



University of California  
San Francisco



# Elbow Fracture Dislocations: Managing the Simple to Complex

*20<sup>th</sup> Annual International San Francisco Orthopaedic Trauma Course*

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4/18/2026

# Case AW

HPI: 53 yo M fell and sustained R elbow injury

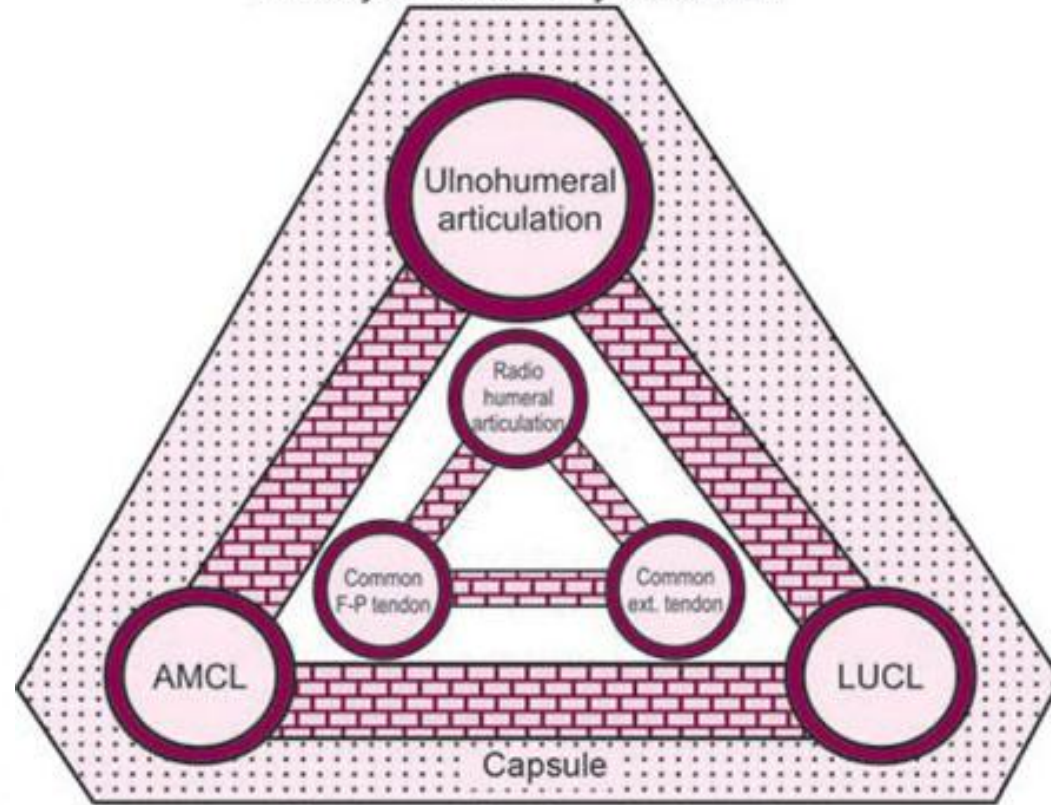


# Learning Objectives

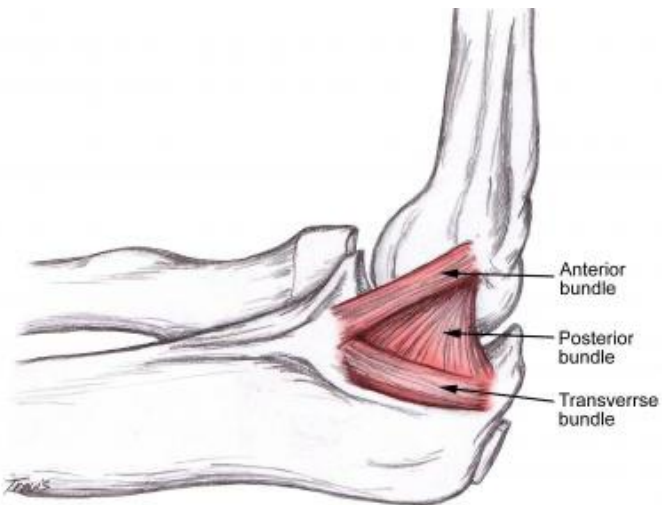
- Review key components of elbow stability
- Define patterns of instability associated with elbow fractures
- Develop treatment approaches in their surgical management

# Elbow Stability: Biomechanics

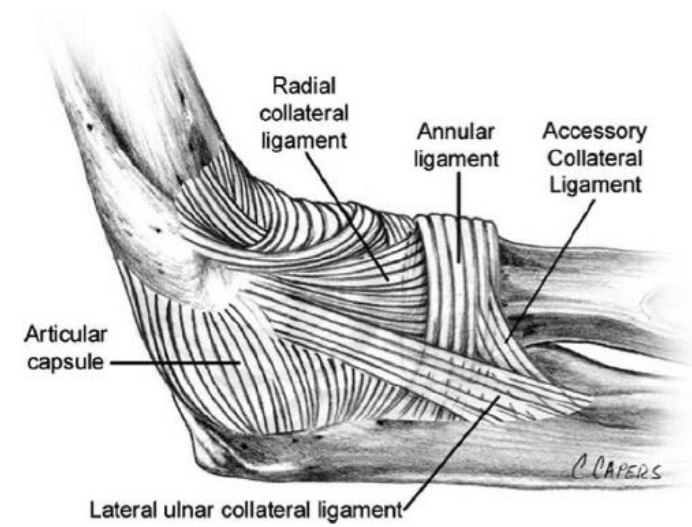
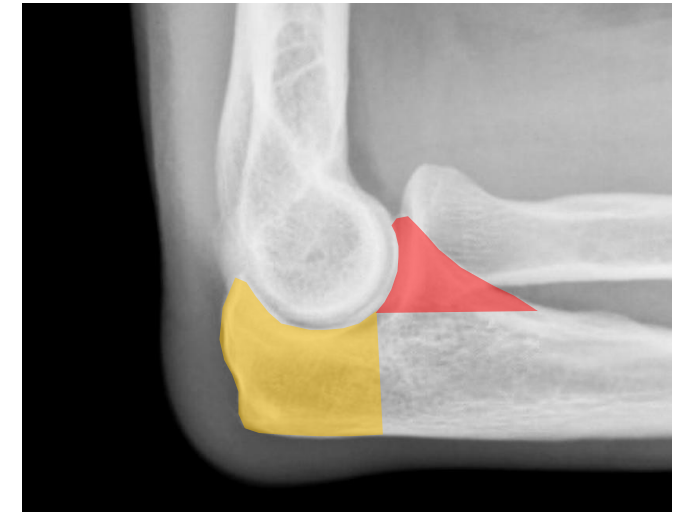
Elbow stability  
Primary and secondary constraints



