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SCHOOL OF MEDICINE
CHARLOTTE CAMPUS

N ■ **NOVANT**[™]
■ **HEALTH**


Fractures About the Elbow

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I (and/or my co-authors) have something to disclose.

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"My Academy" app; 

or

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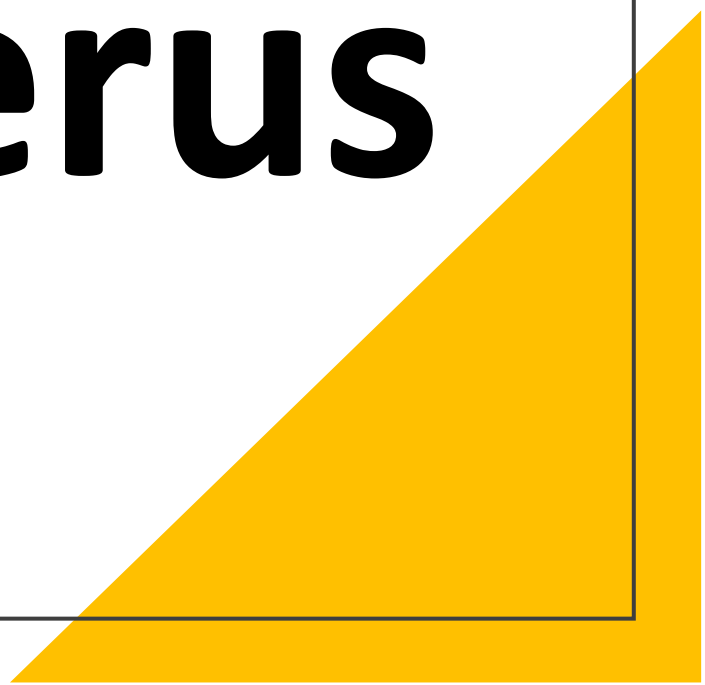




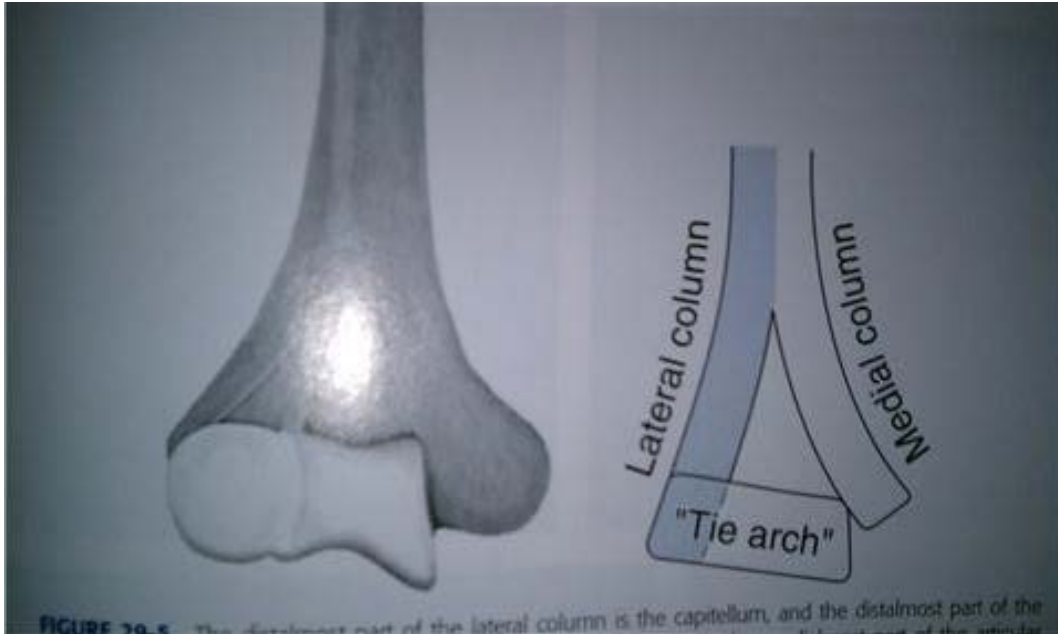
Objectives

- Injury Basics
- Decision Making
- Fixation
- Post-op

Distal Humerus



Functional Anatomy

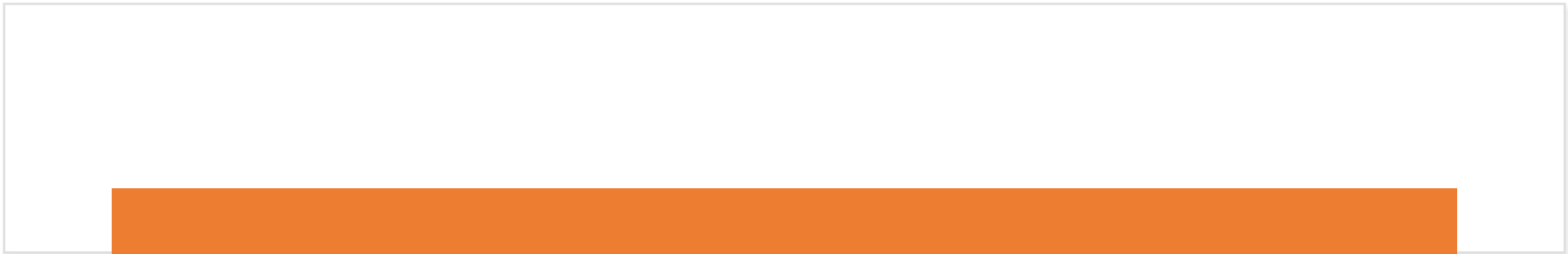


- “Pulley-like” trochlea acts as “tie-arch” between medial and lateral columns
- Radiocapitellar joint
 - Mechanically linked to DRUJ
 - Forearm rotational movements independent of ulnotrochlear joint



The Consult

- Surprise late March snowstorm
- 67 yo female
- Slipped and fell on steps as she went to search for Sunday newspaper

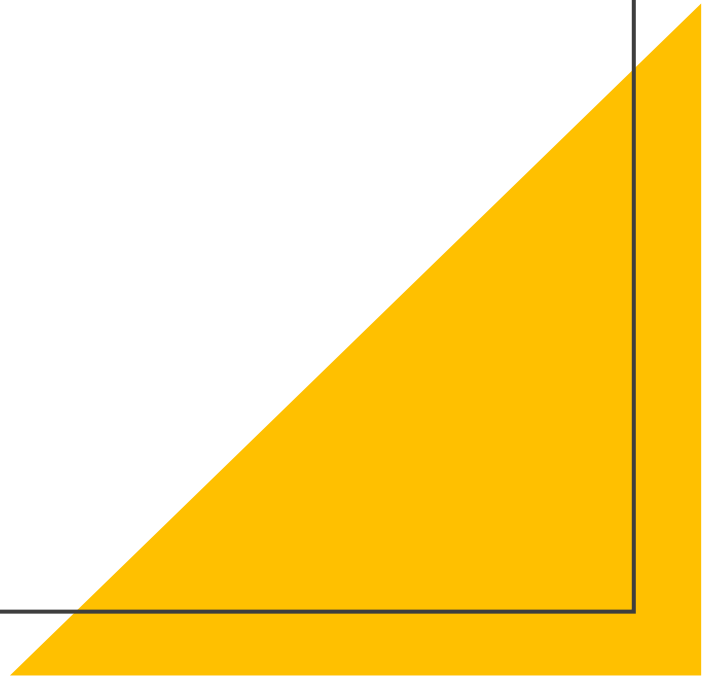




Initial Management:
What Else Do You Want to
Know?
Or Want Done?



Traction View



Thank you!



What About a CT Scan?

