation



## Elbow Injuries

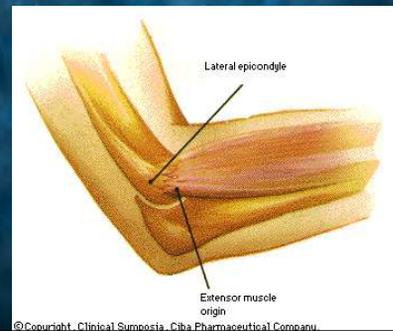
## Structures Around the Elbow

- Radius, ulna and Humerus
- Flexors - of elbow and wrist
- Extensors - of elbow and wrist
- Pronators and supinators
- Nerves
- Blood vessels

## Lateral Pain

- **Tennis elbow** - blanket term for any soft tissue pain on the lateral aspect between the shoulder and the wrist.
- Originally described as 'lawn tennis arm'.

## Anatomy of Injury



## Suggested Causes

- Radio-humeral bursitis
- periostitis of the common extensor tendon

## Suggested Causes

- Tendinitis - ECRB, supinator
- Microtendinous tears of the common extensor tendon with sub-tendinous granulation and fibrosis.
- Myofasciitis

## Suggested Causes

- Radial head fibrillation/chondromalacia
- Calcification
- Radial nerve entrapment and subsequent fibrosis
- Stenosis of the orbicular ligament

## Suggested Causes

- Hyperaemic synovial fringe
- Inflammation of the annular ligament
- Cervical radiculopathy

(Lee, 1986, cited in Norris, 1998)



## Zuluaga et al (1995)

- Tennis elbow results from overuse or constant repetitive stress of the upper attachments of **extensor carpi radialis longus** and **brevis**, and occasionally **extensor carpi ulnaris** and **extensor digitorum**.

## Lateral Epicondylitis (Tennis Elbow)

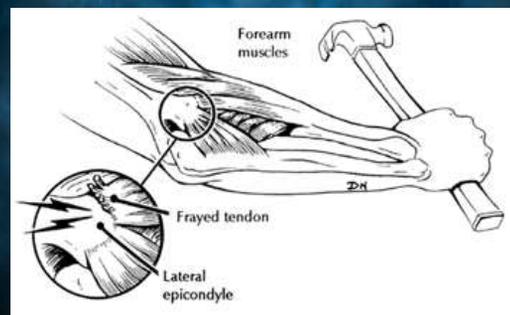
- Affects approximately 40-50% of professional and amateur tennis players at some stage or other.



## Lateral Epicondylitis (Tennis Elbow)

- Lateral epicondylitis can originate from other activities, such as digging.
- Many patients with tennis elbow have never played tennis.

## 'Tennis' Elbow?



## Signs and Symptoms

- **Pain** - elicited over the lateral epicondyle when muscles are contracted or stretched.
- Static radial deviation and extension with pronation will elicit pain.
- Pain is usually localised just above the lateral epicondyle.

## Signs and Symptoms

- Occasionally the superior radio-ulnar joint may be problematic.
- Release of any capsular tightening of this joint may decrease other symptoms due to the close proximity of the two structures.
- May be caused by degenerative disease causing some form of ischaemia.

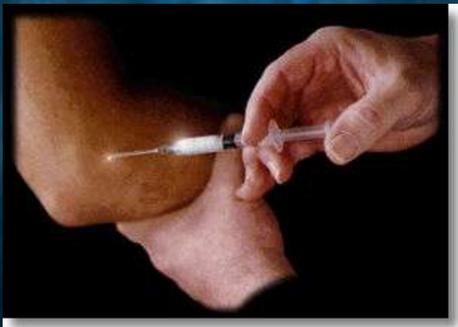
## Treatment

- Initial treatment will follow the RICE regime and passive stretching.
- The causative stresses must be removed.

## Treatment

- A counterforce brace may be applied to the upper forearm.
- Biomechanical analysis of grip and stroke-play may decrease recurrence.