Muscles provide dynamic protection  
to all constraints



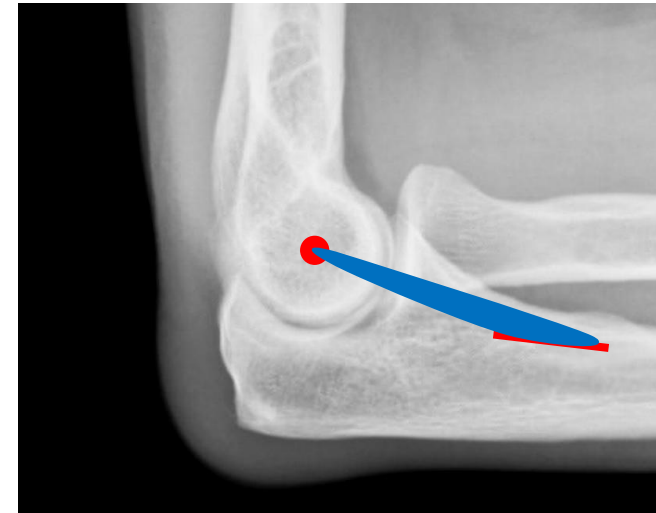
Anterior bundle  
Posterior bundle  
Transverse bundle



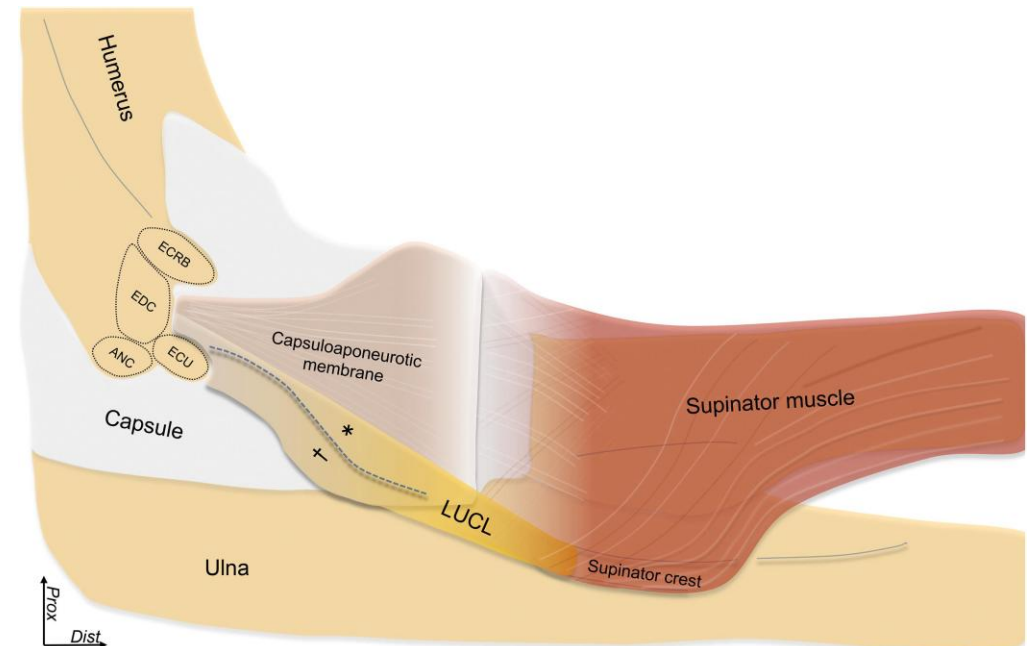
# Elbow Stability: LUCL

## Anatomy and Function

- Primary varus stabilizer
- Posterolateral rotatory stability
- Isometric point in center of capitellum
- Inserts on supinator crest



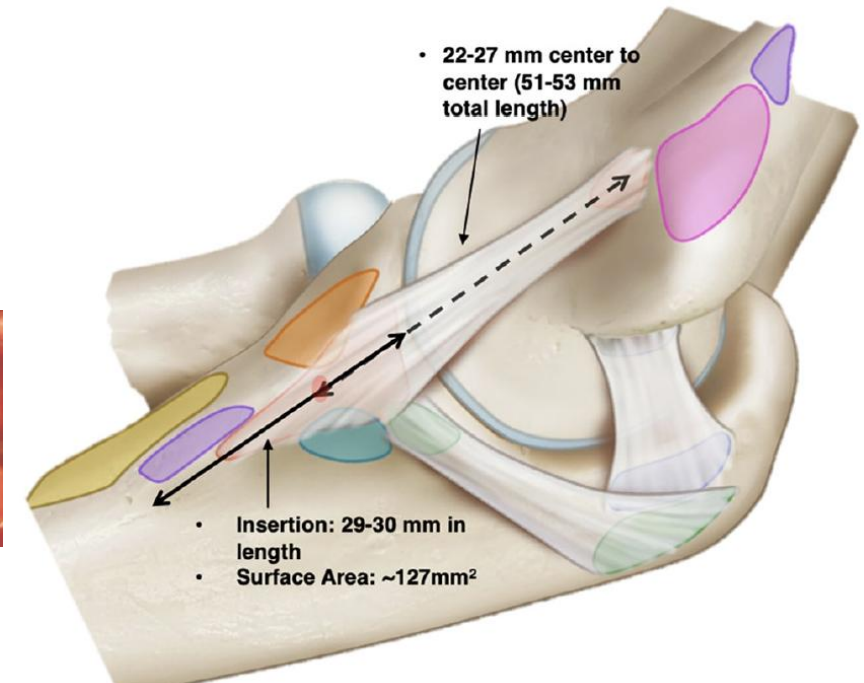
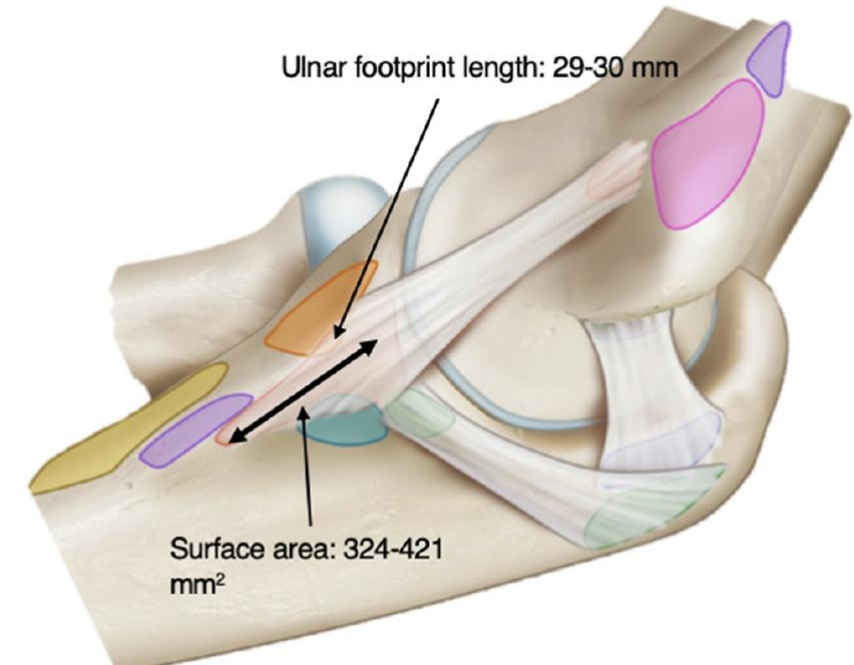
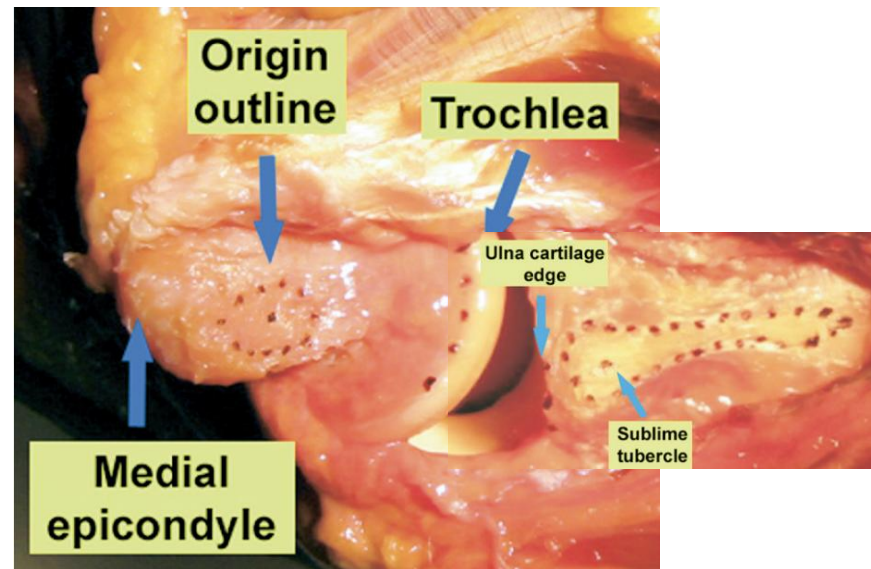
## Posterolateral Rotatory Instability