Coronal Plane Fractures

Coronoid

Comminuted-still is bad on CT

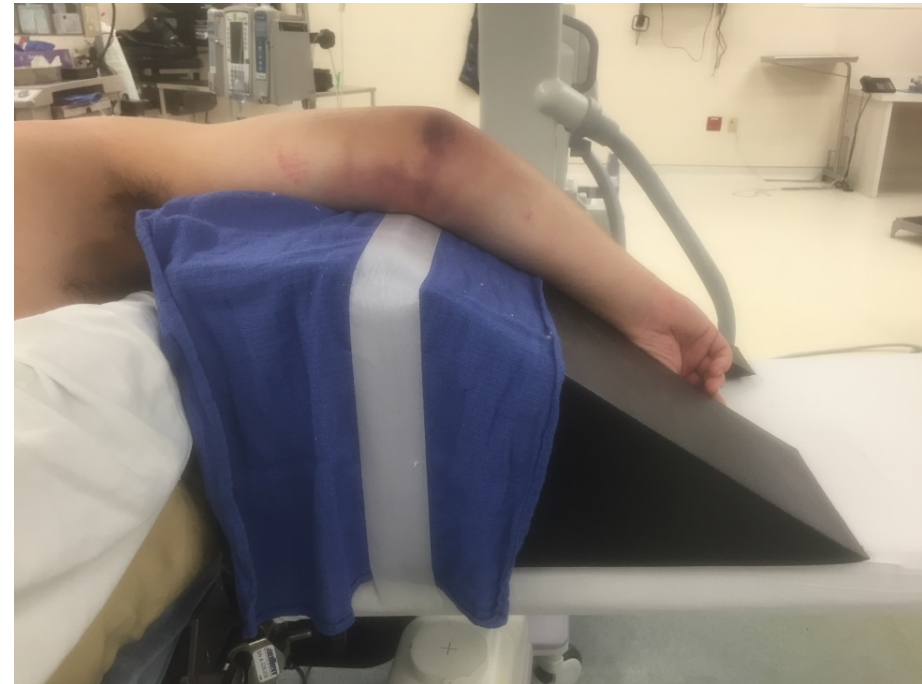


For Operative Planning

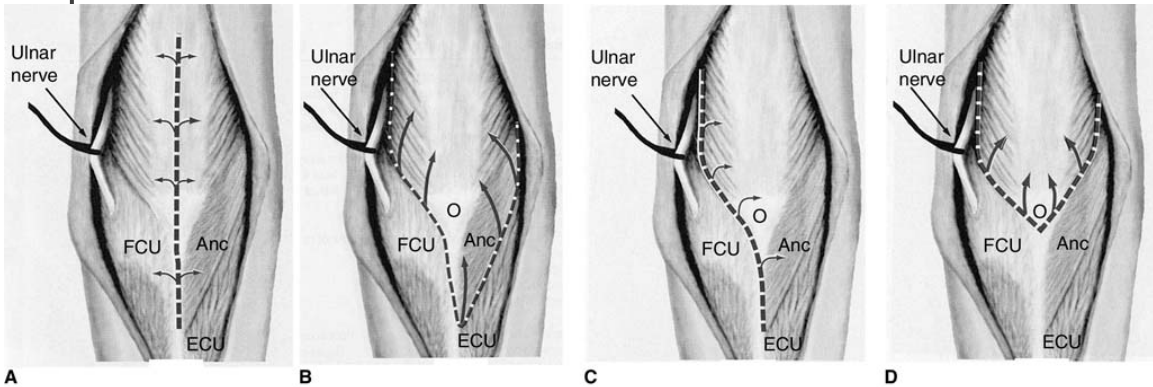


- Patient position
- Approach
- Osteotomy
- Transposition
- Plate options
- Auxiliary fixation

OR Positioning



Surgical Approaches



- All begin from a common initial dissection and branch to more extensive exposures
 - Depends on fracture configuration
- Vary in the handling of the triceps muscle

Incision



Tip: Mark Radial and Ulnar sides

- **Posterior midline**
- **Course around tip of olecranon**
- *Don't make directly over tip of olecranon as there may be wound problems and discomfort*



Tip: Be Nice to the Skin

- Minimizes soft tissue trauma
- Better strength and ROM in some studies
- Lateral
 - Identify radial collateral arteries
 - Identify radial nerve
- Medial
 - Identify ulnar nerve

Triceps Sparing



My Variation



Osteotomy

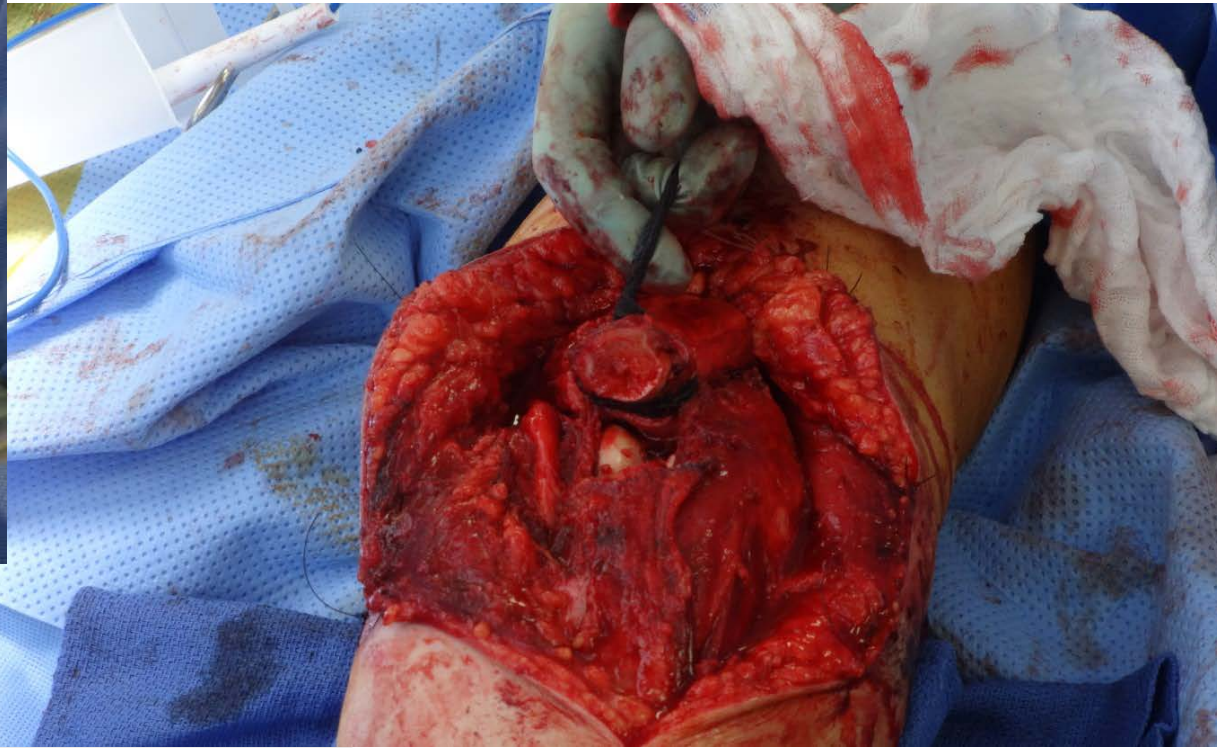
- Identify “bare” area between olecranon articular facet and coronoid articular facet



The Osteotomy

- **Chevron type**
- **Protect the soft tissues**
- **Apex distal**
- **Use a saw to start**
- **Complete with osteotome**

