

**Cracking the Code:
Deciphering Common
Elbow Injuries Through
Case-Based Analysis**

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Presenter Conflicts and Disclosures

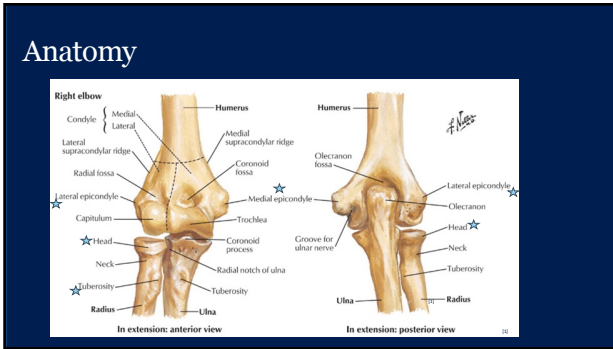
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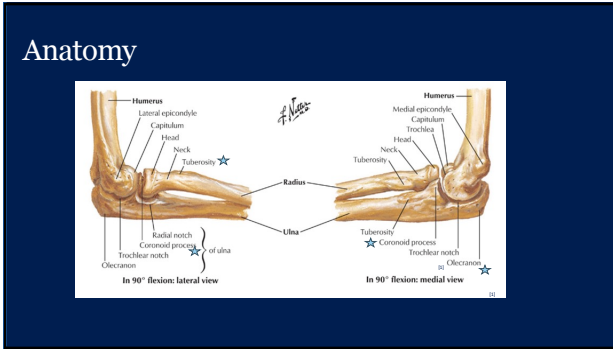
Objectives

- Review important elbow anatomical structures and relevant physiology of the elbow as it relates to musculoskeletal disorders.
- Identify pertinent signs and symptoms associated with musculoskeletal injuries of the elbow including lateral epicondylitis, ulnar collateral ligament injury, and distal biceps tendon rupture.
- Synthesize knowledge of etiology, clinical manifestations, and results of diagnostic studies to correctly identify the most likely diagnosis for conditions within the elbow.
- Formulate an appropriate treatment plan for the elbow musculoskeletal disorders.

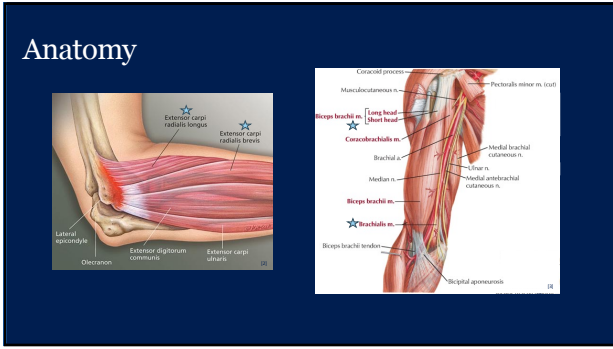
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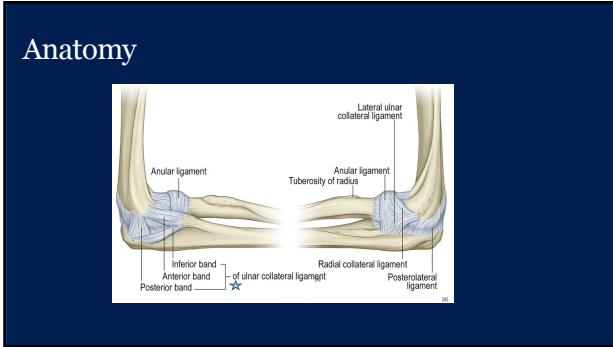
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Case # 1

- CC: Right elbow pain x 6 weeks
- 47-year-old right hand dominant man comes to the clinic for evaluation of right elbow pain for the past 6 weeks with no history of trauma.
- Pain is constant throbbing, 5/10 with intermittent sharp pain that radiates down his forearm. Pain has progressively worsened and is causing weakness. He is having difficulties holding tools at work.
- Patient tried 600mg Ibuprofen twice a day for 7 days with minimal relief of pain.
- No previous history of injury or surgery to right arm