# Elbow Stability: aMCL

## Anatomy and Function

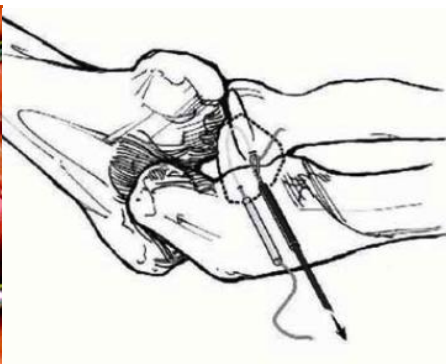
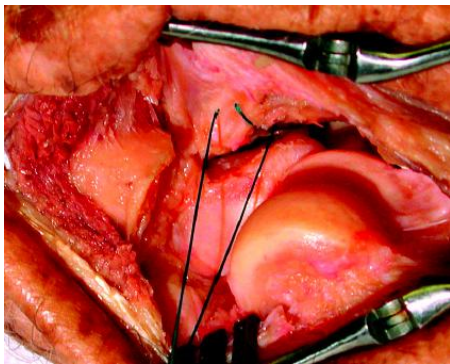
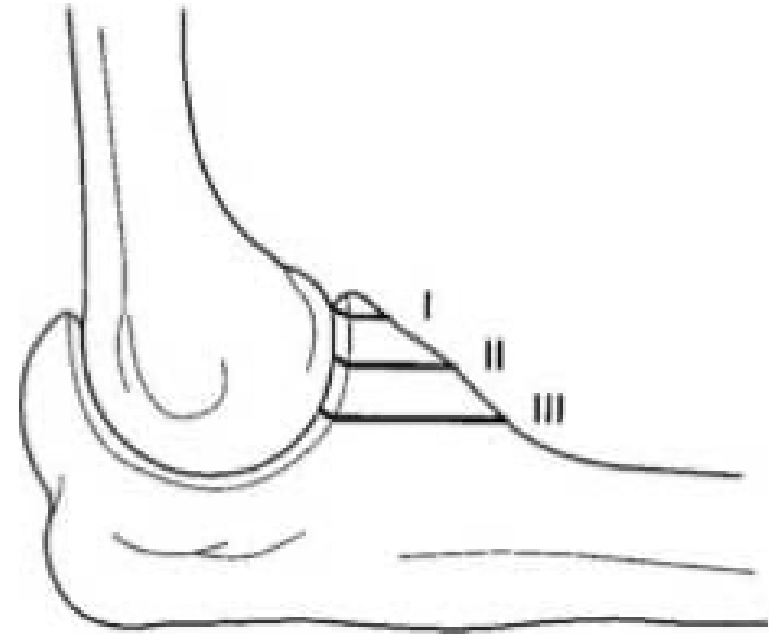
- Primary valgus stabilizer
- No isometric point
  - long insertion on sublime tubercle



# Coronoid Fractures

## Regan and Morrey Classification

- Type I: tip
  - Do not routinely need fixation
- Type II: <50%
- Type III: >50%



Suture through bone tunnels



Cannulated Screw

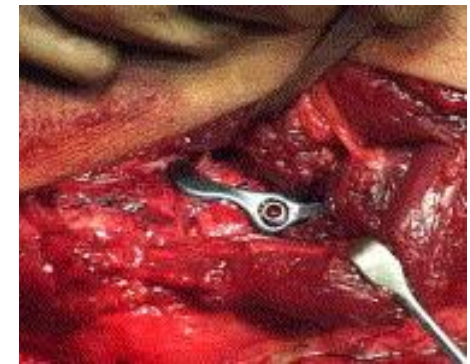
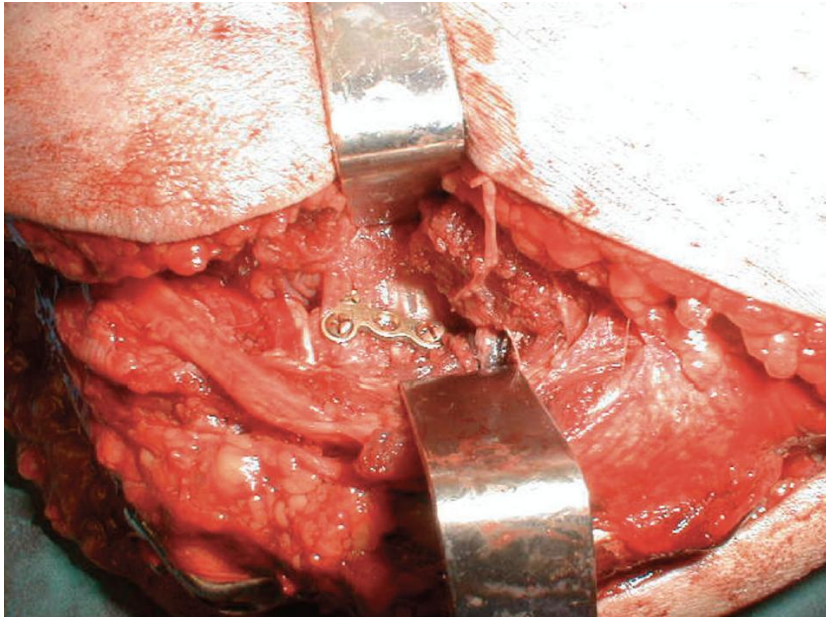