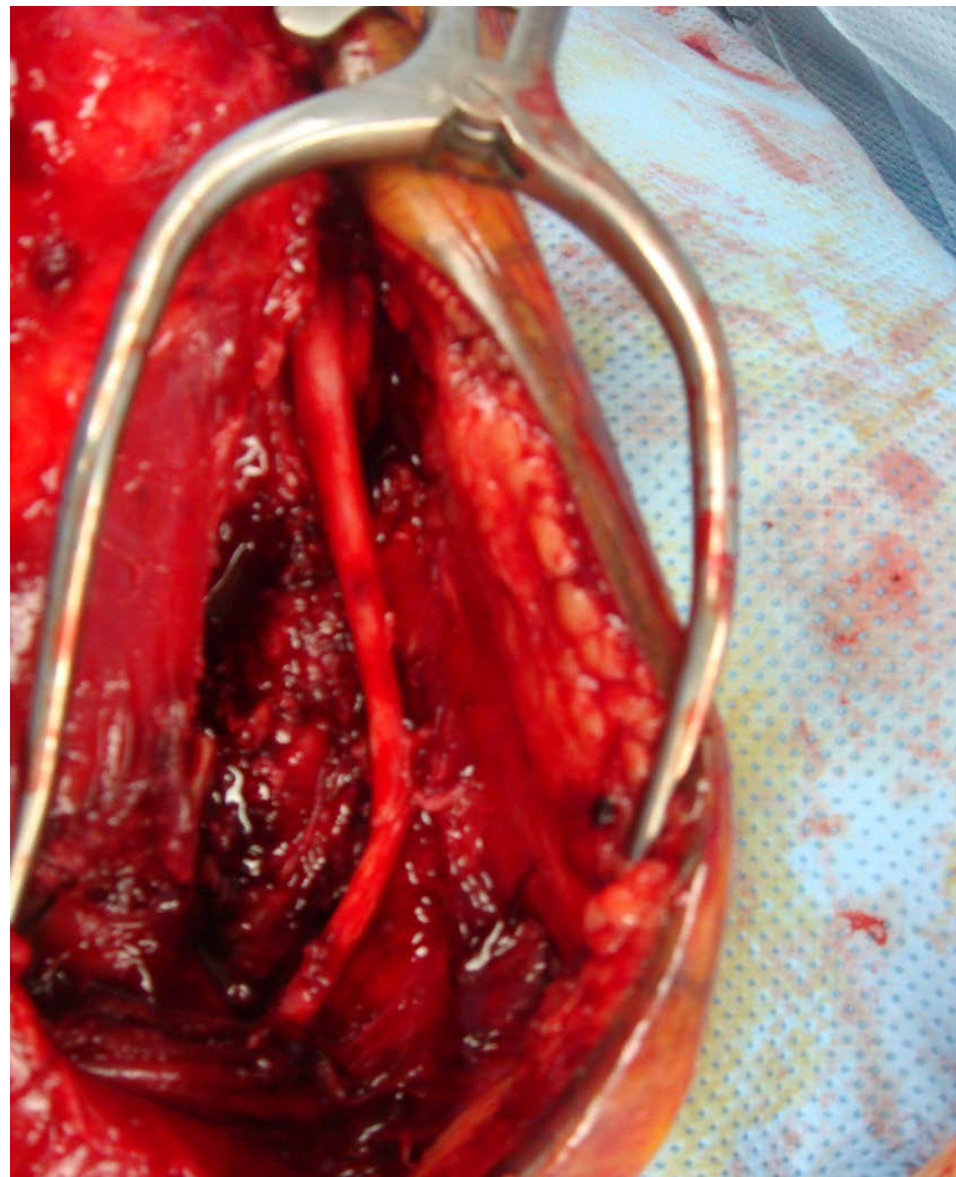




Osteotomy

Ulnar Nerve

- **Transpose?**
 - **Consider transposition if preop ulnar neuropathy**
 - **Not shown to be protective against postop neuropathy**