## Steroid Injection



## Treatment

- With rest the condition may resolve in 6 months to 1 year.
- A variety of electrotherapeutic modalities may be incorporated in treatment and deep transverse frictions are useful.

## Frictions to the Epicondyle



## Treatment

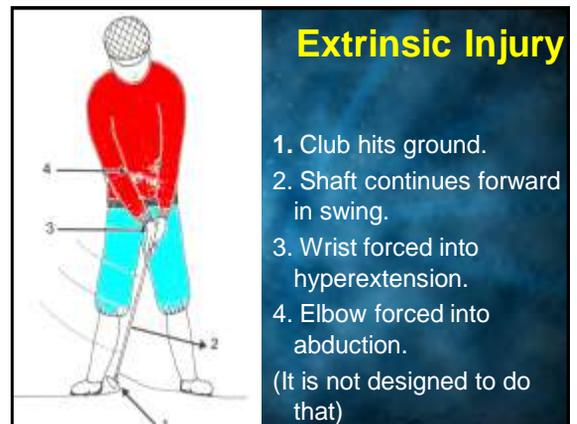
- Manipulation of the elbow joint with the wrist in flexion and pronation may release adhesions.
- In more severe cases surgery to release the superior radio-ulnar capsule may be necessary.

## Medial Pain

- Lesions of the medial aspect occur most often with throwing activities.
- The valgus stress on the joint initially stresses the ulnar collateral ligament.
- Rapid acceleration of the arm into extension may damage the olecranon.

## Medial Epicondylitis

- Commonly called **Golfer's Elbow**
- Repetitive strain injury to the common flexor origin.
- Primary site is the pronator teres and flexor carpi radialis on the medial epicondyle.



## Extrinsic Injury

1. Club hits ground.
  2. Shaft continues forward in swing.
  3. Wrist forced into hyperextension.
  4. Elbow forced into abduction.
- (It is not designed to do that)

## Golfer's Elbow

- Can be complicated by involvement of the ulnar nerve.
- **Tinel's sign** may be positive - tapping the ulnar nerve at the elbow sends tingles down the hand.
- Static test for elbow flexors confirms diagnosis.

## Treatment

- For the most part, treatment is similar to that of tennis elbow.
- Transverse frictions are performed with the wrist in extension and the forearm supinated.

## Thrower's Elbow

- Caused by repetitive stress to the medial collateral ligament.
- Pain is generally localised over the medial joint line.
- Pain is increased on abduction stress test.
- With severe injuries gapping of the joint may be visible.

## Treatment

- Initial treatment is to remove the causative forces.
- Surgical repair of the ruptured ligament is recommended.

## Things to look up

- **Posterior Pain** - Olecranon bursitis
- Posterior impingement
- Muscle Injuries - biceps and triceps
- Myositis Ossificans traumatica
- Elbow dislocations

## Fractures to the Elbow

- Usually immobilised for 3 weeks with a POP back-slab with a collar and cuff.
- Swelling is monitored and released by pumping actions of the hand and fingers.
- Olecranon process fractures are commonly reduced by tension band wiring.

## Fractures to the Humerus



- Fractures at the elbow often involve the joint line

## Fixation Post-Fracture



## Fractures of the Wrist (Colles)

- Most common in women aged 40+ (peak @ 50).
- Fracture of the distal end of radius usually about 1-2 inches from the distal end.
- Result from a fall on the outstretched hand.

## Injury Action for Wrist, Elbow and Shoulder Fractures



- FOOSH injury
- Fall On the Out - Stretched Hand

## Displacement of Colles #'s

- Radial displacement of distal fragment.
  - Anterior angulation of distal fragment.
  - Severe violence may cause tearing of the periosteum.
  - Dorsal displacement of distal fragment.
  - Associated with impaction
  - Dinner-fork displacement due to shape on X-ray

## Displacement With Colles Fractures



## X-ray of Colles Fracture



## Classic Dinner-Fork Deformity



## Colles Fracture Post-Op



## Management of Colles #'s

- Fracture is reduced if necessary.
- Plaster back slab is prepared.
- Manual traction is applied to reduce the #.
- PoP is applied with the arm in full pronation, full ulnar deviation and slight palmar flexion and put in a collar & cuff.
- PoP checked at 2 weeks for slippage.