Plate ORIF

# Coronoid Fractures

## Anteromedial Facet

- Size does not correlate with instability
- Varus, posteromedial rotatory instability (PMRI)
- ORIF with plate or screw fixation



# Elbow Instability Patterns: Simple Dislocation

Simple = NO fracture

## Treatment Algorithm

- Obtain concentric reduction
- Check stability through ROM
  - Hanging arm test in termination extension
  - Test throughout forearm rotation

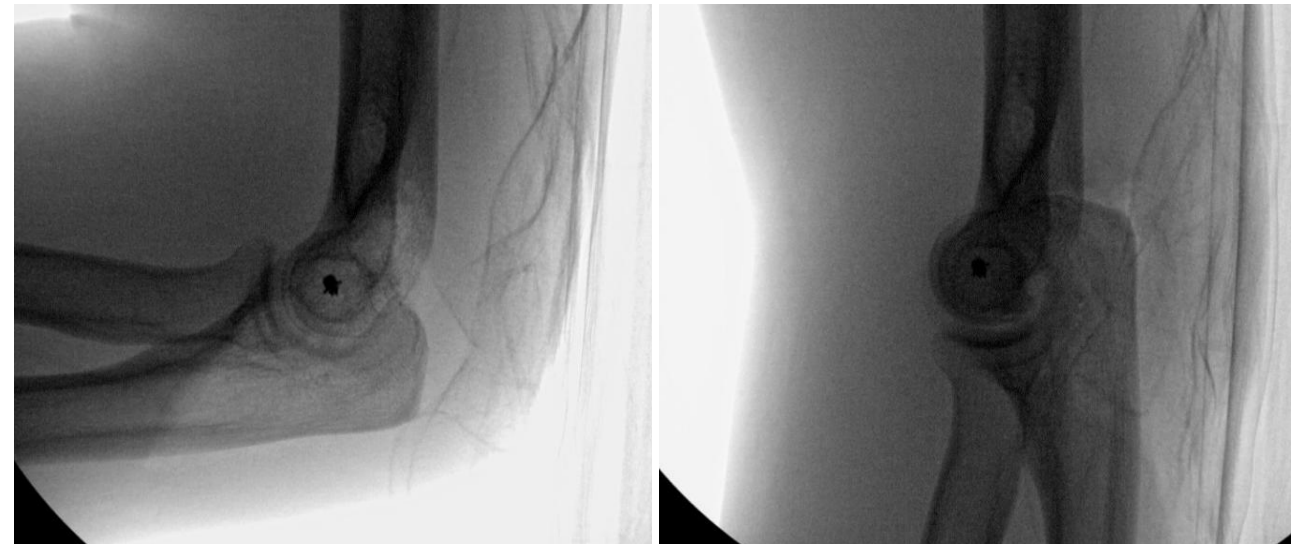
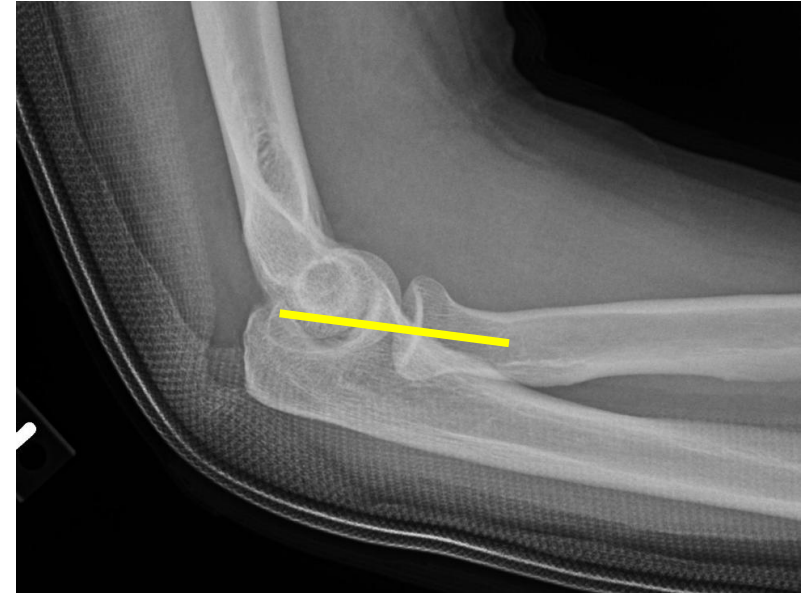


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- If stable through functional arc of motion, treat nonop
- If unstable → ligament repair



# Elbow Instability Patterns: Simple Dislocation

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# Elbow Instability Patterns: Fracture Dislocations

## Monteggia



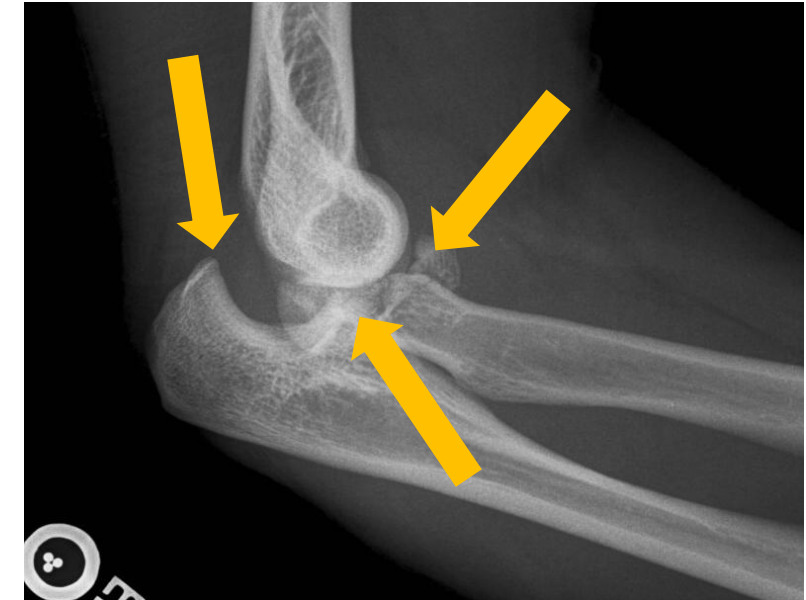
- Proximal ulna fracture
- Radiocapitellar dislocation
- PRUJ Disruption

## Transolecranon



- Olecranon fracture
- Radiocapitellar dislocation
- PRUJ Intact

## Terrible Triad



- Posterior dislocation – ligament disruption
- Coronoid fracture
- Radial head fracture

# Monteggia Fracture Dislocation

## Treatment Principles

- **Anatomic Reduction of proximal ulna fracture**
  - If radiocapitellar joint still unstable – check reduction
  - If still unstable – check reduction
  - If still unstable – check reduction
- Check RC joint for entrapped annular ligament