Finally...Fixation

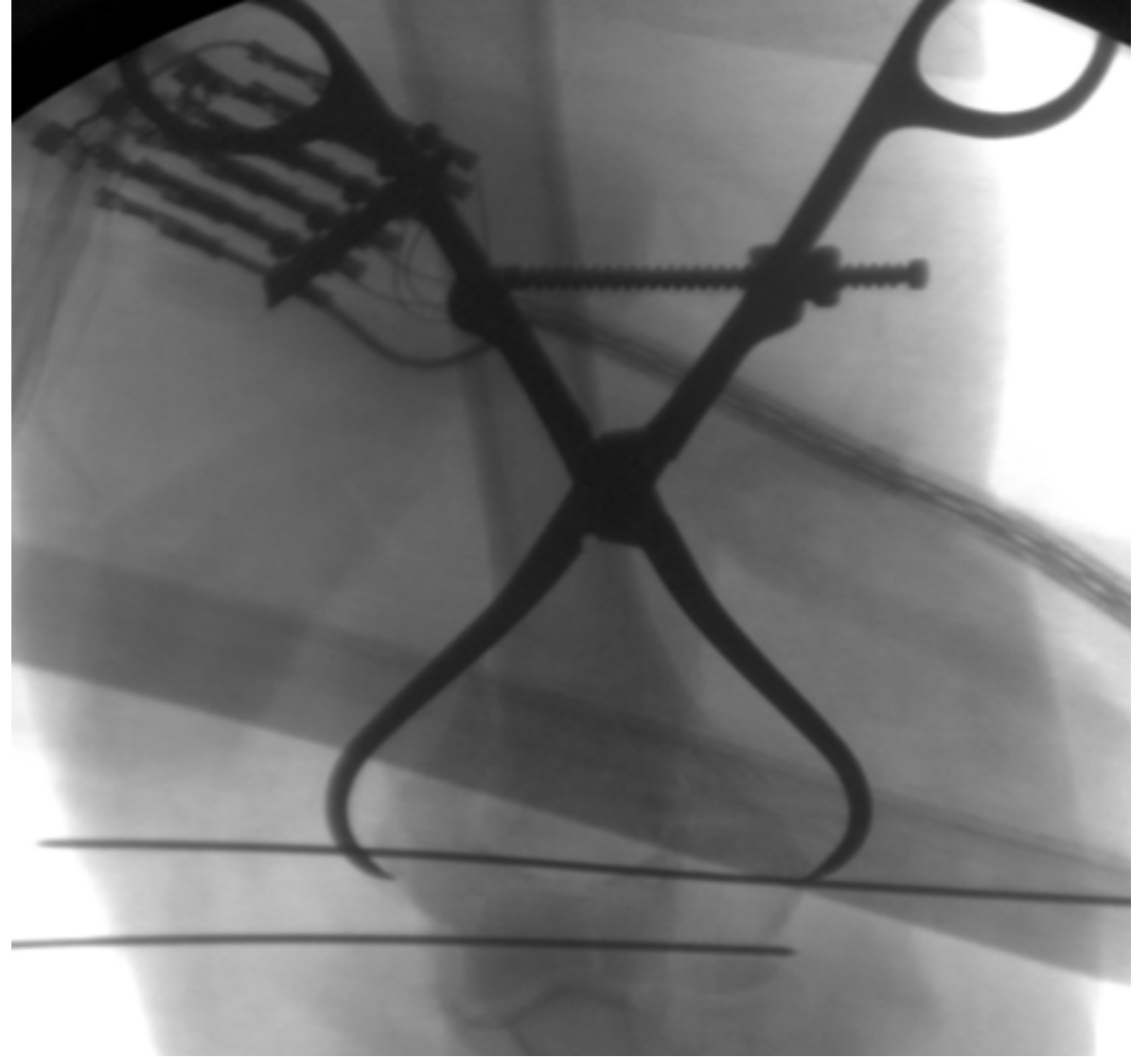


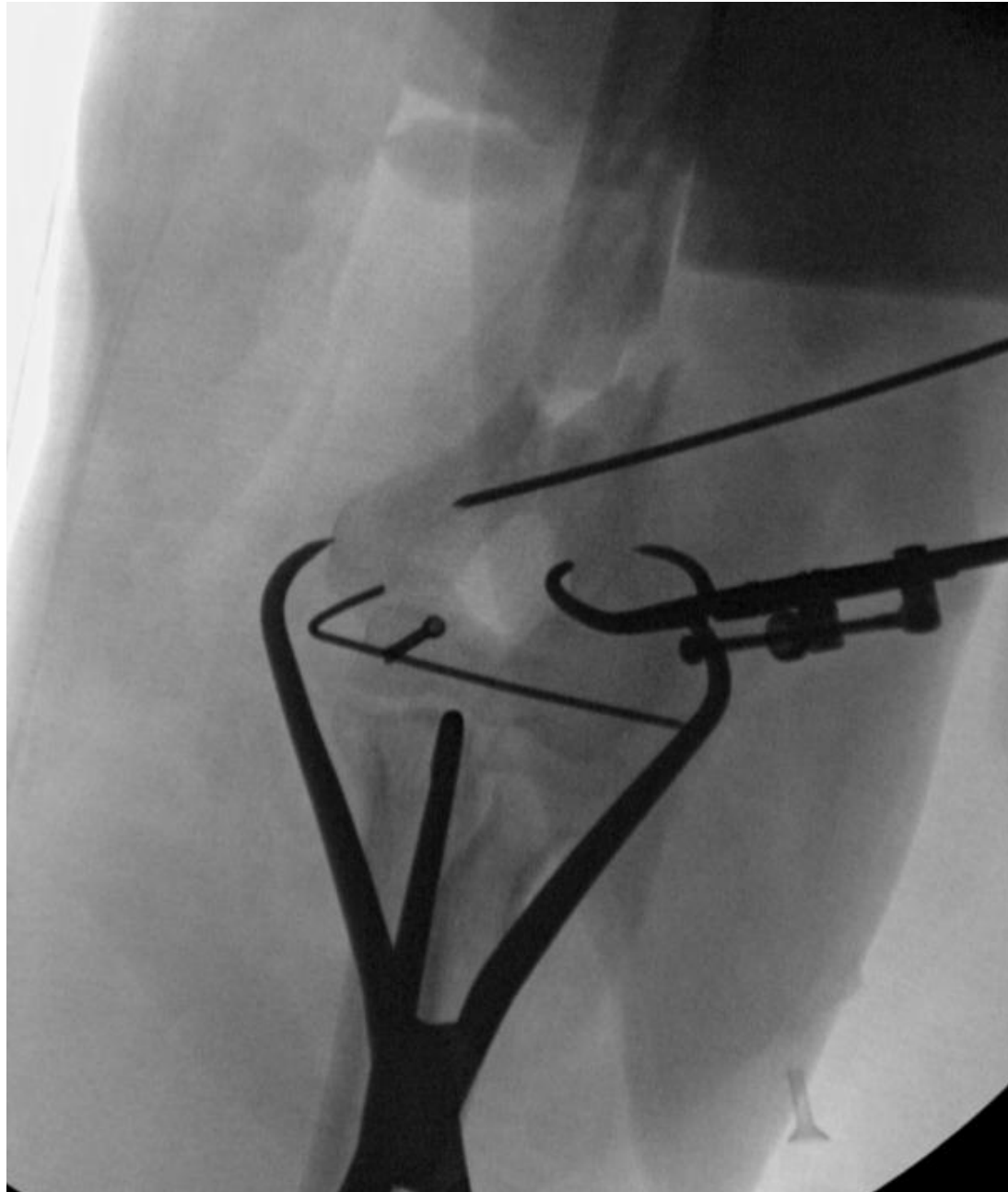
I can see!

- Reconstruct articular surface
- K-wires useful
- May use smaller screws
- Beware of inadvertently narrowing the trochlea!

Fixation

- Restore articular mass to the columns
- Reduce least displaced/least comminuted column first
- Use temporary stabilization
 - K-wires
 - Reduction forceps