## Physiotherapy Management

- The patient can perform finger movements and elbow movements with the cast is in situ (4-6 weeks).
- Rehab begins once the PoP is removed and strengthening of the forearm muscles should begin.
- Care should be taken to regain full RoM at the wrist and radio-ulnar joints.

## Hand Assessment

## Examination of the Hand & Fingers



- Observation of palmar and dorsal aspects

## Range of Motion Activities



## Types of Grip



- Lateral pinch
- Fine pinch grip
- Tip pinch
- Flat pinch
- Tripod grip
- Wide grip
- Power grip

## Ulnar Nerve Assessment



## Hand Injuries

**WARNING!**  
The next slide is a bit gross

## Traumatic Injury



- Amputation of the thumb or fingers is the worst case.

## Scaphoid Fractures

- Scaphoid fractures account for about 60 percent of all wrist (carpal) fractures.
- They usually occur in men between ages 20 and 40 years, and are less common in children or in older adults.
- The break usually occurs during a fall on the outstretched wrist.
- It's a common injury in sports and motor vehicle accidents.
- The angle at which the wrist hits the ground determines the injury.
- If the wrist is extended at a 90-degree angle or greater, the scaphoid bone will break; if the angle is less than 90 degrees, the lower arm bone (radius) will break.



## Scaphoid Fractures

- Signs and symptoms
- Pain and tenderness on the thumb side of the wrist.
- Motion (gripping) may be painful.
- May be some swelling on back and thumb side of wrist.
- Pain may subside, then return as a deep, dull aching.
- Marked tenderness to pressure on the "anatomical snuffbox," a triangular-shaped area on the side of the hand between two tendons that lead to the thumb.



## Scaphoid Fractures

- The scaphoid is more susceptible to injury than any of the other carpal bones because of its unique position bridging the proximal and distal rows of the carpal bones.
- This frequency is due to a tenuous blood supply, with only one dorsoradial artery to the proximal pole, which results in a nearly 100% incidence of avascular necrosis in proximal fractures and a 30% incidence in distal fractures.
- Any tenderness in the anatomic snuffbox over the dorsal scaphoid (figure 1b) should prompt treatment as for a fracture.



## Scaphoid Fractures



## Computer Usage and Carpal Tunnel

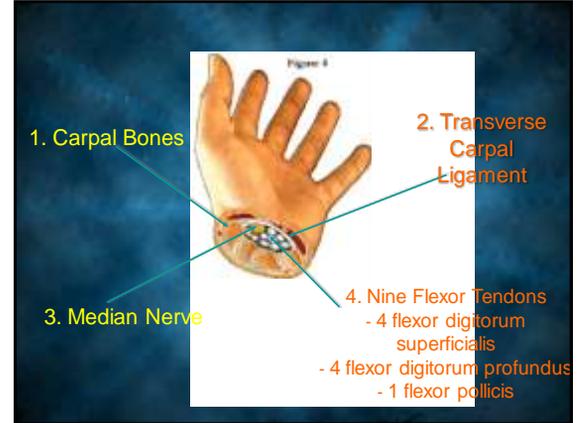


## Carpal Tunnel Syndrome

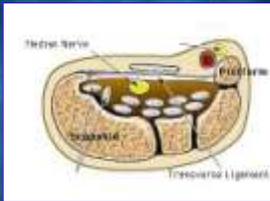
- The flexor retinaculum becomes restricted and inflamed.
- As the flexor tendons pass below the retinaculum they cause compression and pain.
- Increased compression due to swelling can compress the median nerve giving a nerve palsy from the wrist down.