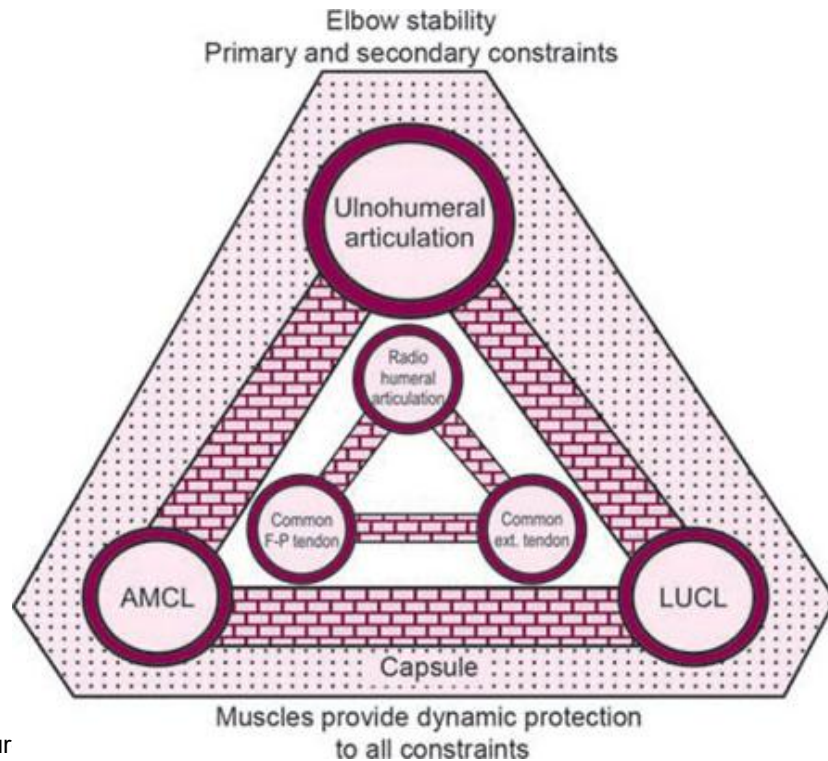


\*\*\* In peds – be aware of plastic deformation in absence of obvious ulna fracture

# “Terrible Triad” Fracture Dislocation

## Treatment Principles

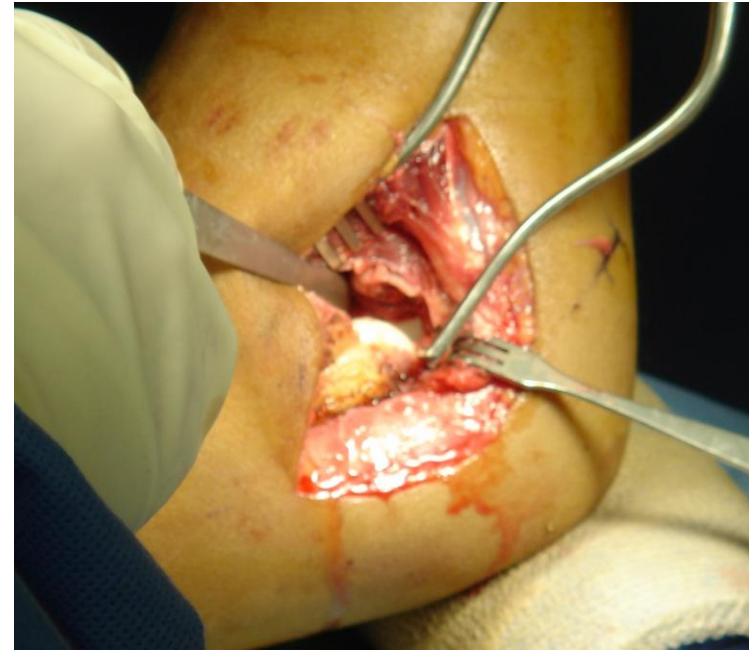
- Early operative treatment
- Restore adequate stability
- Early ROM



# “Terrible Triad” Fracture Dislocation

## Surgical Approach

- Lateral approach to elbow
- +/- Coronoid Fixation



# “Terrible Triad” Fracture Dislocation

## Surgical Approach

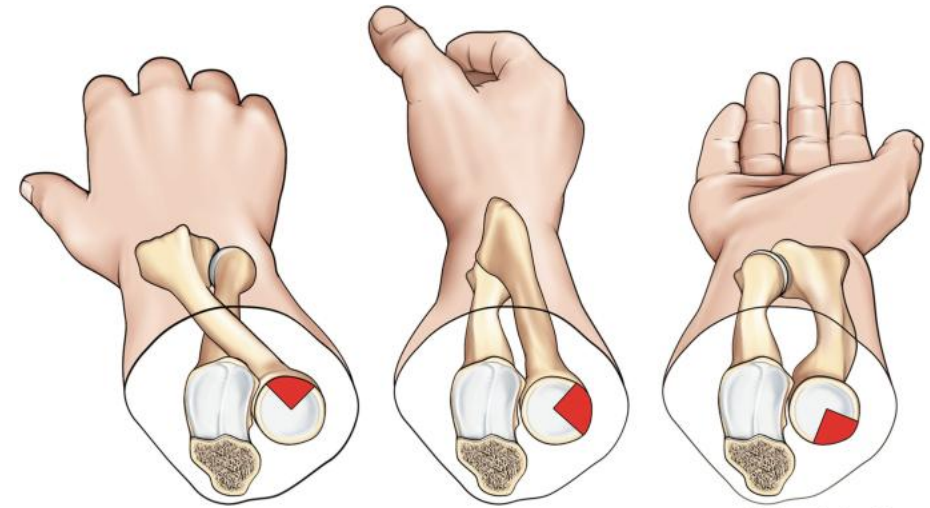
- Lateral approach to elbow
- +/- Coronoid Fixation
- Radial head ORIF vs Arthroplasty



# Radial Head ORIF

## Mason Classification

- Type I: nondisplaced
- Type II: displaced, partial articular
- Type III: comminuted
- Type IV: ulnohumeral dislocation



*M. Cresp® for G. King*

Safe zone: between styloid and Lister's



# Radial Head Arthroplasty

## Mason Classification

- Type I: nondisplaced
- Type II: displaced, partial articular
- Type III: comminuted
- Type IV: ulnohumeral dislocation



# Radial Head Arthroplasty

## Treatment Principles

- **Do NOT overstuff the joint**

## Implant Size

- Native radial head/neck height
  - Use smaller diameter
- Match to capitellum
- Fluoro: Lateral ulnohumeral joint
  - +4mm before widening
- Clinical: Sigmoid notch