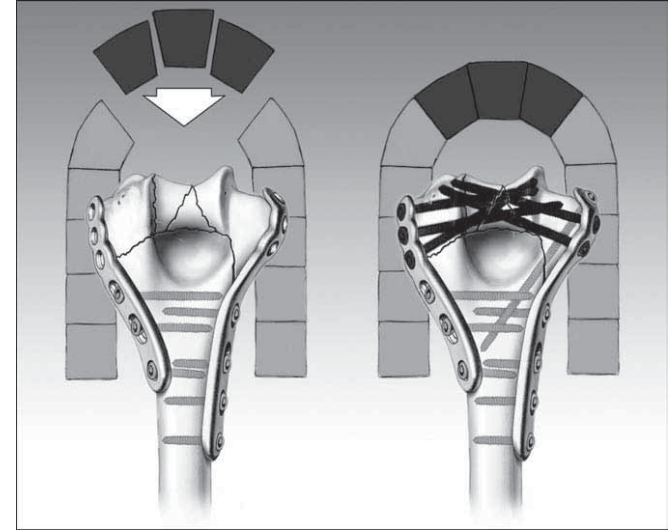


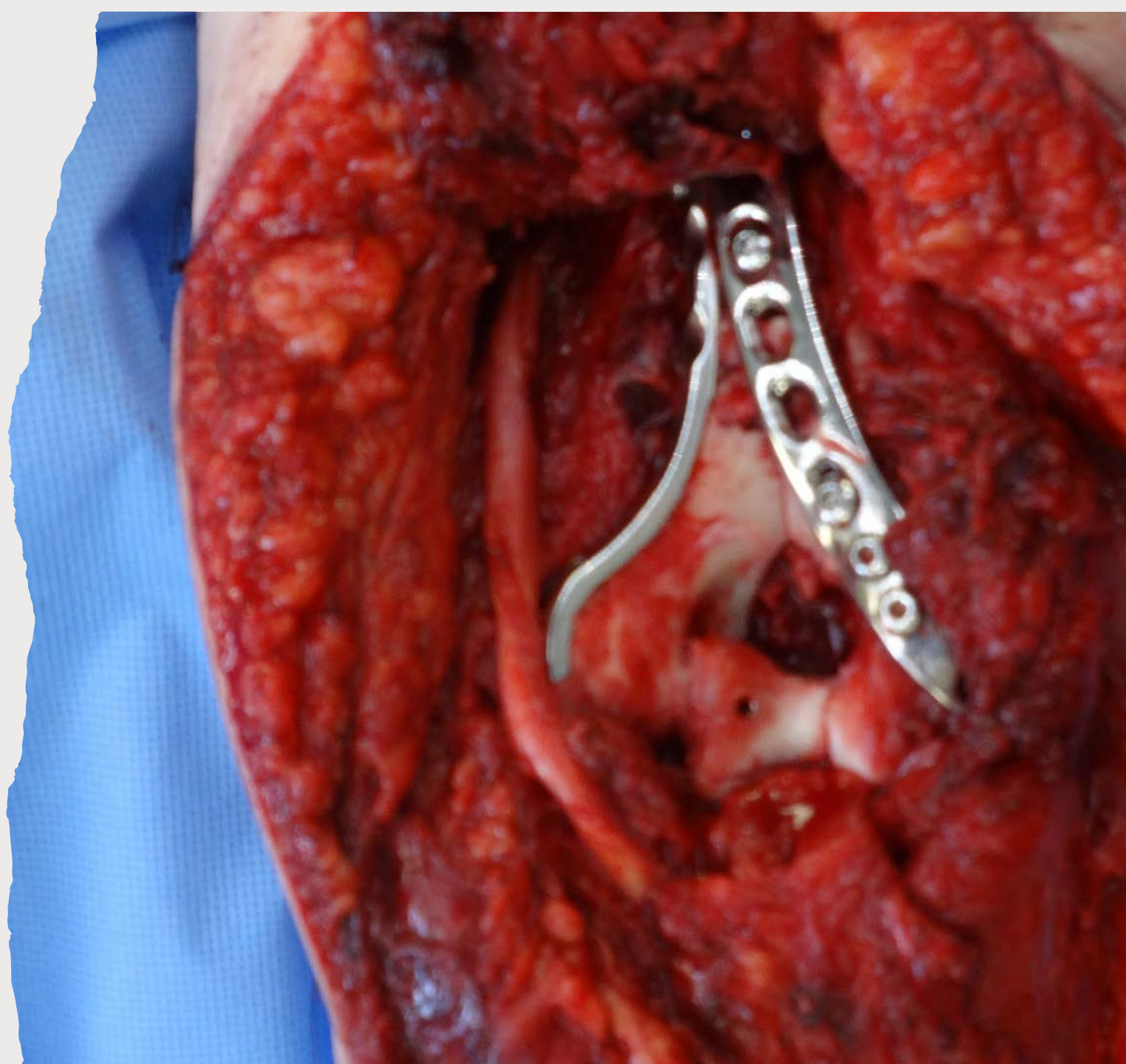




ORIF

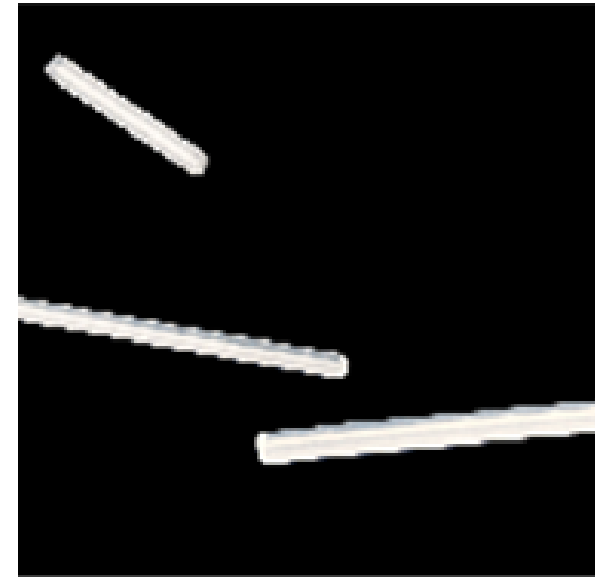
- **Orthogonal (90-90) plating**
 - Posterolateral and Medial plates
 - Able to place screws quite distal for coronal fractures of capitellum
- **Parallel plating**
 - Medial and Lateral column plates
 - Long screws interdigitate within articular segment

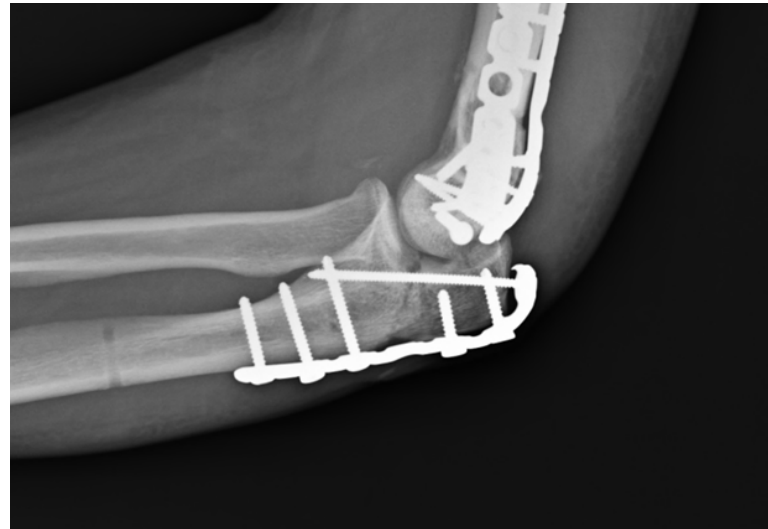
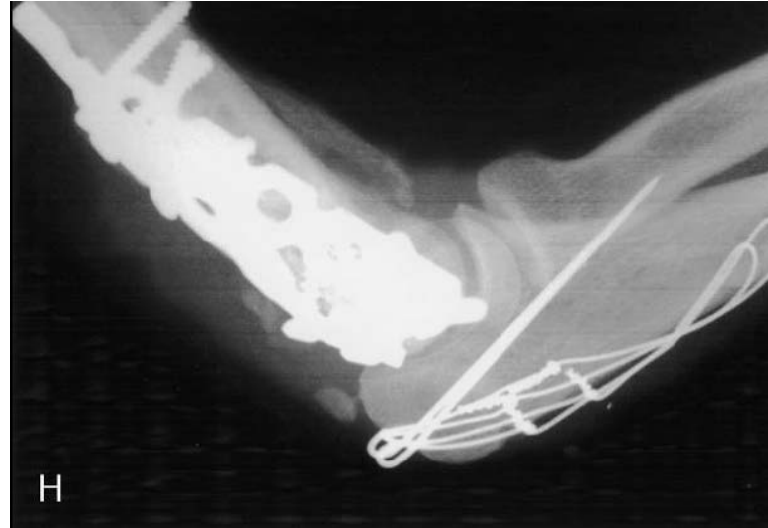




Additional Fixation

- **Headless Compression Screws**
- **Suture anchors**
- **Bioabsorbable Screws**





Osteotomy
Fixation ?

Osteotomy Fixation



A group of diverse young children, including boys and girls of various ethnicities, are sitting on the floor in a classroom. Some children have their hands raised, suggesting an interactive activity or a lesson. The background shows a typical classroom setting with shelves and educational materials.

Post Op Routine

Immediate

- **Goal is rigid fixation so you can begin ROM**
- **May splint temporarily for soft tissues**
- **Edema Glove**



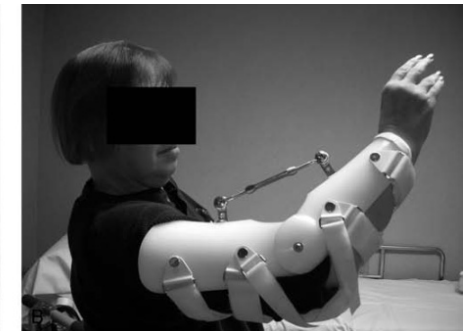
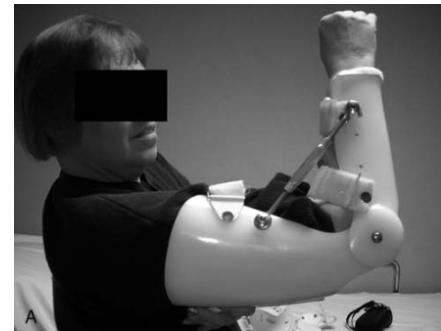
Discharge Orders

- ROM Instructions
- Lifting Instructions
- Driving Instructions
- PT orders
- Do you really think they will do it on their own?



