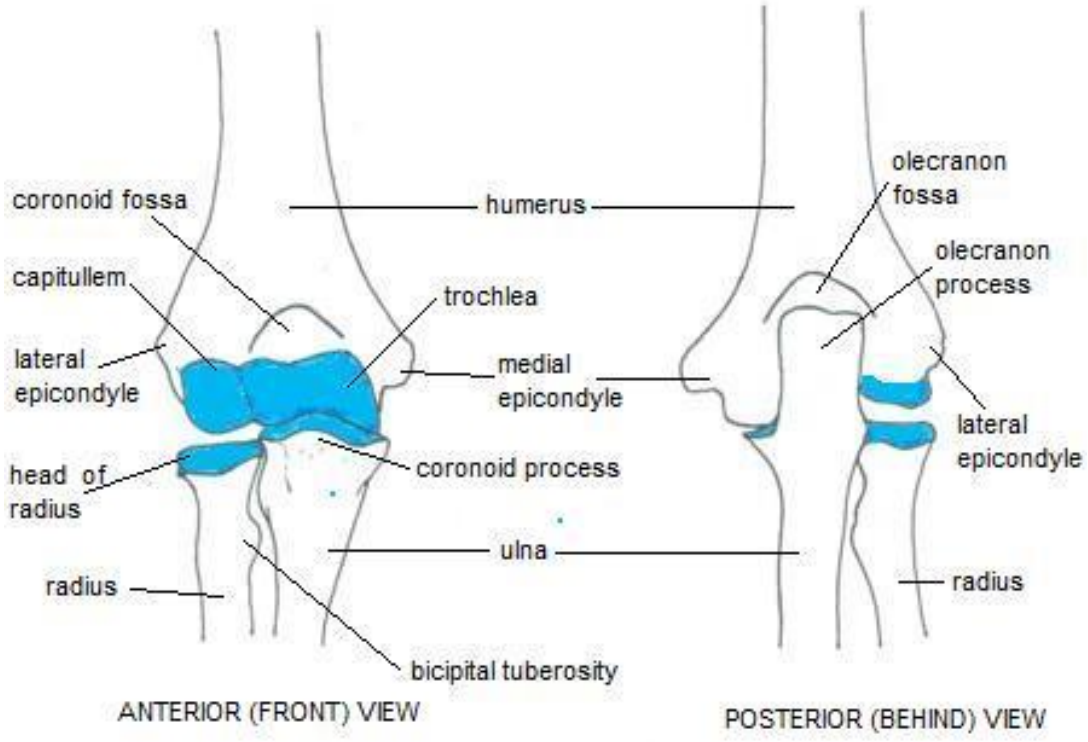
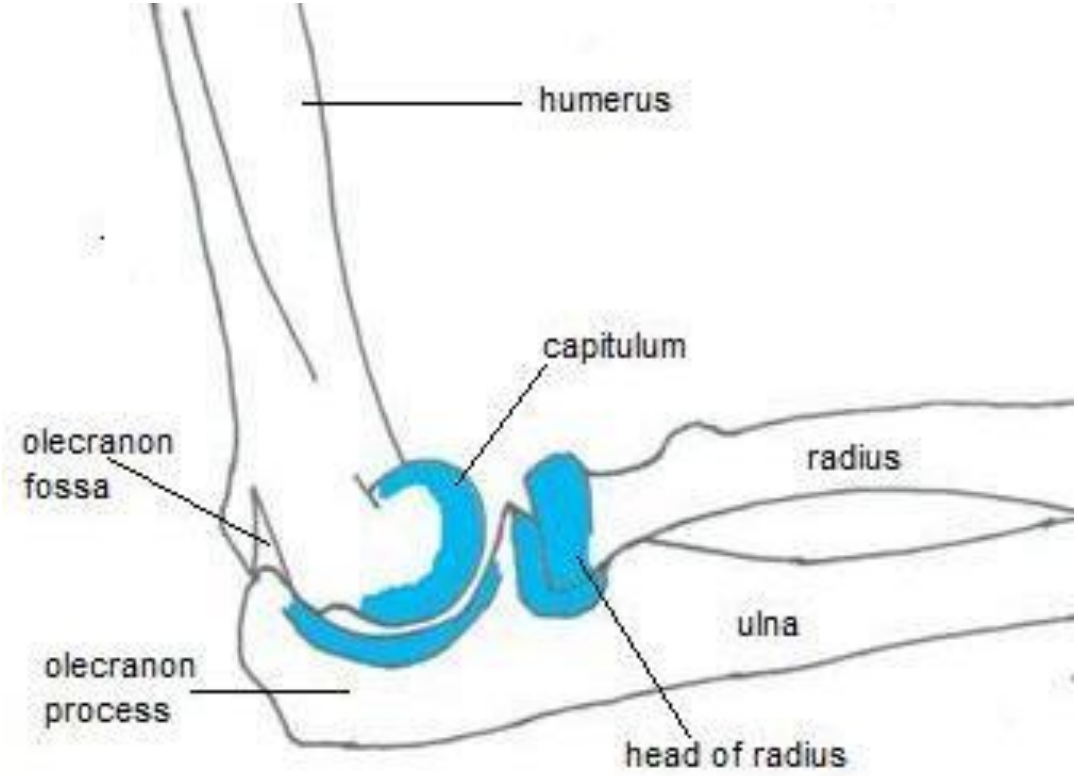
The Elbow and Arm