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Case # 1

- Medical History
 - Obesity
 - No prescription medications or over the counter supplements
 - No known allergies
 - No previous surgeries
- Social History
 - Mechanic at autobody shop x 20 years
 - Smokes 1 pack per day x 20 years, 20 pack year history
 - Consumes 1-2 (12oz) cans of beer a day
 - Denies illegal or illicit drug use

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Case # 1

- Physical Examination
 - No obvious deformity, ecchymosis, swelling
 - Tenderness to palpation over the lateral epicondyle and proximal common extensor tendons
 - AROM and PROM elbow equal bilaterally (0-135°)
 - Elbow strength
 - Supination 4/5 on right
 - AROM and PROM wrist equal bilaterally
 - AROM elicits pain at end range extension

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Case # 1

- Physical Examination
 - Wrist strength
 - Extension 4/5 on right
 - Grip strength 4/5 on right
 - (+) Cozen's test; (-) varus and valgus stress test
 - Neurologic/vascular
 - Sensation intact to sharp dull
 - Radial and ulnar pulses 2+ brisk bilaterally

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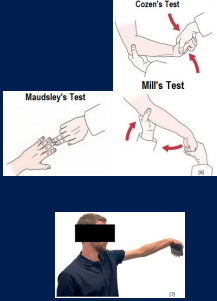
Lateral Epicondylitis

- Tendinopathy of common extensor tendon origin on the lateral epicondyle
 - Overuse, poor ergonomics, or injury
 - Extensor carpi radialis brevis most often involved
- Risk Factors⁵
 - Repetitive movement for at least 2 hrs. daily
 - Managing loads >44lbs
 - Age 45-54
 - Obesity
 - Smoking

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Lateral Epicondylitis

- History
 - Pain worse with gripping, lifting, repetitive movement
 - Possible history of injury or trauma
- Physical Examination
 - +/- swelling lateral epicondyle
 - Tenderness to palpation lateral epicondyle
 - Normal ROM
 - Possible pain with wrist extension and supination
 - Weakness
 - Wrist extension
 - Supination
 - (+) Cozen's test, Maudsley's test, Mill's test, Selfie test'



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Lateral Epicondylitis

- Imaging
 - Radiographs
 - Only if examination reveals
 - Diminished elbow mobility
 - Signs consistent with injury or intra-articular pathology
 - Ultrasounds
 - Noninvasive
 - Cost effective
 - Real time
 - Assess tendon integrity and pathology
 - Thickening, partial tear at origin, calcifications
 - MRI
 - Refractory patients

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Lateral Epicondylitis- Management

<p>Initial</p> <ul style="list-style-type: none"> ➢ Avoid aggravating activities <ul style="list-style-type: none"> ➢ Activity modification ➢ NSAIDS ➢ Ice/heat ➢ Occupational/Physical therapy ➢ +/- wrist splint or counterforce brace 	<p>Secondary</p> <ul style="list-style-type: none"> ➢ Consider imaging ➢ Corticosteroid injection⁹ ➢ PRP injection⁹ ➢ Iontophoresis <ul style="list-style-type: none"> ➢ Occupational/physical therapy
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Lateral Epicondylitis- Management

- 80-90% improve with nonoperative treatment at 1 year²
- Operative indications
 - Failed conservative management 6-12 months
 - Large tear found on imaging
- Techniques
 - Release and debridement of ECRB origin
- Postoperative course
 - Approximately 3 months for full return to activity

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Case # 2

- CC: "I felt a pop in my left arm 2 days ago"
- 41-year-old left hand dominant male comes to the clinic for evaluation of left elbow pain for the past 2 days. He reports feeling a pop as he reached out to catch his motorcycle that was tipping over.
- Patient reports immediate, sharp 9/10 pain. Current pain is constant, achy, tight and 4/10. He reports bruising, swelling, and weakness. Denies numbness or tingling
- Patient iced initially after injury- unsure if helpful. No other treatments tried.
- No previous history of left elbow pain or injury