Intermediate

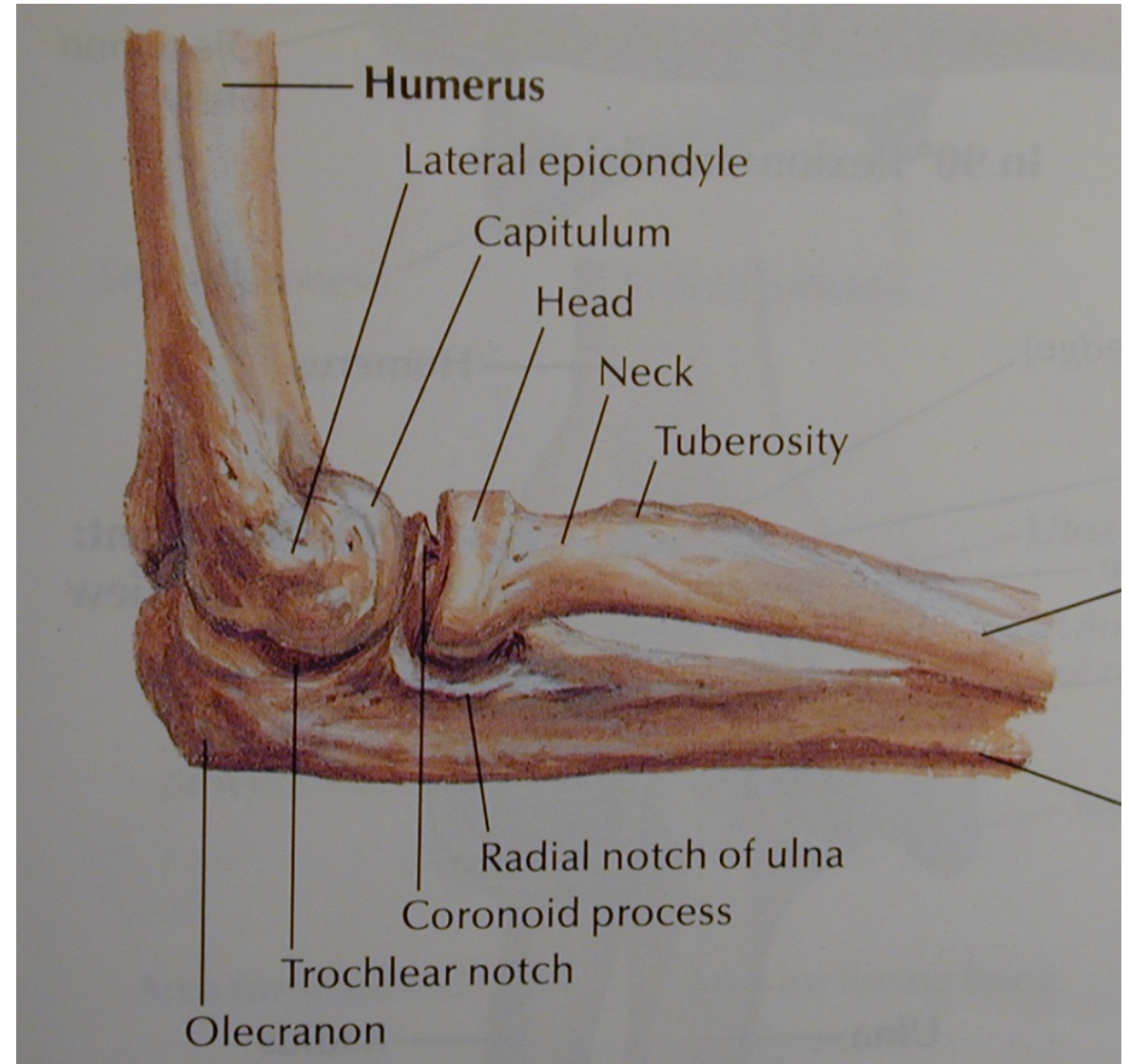
- ROM and Gentle Stretching
- More aggressive ROM at 6 weeks
- Static night splints (flexion or extension) maintains gains made during daytime



Radial Head Fractures

Radial Head Fractures

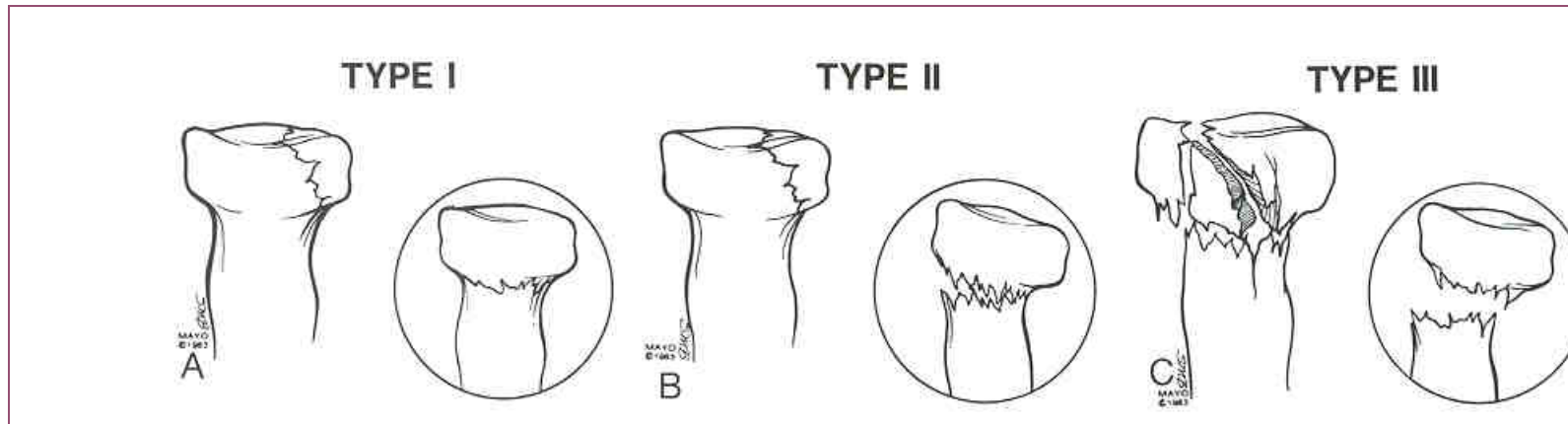
- **Anatomy**
 - **Elliptical**
 - **15 degree angulation**
- **Crucial to stability if injury to ligaments and other bony structures**
- **Secondary stabilizer**



Evaluation

- **Examine entire extremity**
- **Associated Injuries are common: 30%**
- **Stability: Difficult to assess unless asleep**
- **Evaluate for mechanical block to rotation**
- **Ensure adequate radiographs**

Mason Classification



***Type IV added by Johnson:
Fracture of radial head with dislocation**

***1987 Broberg and Morrey**

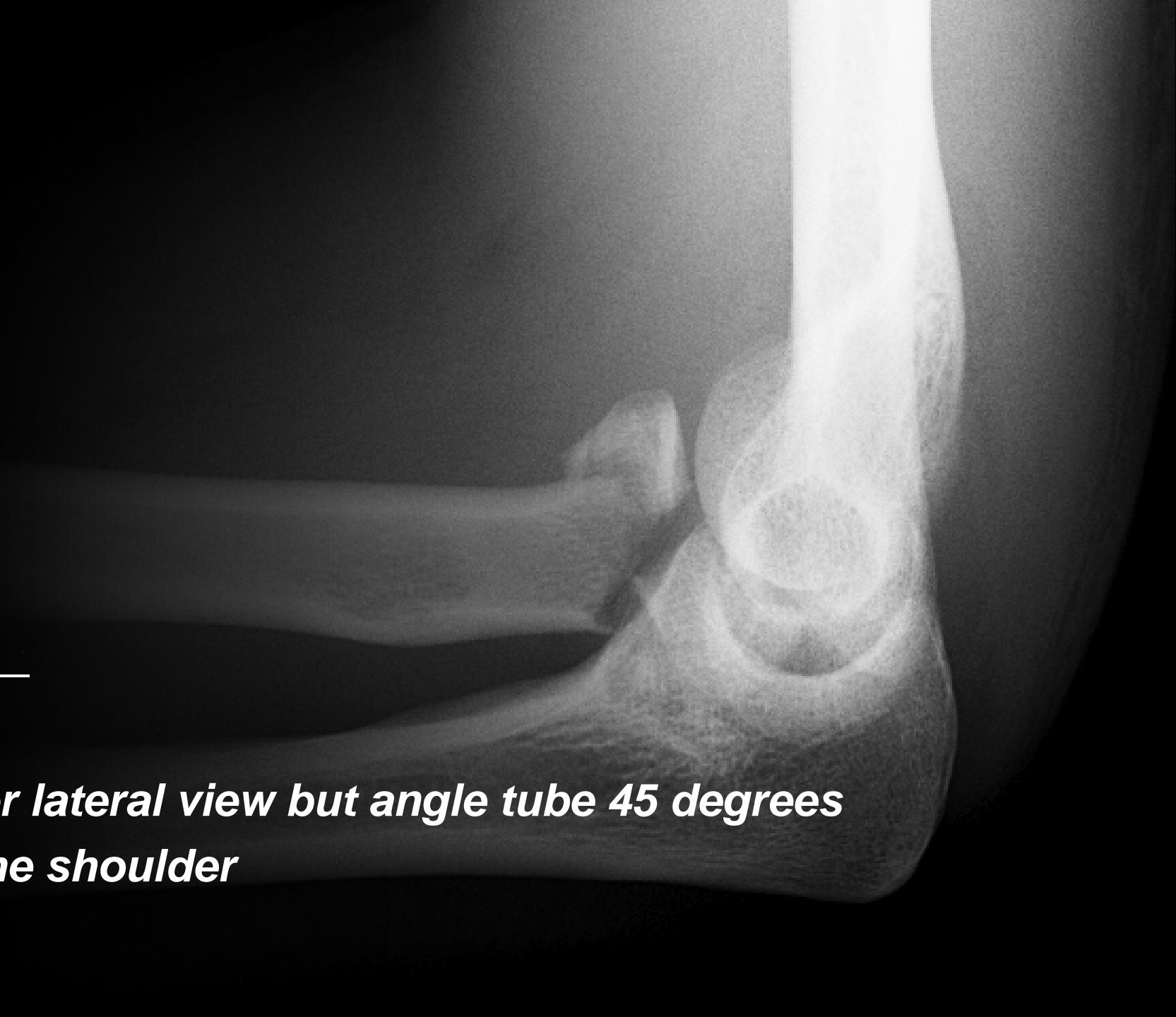
***2011 article describes fracture by displacement**