Elbow Anatomy



Elbow Anatomy



LATERAL (SIDE) VIEW

Elbow Anatomy

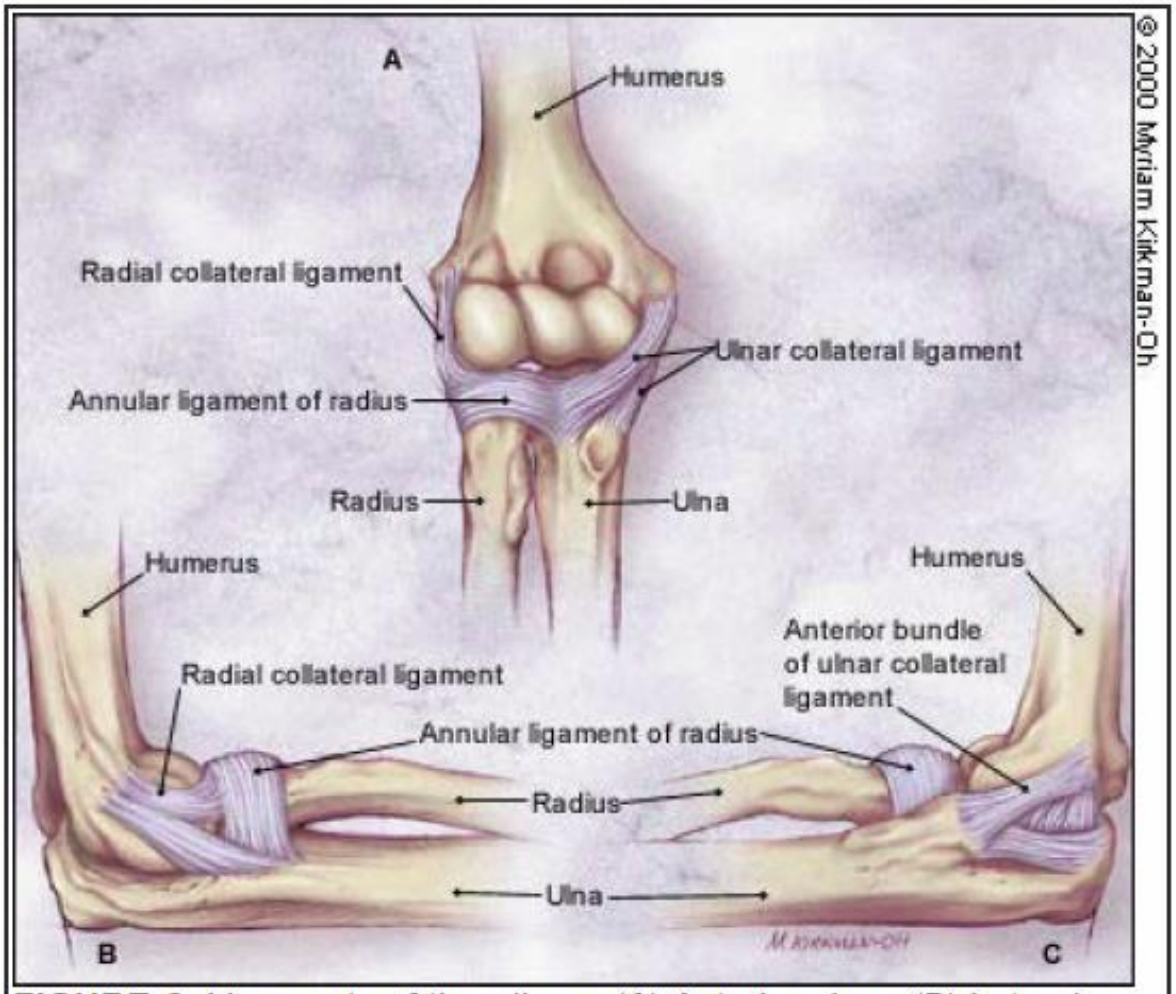
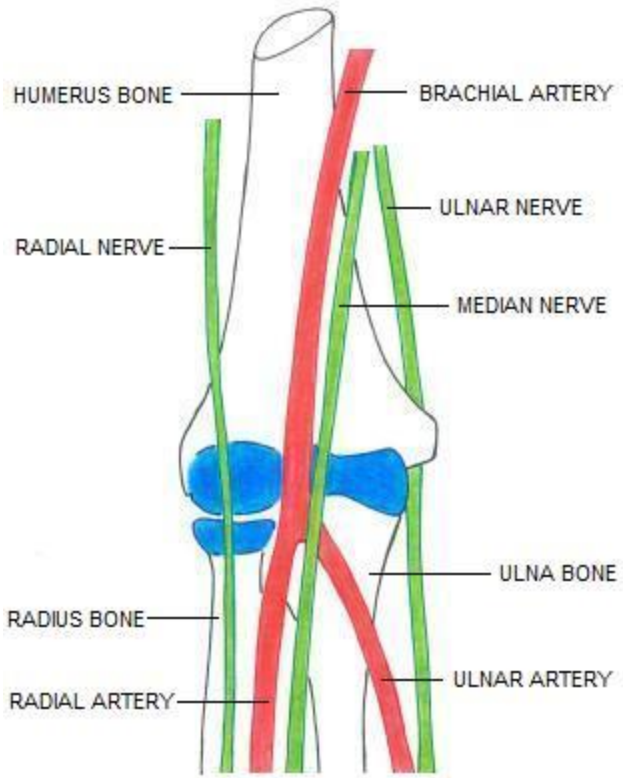


FIGURE 2. Ligaments of the elbow. *(A)* Anterior view. *(B)* Lateral view. *(C)* Medial view. In the medial view, note the position of the anterior bundle of the ulnar collateral ligament.