# “Terrible Triad” Fracture Dislocation

## Surgical Approach

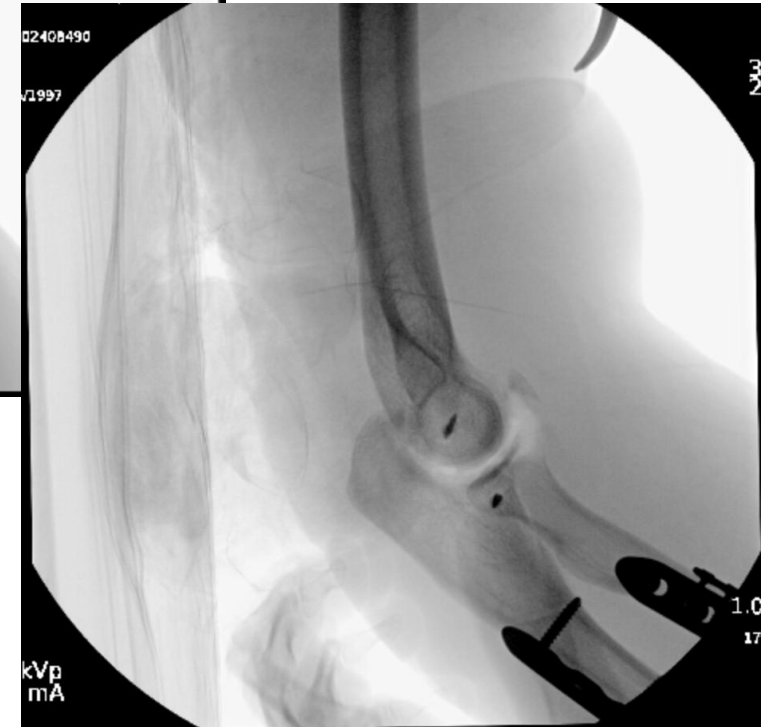
- Lateral approach to elbow
- +/- Coronoid Fixation
- Radial head ORIF vs Arthroplasty
- **LUCL Repair**
  - Usually torn off distal humerus
  - Identify isometric point
  - Repair with suture anchors, bone tunnels



# “Terrible Triad” Fracture Dislocation

## Surgical Approach

- Lateral approach to elbow
- +/- Coronoid Fixation
- Radial head ORIF vs Arthroplasty
- LUCL Repair
- Assess stability
  - Additional medial approach?



# Transolecranon Fracture Dislocation

## Treatment Principles

- ORIF proximal ulna
  - Work from distal to proximal
  - Convert to 2-part olecranon
- Assess stability






# Trans-Ulnar Basal Coronoid (TUBC) Fracture

Coronoid detached from olecranon and metaphysis

- Must consider coronoid fixation
  - Additional approach?



What is the coronoid attached to?	Classification
Ulnar Metaphysis	<b>Trans-olecranon</b> 
Olecranon	<b>Monteggia Variant</b> 
Neither	<b>Trans-ulnar basal coronoid</b> 

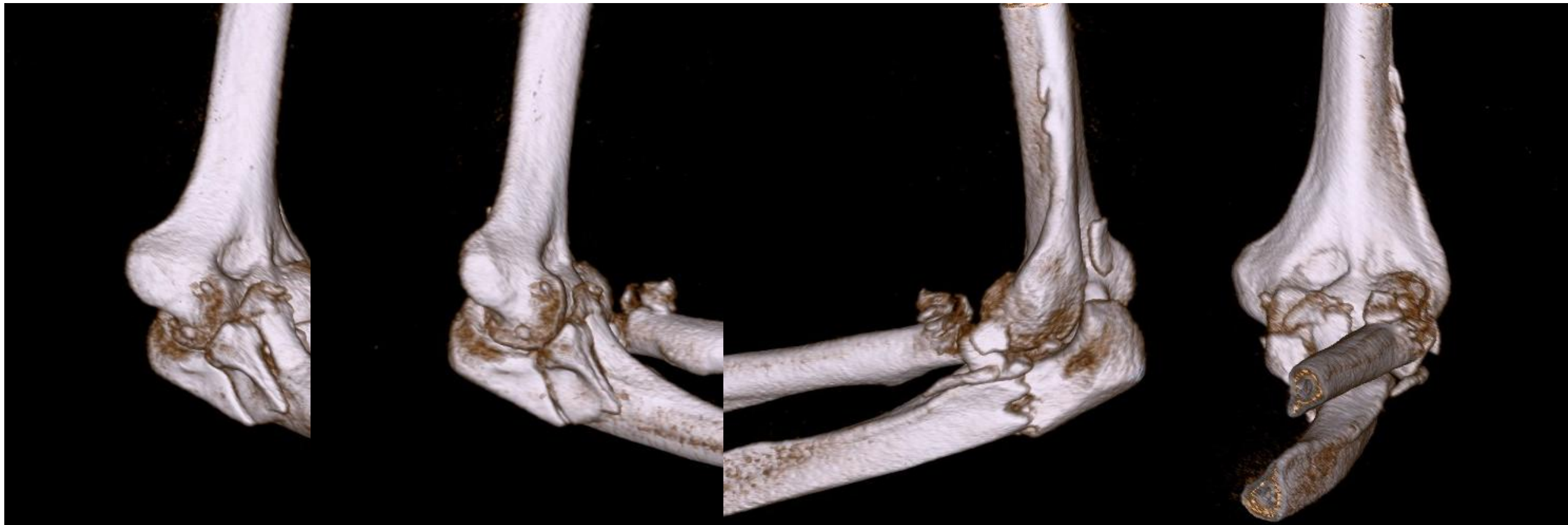
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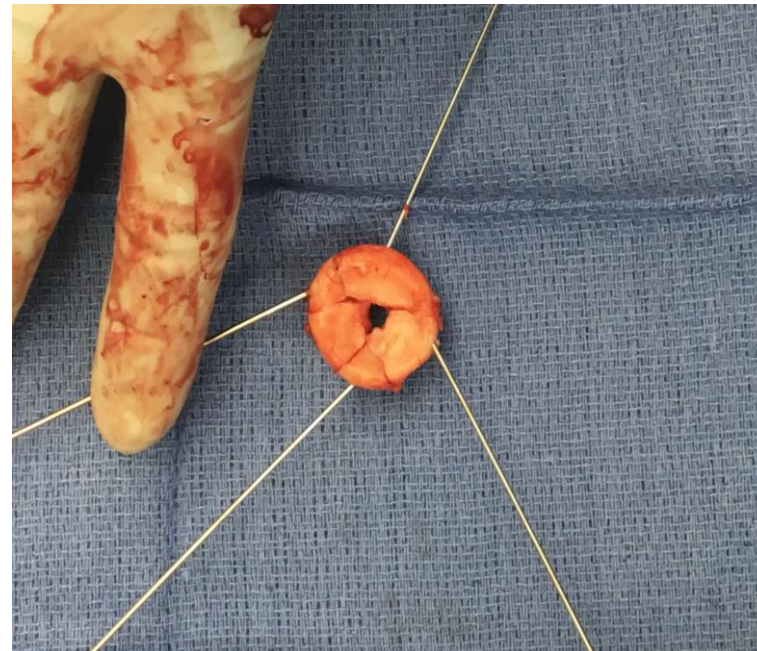
# Case AW