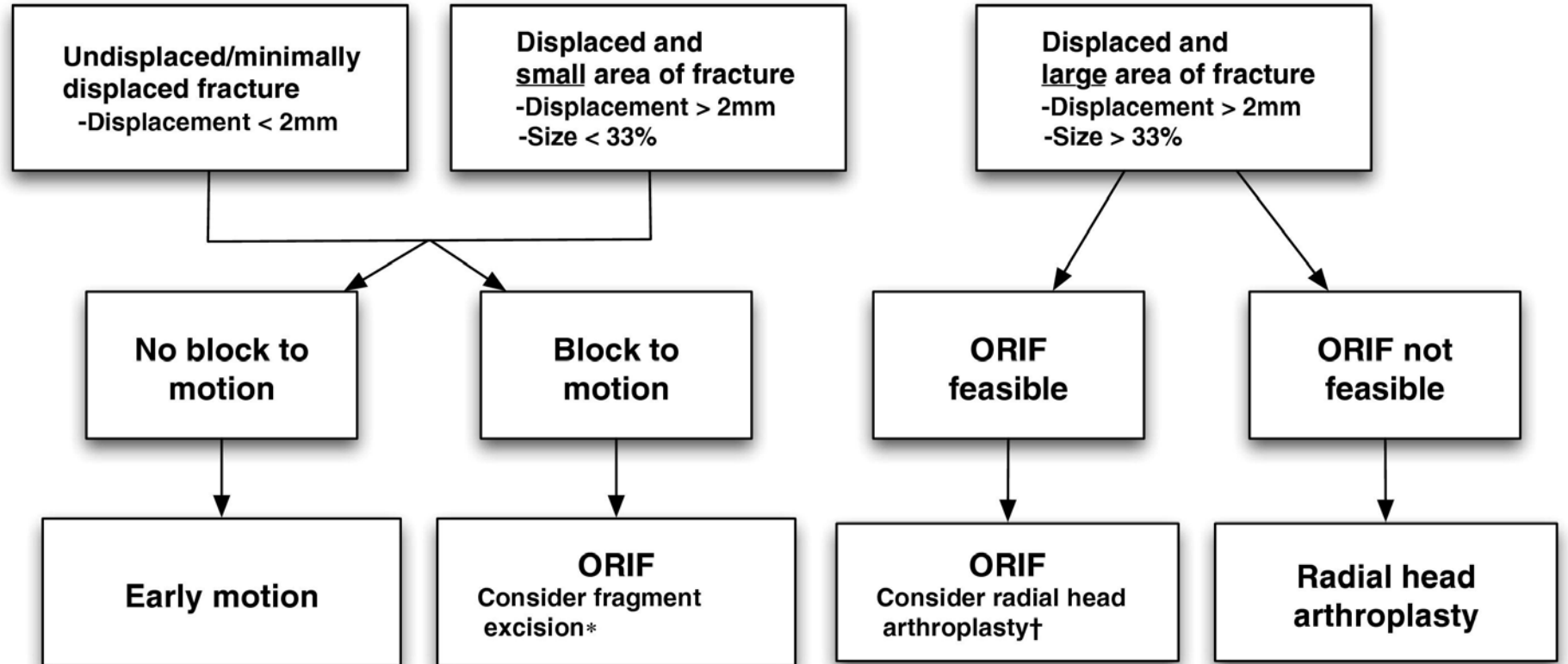


Radiocapitellar View

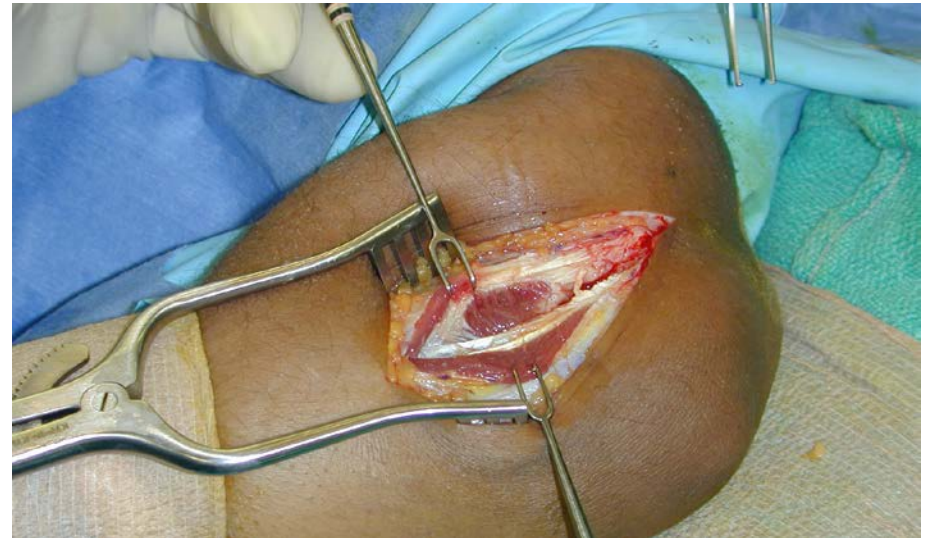
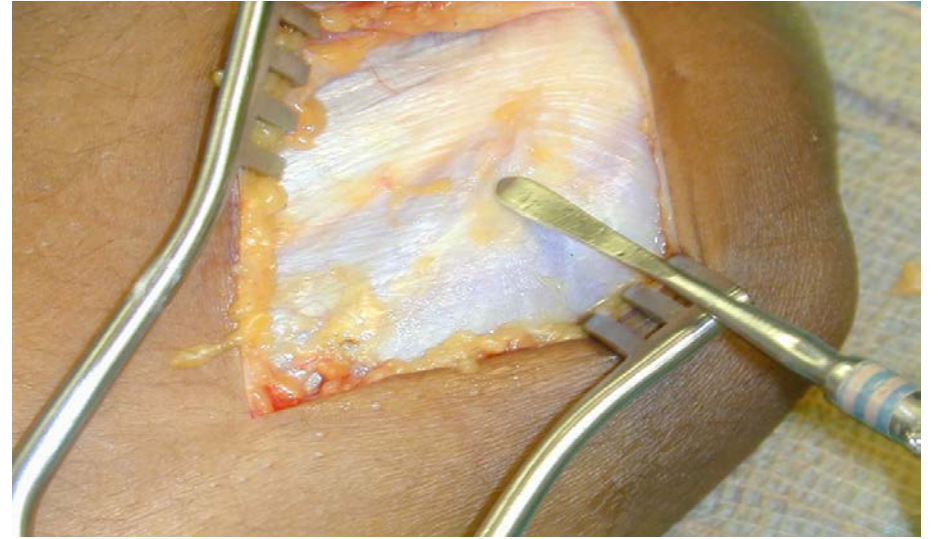
Position for lateral view but angle tube 45 degrees towards the shoulder