Elbow Anatomy



NERVES & ARTERIES AROUND ELBOW JOINT

Elbow Anatomy

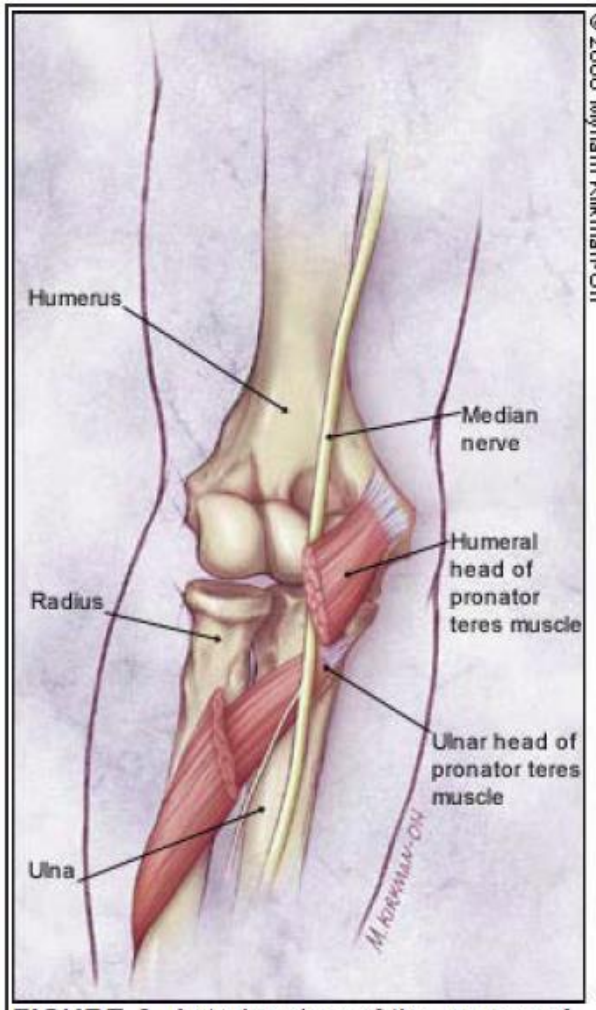


FIGURE 3. Anterior view of the course of the median nerve. Note the path of the nerve between the two heads of the pronator teres muscle.

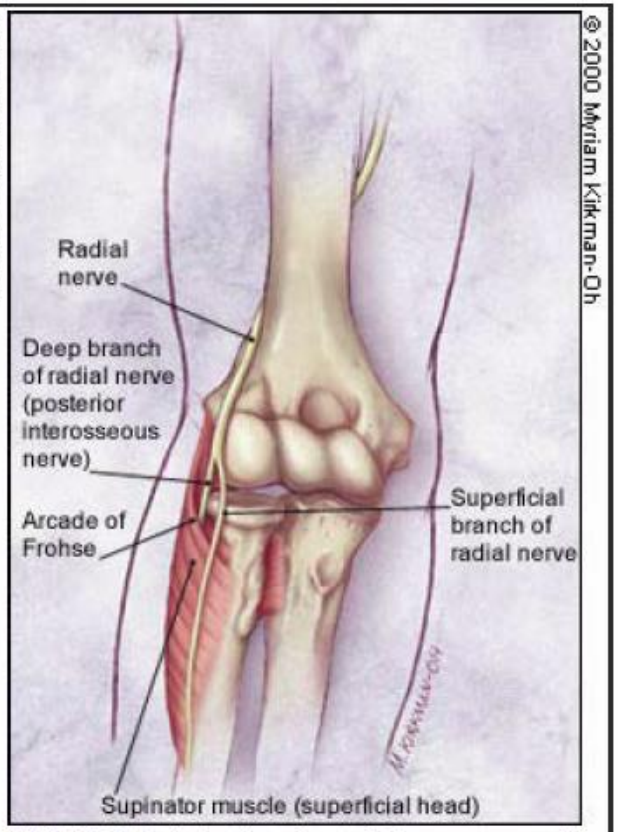


FIGURE 4. Anterior view of the course of the radial nerve. Note the position of the deep branch of the radial nerve (posterior interosseous nerve) as it passes through the arcade of Frohse at the proximal margin of the superficial head of the supinator muscle.

Muscles Across the Elbow

- Biceps brachii (supination and flexion)
- Brachialis (flexion)
- Triceps (extension)
- Pronator teres (pronation)

History

- Typical complaints
  - Pain
    - Acute
      - Trauma?
    - Chronic (>2 weeks)
  - Stiffness
    - Arthritis
    - Trauma
    - Immobilization

History

- Severity
  - After activity
  - With activity
  - At rest
- Weakness or Paresthesias
  - Peripheral nerve entrapment
  - Cervical radiculopathy
- Mechanical symptoms
  - Intra-articular pathology