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Case # 2

- Medical History
 - No prescription medications or over the counter supplements
 - No known allergies
 - No previous surgeries
- Social History
 - Car salesman and competitive body builder
 - Quit smoking 3 years ago. Use to smoke 1 pack per day x 15 years
 - Denies alcohol consumption
 - Denies illegal or illicit drug use

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Case # 2

- Physical Examination
 - Ecchymosis antecubital fossa and medial joint line
 - Diffuse swelling anterior and medial elbow
 - Visible prominence of biceps muscle belly on left
 - Tenderness to palpation just distal to antecubital fossa and proximal radius
 - AROM elbow equal bilaterally
 - Elbow strength
 - Flexion 4/5
 - Supination 3/5
 - (+) Hook test
 - Neurologic/vascular
 - Sensation intact to sharp dull
 - Absent biceps reflex
 - Radial and ulnar pulses 2+ brisk bilaterally



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Distal Biceps Tendon Rupture

- Rupture of the distal biceps brachii tendon from the insertion at the radial tuberosity
 - Sudden extension load placed on flexed arm
- National incidence¹²
 - 2.55 injuries per 100,000 people per year
- Risk Factors
 - Smoking
 - Anabolic steroid use
 - Intrinsic degeneration

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Distal Biceps Tendon Rupture

- History
 - Involved arm eccentric contraction of biceps
 - Arm being forced into extension while the elbow is contracted to prevent dropping an object
 - Patient reports a "pop or tearing"
- Physical Exam
 - Swelling & ecchymosis
 - Visible "Popeye deformity"
 - Tenderness to palpation antecubital fossa
 - Full elbow ROM
 - Elbow strength
 - Weakness with supination & flexion
 - Hook test¹⁴

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Distal Biceps Tendon Rupture

- Imaging
 - Radiographs
 - AP, lateral, and oblique views obtained
 - Often normal
 - MRI
 - If diagnosis is unclear
 - Partial tear suspected
 - Possible for operative planning

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Distal Biceps Tendon Rupture

- Nonoperative Management
 - Indications
 - Tear < 50% of tendon insertion
 - Low physical demand
 - Older age
 - Significant medical comorbidities
 - Treatment
 - Splint elbow no more than 3 weeks
 - Transition to hinged elbow brace
 - Strengthening typically begins around 3 months

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Distal Biceps Tendon Rupture

- Operative Management- timing is key
 - Indications
 - Acute rupture
 - Partial rupture > 50% tendinous insertion
 - Chronic ruptures
 - Techniques
 - Single incision
 - Dual incision
 - Tendon repair
 - Bone tunnels, suture anchor, suspensory cortical button, or interference screw fixation
 - Postoperative Course
 - Approximately 6 months for full return to activity

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Case # 3

- CC: Right elbow pain x 5 days
- 20-year-old right hand dominant, college softball player, comes to the clinic for evaluation of right elbow pain and instability for the past 5 days.
- During a game 5 days ago, she felt a sudden, sharp pain while throwing from center field to home base. She did not return to the game.
- Reports swelling and bruising around elbow joint.
- Pain is constant, throbbing, with intermittent sharp pain that is a 7/10 at its worst. Reports instability and worsening pain with throwing. Intermittent numbness/tingling down arm into 4th and 5th fingers.
- Has tried ice with minimal improvement in swelling.
- No previous history of injury or surgery on right arm.
- Admits to recent increased training for tournaments and limited warm-up and cool-down before and after practice.