## Injury CT



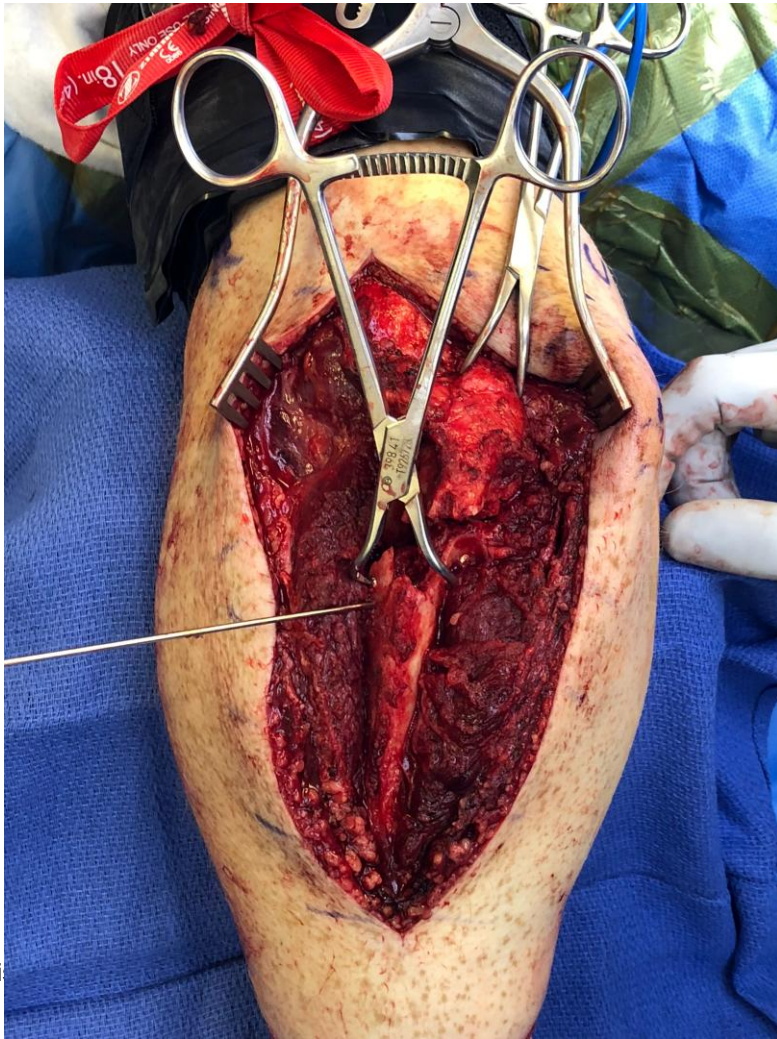
# Case AW

## Radial Head Arthroplasty



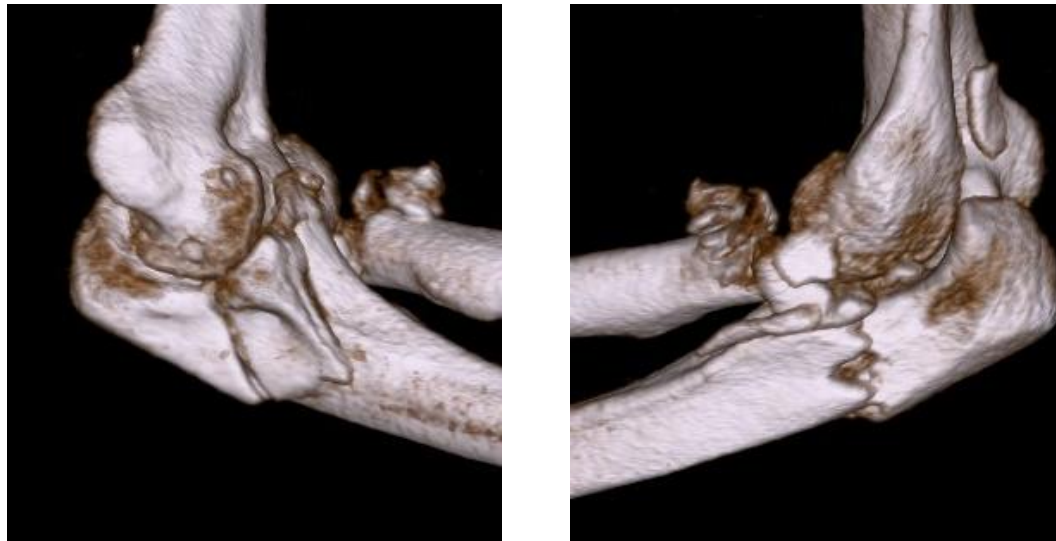
# Case AW

## Provisional Reduction and Fixation



# Case AW

## Intraop Instability



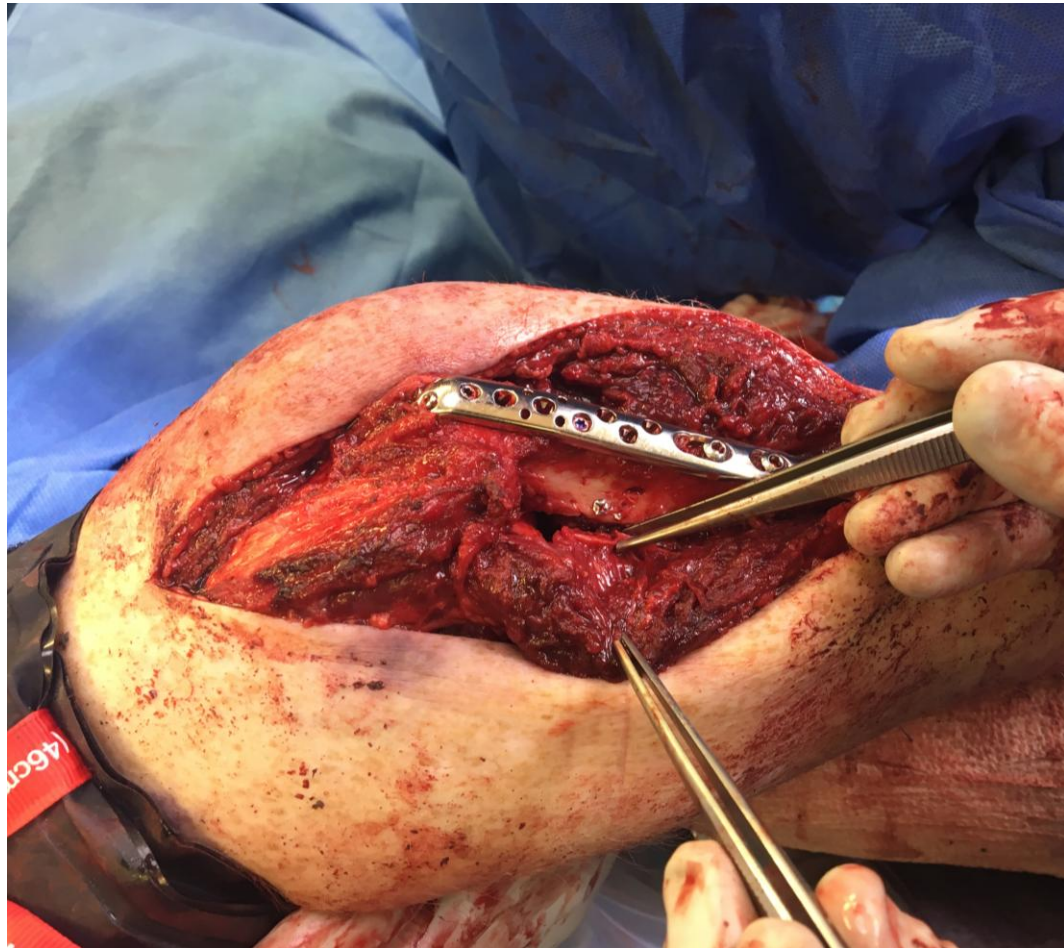
Fracture involves MCL and LUCL attachments