Activities Commonly Associated with Overuse Elbow Injuries

Activity	Injuries
Bowling	Biceps tendinosis, radial tunnel syndrome
Boxing	Triceps tendinosis
Friction in football, wrestling or basketball	Olecranon bursitis
Golf	Golfer's elbow (trailing arm), radial tunnel syndrome
Gymnastics	Biceps tendinosis, triceps tendinosis
Posterior dislocation	Posterolateral rotatory instability
Racquet sports	Pronator syndrome, triceps tendinosis, olecranon stress fracture, lateral tennis elbow, radial tunnel syndrome, golfer's elbow, ulnar nerve entrapment
Rowing	Radial tunnel syndrome
Skiing	Ulnar nerve entrapment
Swimming	Radial tunnel syndrome
Throwing	Pronator syndrome, triceps tendinosis, olecranon impingement, olecranon stress fracture, radiocapitellar chondromalacia, ulnar collateral ligament sprain, golfer's elbow, ulnar nerve entrapment
Weight lifting	Biceps tendinosis, triceps tendinosis, anterior capsule strain, radial tunnel syndrome, ulnar nerve entrapment

Ddx Based on Location

Anterior elbow
Biceps tendinosis
Pronator syndrome
Anterior capsule strain
Posterior elbow
Triceps tendinosis
Olecranon impingement
Olecranon stress fracture
Olecranon bursitis
Lateral elbow
Lateral tennis elbow
Radial tunnel syndrome
Radiocapitellar chondromalacia
Posterolateral rotatory instability
Medial elbow
Medial tennis elbow (golfer's elbow)
Ulnar collateral ligament sprain
Ulnar nerve entrapment

Physical Exam

- Inspect and Palpate
  - Anterior
  - Lateral
  - Medial
  - Posterior
- ROM
  - Flexion: 0 to 140-150°
  - Pronation/Supination: 80°

Physical Exam

- Muscle Testing
  - Resisted Supination (biceps)
    - Weakness
      - Biceps tendinitis or rupture
      - Musculocutaneous nerve lesion
      - C5-6 nerve root lesion
    - Pain
      - Lateral epicondylitis

Physical Exam

- Muscle Testing
  - Resisted Pronation (pronator teres)
    - Weakness
      - Rupture of pronator origin
      - Fracture of medial elbow
      - Median nerve lesions
      - C6-7 nerve root lesion
    - Pain
      - Medial epicondylitis

Physical Exam

- Muscle Testing
  - Resisted wrist flexion (fingers extended)
    - Weakness
      - Rupture of common flexor origin
      - Medial elbow fracture
      - Tendinitis of medial elbow
      - Ulnar nerve (C8-T1) lesion
      - Median nerve (C6-C7) lesion

Physical Exam

- Muscle Testing
  - Resisted wrist extension (fingers flexed) – ECU, ECRB
    - Weakness
      - Rupture of common extensor origin
      - Lateral elbow fracture
      - Lateral epicondylitis
      - Radial nerve or C6-C8 nerve root lesion

Special Testing

- To check for radial tunnel
  - Apply flexion force against 3rd finger extension distal to PIP joint
  - Positive test elicits pain in extensor group in proximal forearm
- To check collateral ligament damage
  - Ulnar – supinate forearm and flex elbow 20º and apply valgus force
  - Radial – pronate forearm and flex elbow 20º and apply varus force

Anterior Elbow Disorders

- Biceps tendinosis
  - Activities involving repetitive elbow flexion and forearm supination
  - Tenderness over distal tendon that increases with resistance
  - RICEM treatment is standard

Anterior Elbow Disorders

- Pronator syndrome – Median nerve entrapment distal to elbow
  - Common in racquet/throwing sports
  - Distal paresthesias may be present
  - PE shows hypertrophied pronator muscle often with positive Tinel's sign over muscle and worsening pain with resisted pronation
  - May have "papal sign" – weak active flexion of 2nd and 3rd fingers resulting in finger extension at rest
  - NCV may be helpful but false-negatives possible
  - RICEM treatment is standard

Anterior Elbow Disorders

- Anterior Capsule Strain – from repetitive hyperextension
  - Tender antecubital fossa worse with passive extension or hyperextension stress testing
  - Brachialis muscle with associated myositis ossificans is possible related injury therefore radiographs should be obtained.