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Case # 3

- Medical History
 - No prescription medications or over the counter supplements
 - No known allergies
 - No previous surgeries
- Social History
 - Division 2 College Softball player
 - Denies smoking
 - Denies alcohol consumption
 - Denies illegal or illicit drug use

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Case # 3

- Physical Examination
 - Visible swelling and ecchymosis over the anterior and medial elbow
 - Tenderness to palpation over the medial epicondyle and medial joint line
 - AROM elbow
 - Limited extension, flexion, pronation- (+ pain)
 - Full supination- (+) pain
 - Elbow strength
 - Flexion and extension 4/5
 - Pronation 3/5
 - Grip strength 4/5

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Case # 3

- Physical Examination
 - Wrist ROM and Strength
 - Full AROM pain at end range flexion
 - (+) Valgus stress test and moving valgus stress test
 - Neurologic/vascular
 - Sensation intact to sharp dull
 - Radial and ulnar pulses 2+ brisk bilaterally
 - Shoulder & neck examination benign

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Ulnar Collateral Ligament Sprain

- Ulnar collateral ligament is a primary stabilizer of the medial side of the elbow and injuries are characterized by attenuation or rupture
 - Occurs from excessive valgus force at the elbow
- Most often seen in overhead athletes
 - Can be trauma related from FOOSH
- Injuries can occur as result of gradual degeneration or acute rupture
- Incidence continues to rise particularly among adolescent baseball pitchers¹⁶

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Ulnar Collateral Ligament Sprain

- History
 - Acute injury
 - Throwing injury
 - FOOSH
 - Athlete may complain of decreased velocity, control, and accuracy with throwing
- Physical Exam
 - Effusion anterior and medial elbow
 - Ecchymosis medial elbow
 - Tenderness to palpation medial epicondyle, medial joint line, coronoid process
 - AROM elbow
 - Limited secondary to pain
 - Elbow extension

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Ulnar Collateral Ligament Sprain

- Physical Exam
 - AROM wrist
 - +/- decreased wrist flexion, will have pain
 - Elbow strength
 - + weakness with flexion and extension
 - (+) Provocative test (pain, apprehension, laxity)
 - Valgus stress test
 - Milking maneuver
 - Moving valgus stress test
 - Recreates throwing position
 - Neurologic exam
 - Sensory and motor testing ulnar and radial nerve distribution



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Ulnar Collateral Ligament Sprain

- Imaging
 - Radiographs
 - AP, lateral, oblique views
 - Often normal but may show loose bodies, osteophytes, or calcifications of UCL
 - Optional valgus stress view
 - MRI or MR arthrogram
 - Diagnostic study of choice
 - Differentiate partial from full-thickness tears
 - T-sign
 - Dynamic ultrasound
 - Can evaluate laxity

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Ulnar Collateral Ligament Sprain

- Nonoperative Management
 - Indications
 - Sprained ligaments (Grade I or II)
 - Treatment
 - Period of rest
 - Physical therapy
 - Return to throwing program
 - Treatment Course
 - Return to play average 3-4 months¹⁶
 - 42% return to pre-injury level of sport around 6 months¹⁵

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Ulnar Collateral Ligament Sprain

- Operative Management
 - Indications
 - Complete rupture (grade III)
 - Failure of extensive conservative treatment of partial tear
 - Techniques
 - Reconstruction vs. Repair^{15,18}
 - Reconstruction still gold standard
 - Long term patient outcomes lacking for repair
 - Postoperative Course
 - Most athletes return to play 12-15 months
 - Professional pitchers return to play 12-18 months

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Summary

- When assessing MSK injuries, foundational anatomical knowledge and thorough physical examinations are mainstays for accurate differential diagnoses.
 - Remember "When you hear hoofbeats, don't look for zebras".
 - Many times, the answers you seek are in the foundations
- Based on the differential diagnosis, selection of the most appropriate imaging will help clinicians and patients make better informed decisions regarding appropriate medical care and outcomes.
- Collaborate with Physical therapy, Athletic Trainers, and Occupational therapists to ensure the patient is meeting criteria to progress toward full return to activity or work.
 - Prognostic accuracy for recovery is only as good as the treatment received and patient compliance!

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Questions?

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