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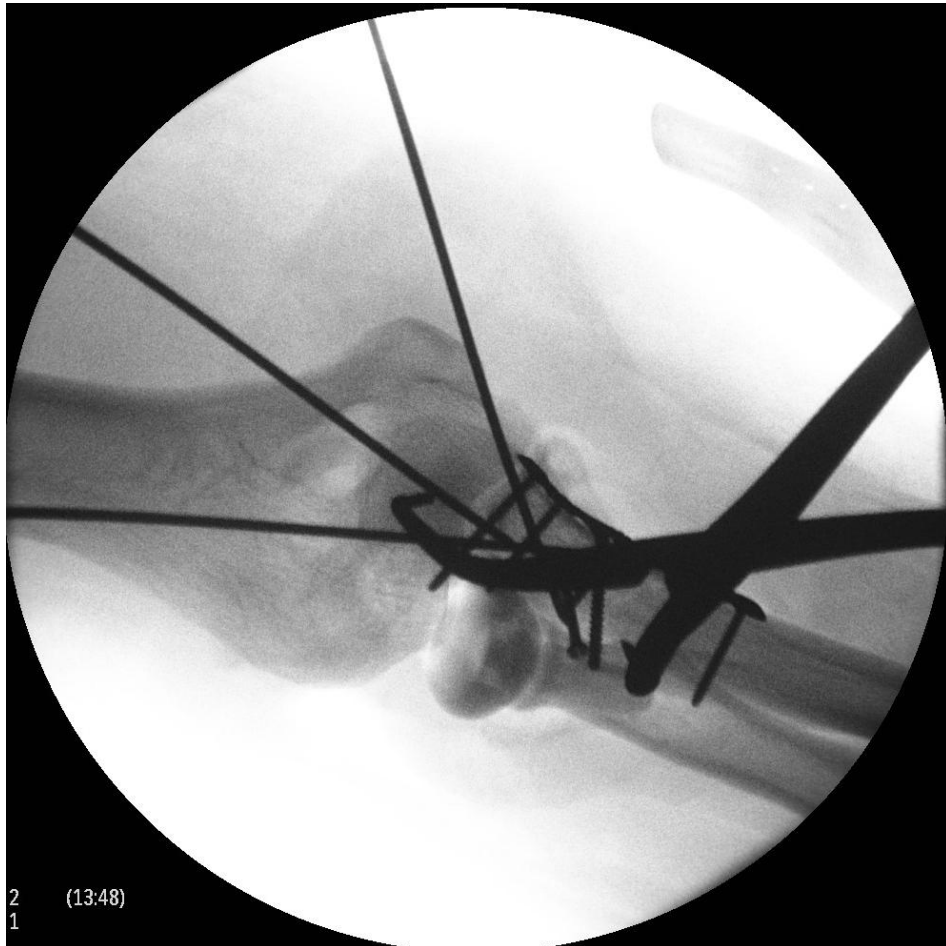
# Case AW

## Intraop Instability: Supinator Crest



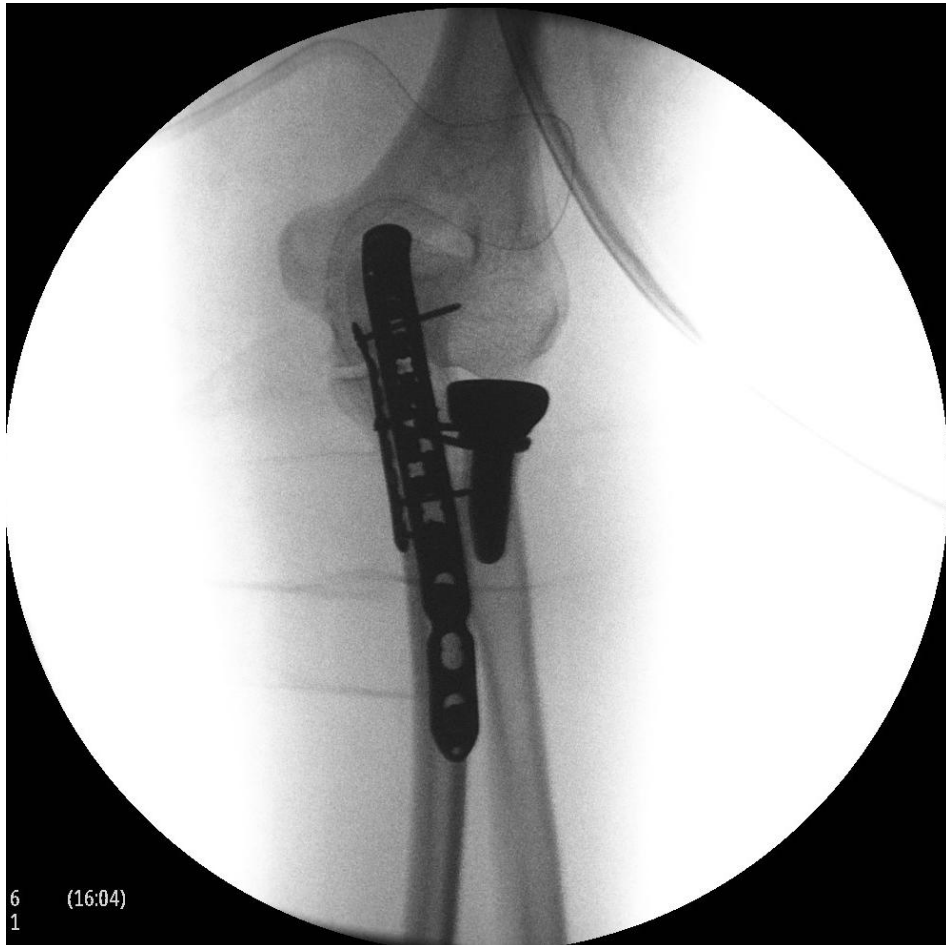
# Case AW

## Provisional Reduction and Fixation



# Case AW

## Definitive Fixation



# Take Home Points

Elbow stability is dictated by bony and soft tissue components

- Critical to understand what leads to instability

Appropriate management should address underlying instability pattern

- Bony fixation prior to ligament
- Important to assess stability after each step

Better have stiff but stable joint than unstable one

- Terrible Triad: Lateral side first
- Monteggia: Get the ulna right
- Transolecranon: Fix the ulna, shaft to olecranon
- TUBC: + Coronoid Coronoid Coronoid

# Thank You