Posterior Elbow Disorders

- Triceps Tendinosis – Repetitive elbow extension injury (throwing, hammering)
  - Pain at or just superior to attachment on olecranon worse with resisted extension
  - Radiographs usually normal and not indicated initially but if associated with OA may show calcific tendinosis, traction spurs, hypertrophy of the ulna or loose bodies
  - PRICEMM treatment is standard (can use triceps strap)

Posterior Elbow Disorders

- Olecranon Impingement – Usually from throwing activities
  - Clicking or locking and increased pain with terminal extension
  - Crepitus and mechanical extension block often present
  - Associated with UCL injury
  - Radiographs may show osteophytes of olecranon tip and medial wall of fossa, olecranon hypertrophy and loose bodies
  - Orthopedic referral

Posterior Elbow Disorders

- Olecranon Stress Fracture – Pain that gradually increases with extension in throwing
  - Tender olecranon process and pain increased with resisted extension
  - Radiographs may be negative initially (can diagnose with bone scan)
    - May show transverse radiolucency from posterior nonarticular surface to articular surface
    - Lucent region surrounded by sclerotic margin may indicate non-union
  - RICEM initially
  - Ortho referral for non-union

Posterior Elbow Disorders

- Olecranon Bursitis "Student's Elbow" – Due to repetitive friction
  - Localized non-tender swelling without decreased range of motion
  - PRICEM initially but rule out septic bursitis if significant erythema or pain
  - Aspiration of bursa and elastic bandage
  - Consider steroid injection if fluid re-accumulates and no evidence of infection
  - Recalcitrant cases require surgical removal of the bursa

Lateral Elbow Disorders

- Lateral Epicondylitis "Tennis Elbow" – Overuse of wrist extensors (racquet sports) and subsequent tendinosis of ECRB
  - Exam shows tenderness at origin over lateral epicondyle and worse with resisted wrist extension with elbow extended and forearm pronated
  - PRICEM initially – Tennis elbow strap
  - Injections for persistent symptoms
  - Surgery for recalcitrant cases

Lateral Elbow Disorders

- Radial Tunnel Syndrome – Compression of deep branch of radial nerve
  - Pain radiating into dorsal forearm and increases with repetitive pronation and supination
  - Paresthesias absent as posterior interosseous nerve contains only motor fibers
  - Muscle weakness is a sign of late disease
  - Pain is typically maximal 4 cm distal to lateral epicondyle but often confused with refractory tennis elbow
  - RICEM treatment is standard

Lateral Elbow Disorders

- Radiocapitellar Chondromalacia – from repetitive valgus stress
  - Presents with catching, locking, and lateral elbow pain with active use
  - Swelling can be found on exam and pain can be exacerbated with an applied axial load and passive supination and pronation
  - Radiographs may show loss of joint space, marginal osteophytes and possibly loose bodies
  - Orthopedic referral

Medial Elbow Disorders

- Medial Epicondylitis "Golfer's Elbow" – rapid wrist flexion and forearm pronation
  - Pain present from tip of medial epicondyle to pronator teres and FCR that increases with resisted wrist flexion and forearm supination
  - PRICEM initially – Elbow strap
  - Injections for persistent symptoms
  - Surgery for recalcitrant cases

Medial Elbow Disorders

- Ulnar Collateral Ligament Sprain
  - Insidious onset of medial elbow pain worse with activity, relieved with rest but returns on resumption of throwing over 70% normal velocity
  - Valgus stress testing shows pain or instability
  - RICEM treatment initially
  - Radiographs can show loose bodies, traction spurs or heterotopic ossification of ligament
  - MRI can identify complete tears
  - "Tommy John" surgery for competitive athletes who want to continue playing sports

Medial Elbow Disorders

- Ulnar Nerve Entrapment "Cubital Tunnel" – medial elbow pain with paresthesias along ulnar nerve distribution
  - Throwing sports, racquet sports, weight lifting, skiing, or continued elbow flexion
  - Tenderness or positive Tinel's sign over ulnar nerve within medial epicondyle groove.
  - Differentiate between cervical radiculopathy, thoracic outlet syndrome or ulnar nerve compression at wrist
  - PRICEM treatment standard – can splint elbow in extension intermittently
  - Ulnar nerve transposition for recalcitrant or advanced cases