## Carpal Tunnel Syndrome

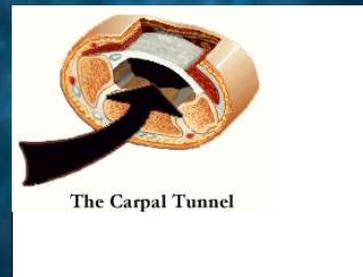
- The retinaculum must be stretched to allow clear passage of the tendons, failing this then it must be cut surgically.
- The pain from this condition is usually localised but may spread into the hand and fingers.



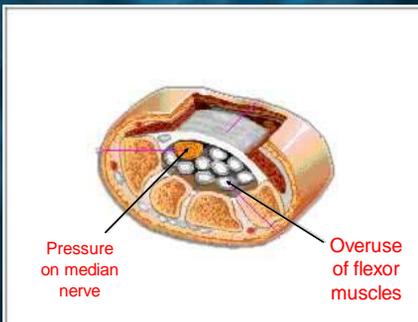
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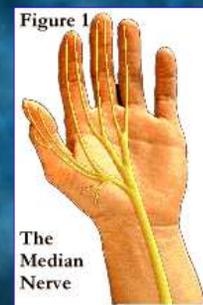
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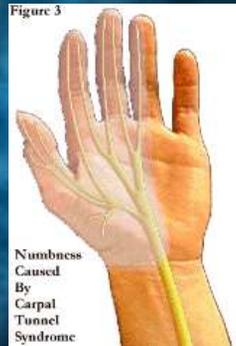


## Carpal Tunnel Syndrome



## Carpal Tunnel Syndrome

- Symptoms
- Pain and numbness in 1-3 fingers and half of the 4<sup>th</sup> or ring finger
- Symptoms do not include palm or little finger



## Carpal Tunnel Syndrome

- Modification in activities
  - Table height, wrist angle, elbow angle
  - 10-15 minute breaks
- Exercises and warm-up wrist flexor muscles
  - Flex fingers tightly then extend and abduct fingers for 5 seconds
  - With arms extended, flex and extend wrist several times followed by circumduction of the wrist

## Carpal Tunnel Syndrome

- Removable wrist brace
- Anti-inflammatory medicines
  - NSAID
  - Cortisone
- Surgery – carpal tunnel release

## Finger Tendinitis

- This is inflammation of the tendons of the muscles moving the fingers due to some form of overuse or repetitive strain injury.
- Usually the flexors are involved and contraction is painful.
- Continued stress may eventually lead to rupture and subsequent surgical repair.

## Dupytren's Contracture

- This is a thickening and tightening of the palmar fascia, especially the medial aspect.
- As the fascia tightens it draws down the little and ring fingers into flexion.

## Dupytren's Contracture

- More tightening holds the metacarpophalangeal joints in flexion and even more causes distal inter-phalangeal joint flexion.
- Extension in the index and middle fingers is limited and these rigid bands of tightened fascia are easily palpated.

## Dupytren's Contracture

- They are treated by massage, stretching, ultrasound and in the final stages surgery.

## De Quervain's Disease

- Also known as washer woman's strain.
- It is a strain to extensor pollicis brevis and abductor pollicis longus tendons.

## De Quervain's Disease

- The synovial sheaths of these tendons pass through the flexor retinaculum.
- Overuse causes an inflammatory response to be set up causing swelling and pain.

## De Quervain's Disease

- Movement causes pain and static muscle test elicit pain.
- Palpation of the tendons in their sheaths is tender.

## De Quervain's Disease

- Adhesions may form after the acute stage, between the tendon sheaths which restricts movement and sets up a restrictive synovitis.

## De Quervain's Disease

- If stenosing paratenonitis occurs the tendon begins to stick in the sheath and movement again is halted.
- Movement must be maintained in the sheath at all times and if adhesions are great then surgery may be necessary.

## Things To Look Up Yourself

- Galeazzi fracture.
- Smith's fractures.
- Scaphoid fractures.
- Fracture/dislocation of the lunate.
- Fracture of the metacarpals and phalanges
- Bennett's fracture (thumb)

Any Questions?