Elbow Trauma - Dislocation

- Most common joint to dislocate in kids and third in adults (shoulder/finger)
- Typical MOI is fall on outstretched hand
- 80% posterior (unless olecranon fracture
- MCL typically torn
- Associated with radial head fx (adults) or medial epicondyle fx (kids)
- Always check neurovascular status
- Extreme pain, swelling, and inability to bend elbow

Elbow Trauma - Dislocation

- Reduce dislocation ASAP after injury
  - Conscious sedation
  - Flex elbow 45° and place traction on forearm in line with humerus until reduced
- Splint in stable range but avoid >100° flexion which can cause neurovascular compromise with developing swelling
- Repeat radiograph and neurovascular exam post-reduction

Elbow Trauma - Dislocation

- Motion begins after 5-7 days of splinting and progresses over next 3-4 weeks (brace blocking terminal extension sometimes needed)
- Orthopedic consult for
  - Neurovascular compromise or fracture
  - Incomplete reduction
  - Persistent instability or flexion contracture > 45° after 3 weeks

Elbow Trauma – Distal Humerus Fracture

- Uncommon (<2% of all adult fractures)
- Considerations
  - Joint surface involvement
  - Skin or neurovascular structures involved
- Neurovascular exam crucial
- Watch out for compartment syndrome

Elbow Trauma – Distal Humerus Fracture

- If fracture not evident check for fat pad sign (bleeding into joint)
- Stable non-displaced fractures can be splinted for 10 days
- Displaced fractures require ORIF
- Some degree of residual pain and stiffness is common

Elbow Trauma – Olecranon Fracture

- Easily fractured from direct blow to elbow or fall on outstretched arm with elbow flexed
- Assess neurovascular status
- Treatment depends on whether or not fracture is displaced
  - Non-displaced – posterior splint in 45° flexion
    - Repeat radiograph in 7-10 d
  - Displaced - surgery

Elbow Trauma – Radial Head Fracture

- Fall on outstretched hand
- Mason classification
  - I – nondisplaced or minimally displaced
  - II - >2 mm displacement at articular surface or angulated neck fractures
  - III – severely comminuted fractures

Elbow Trauma – Radial Head Fracture

- Pain and swelling over lateral aspect elbow
- Loss of motion from pain inhibition and joint effusion
- Mechanical block for pronation and supination with type II and type III fractures
- Loss of terminal extension is common even with type I injuries

Elbow Trauma – Radial Head Fracture

- Type I fractures treated with sling or splint and early active motion
- ORIF for
  - Type II that block rotation or involve more than 30% of head
  - Type III fractures
  - Fracture dislocation

Elbow Trauma – Distal Biceps Tendon Rupture

- Uncommon (<5% ruptures)
- Usually in men >40
- Sudden sharp pain after excessive extension force on flexed elbow
- If not repaired timely 30-50% loss of elbow flexion/forearm supination strength

Elbow Trauma – Distal Biceps Tendon Rupture

- Biceps tendon absent in antecubital fossa
- Muscle belly retracts proximally against resistance
- Complete tears do better with operative repair of the tendon
- Partial ruptures can be managed with intermittent splinting and activity modification but should undergo operative repair if treatment fails

Clinical Case

37 yo M RH dominant presents with R elbow pain. Has been painting the walls of his kitchen the past 5 days. Hurts when lifting things, when shaking hands, and even when trying to fully straighten his elbow.
Exam, full ROM but pain with full extension. Pain and weakness when wrist extensor and supinator muscles stressed. Palpation reveals tenderness over the dorsum of the forearm extending proximally to the elbow

To show this poll

1

Install the app from
pollev.com/app

2

Start the presention

Still not working? Get help at pollev.com/app/help
or
Open poll in your web browser

To show this poll

1

Install the app from
pollev.com/app

2

Start the presention

Still not working? Get help at pollev.com/app/help
or
Open poll in your web browser

To show this poll

1

Install the app from
pollev.com/app

2

Start the presention

Still not working? Get help at pollev.com/app/help
or
Open poll in your web browser