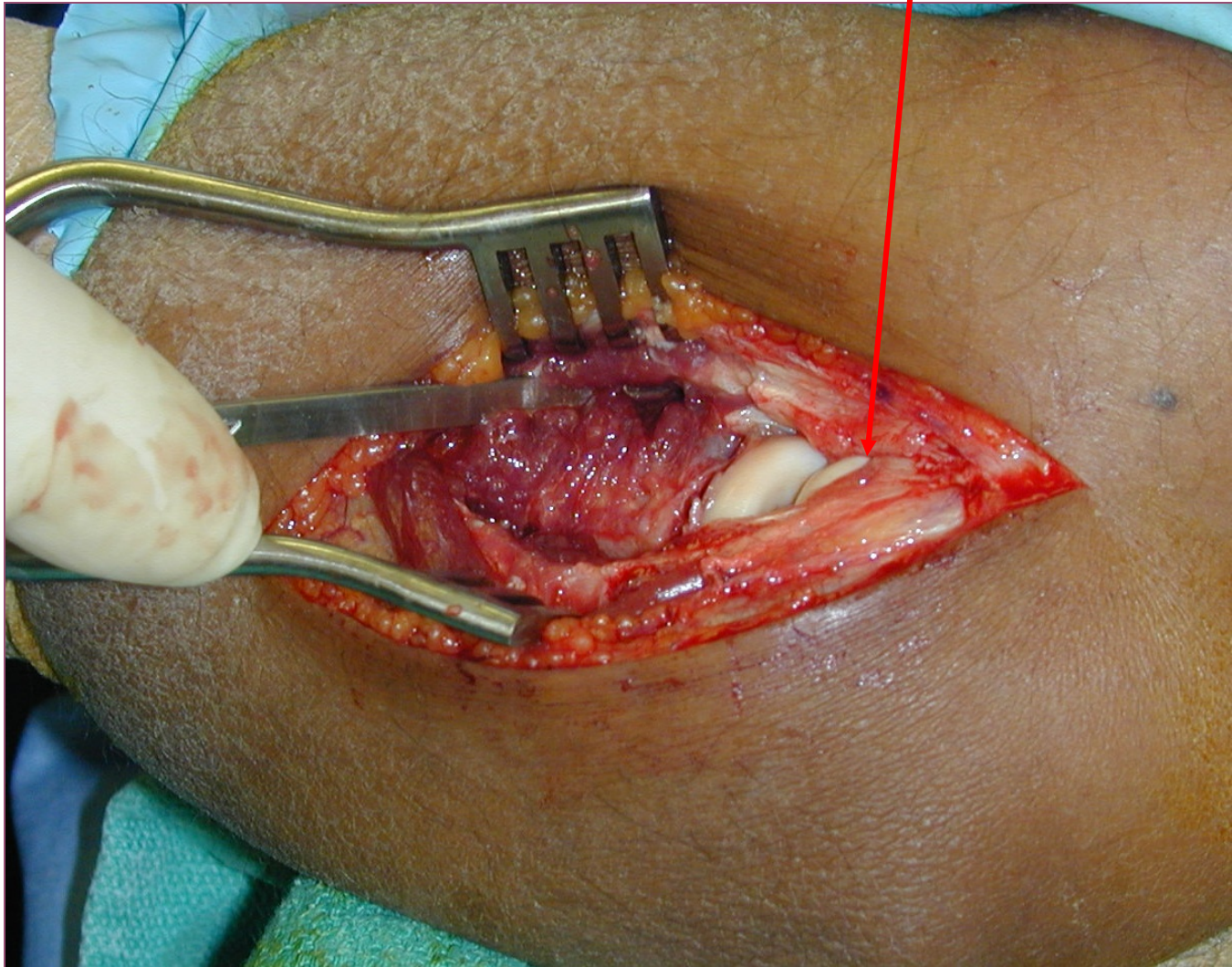
Decision Making



Surgical Technique



Keep LUCL ligament
origin intact



Stay above
equator of
Radial Head

Slide courtesy John Capo



Operative treatment

Tips:

- **Kirschner wires to hold reduction**
- **Use small screws**

Order:

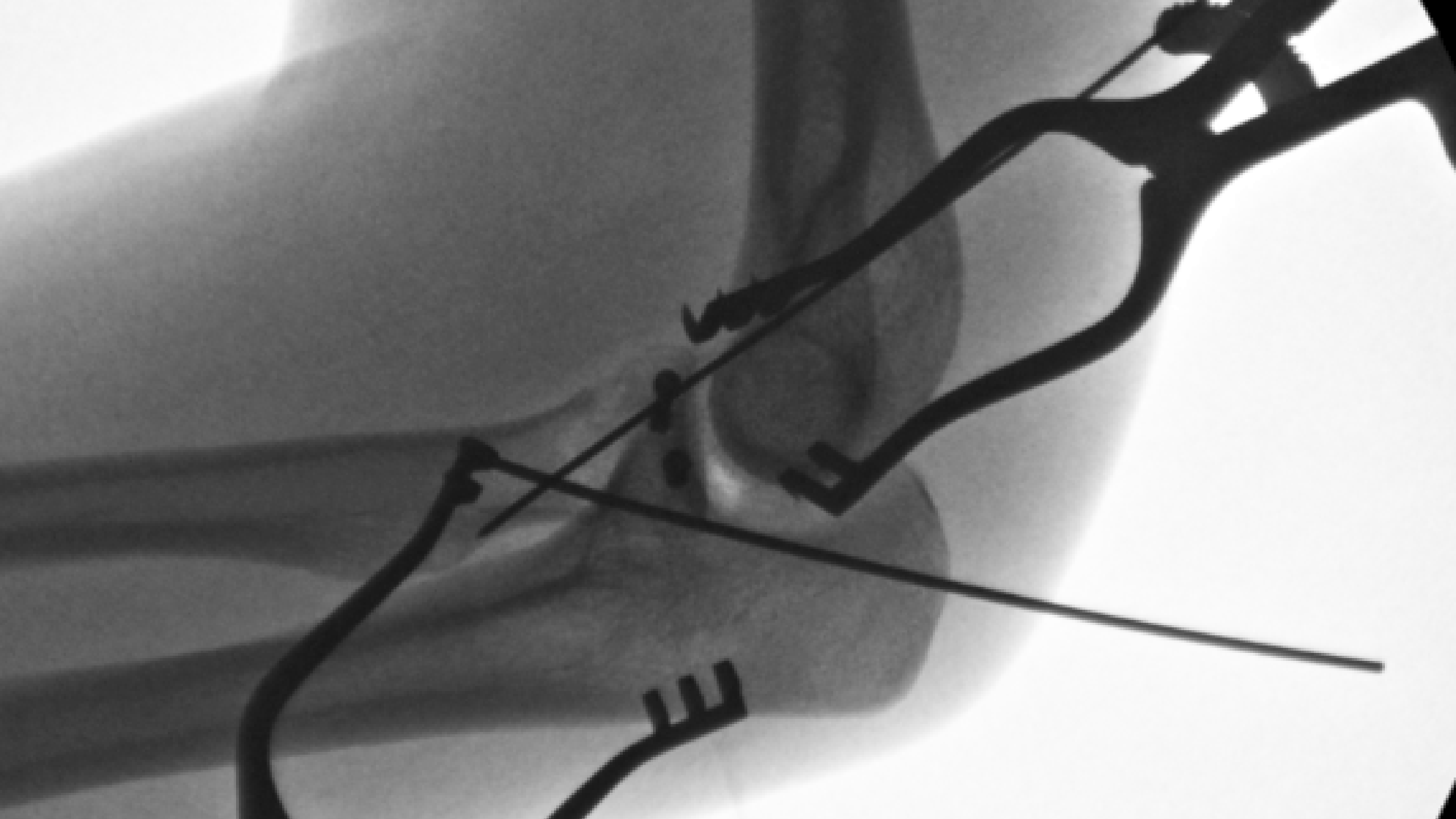
- **Reconstruct Head**
- **Secure radial head to neck**

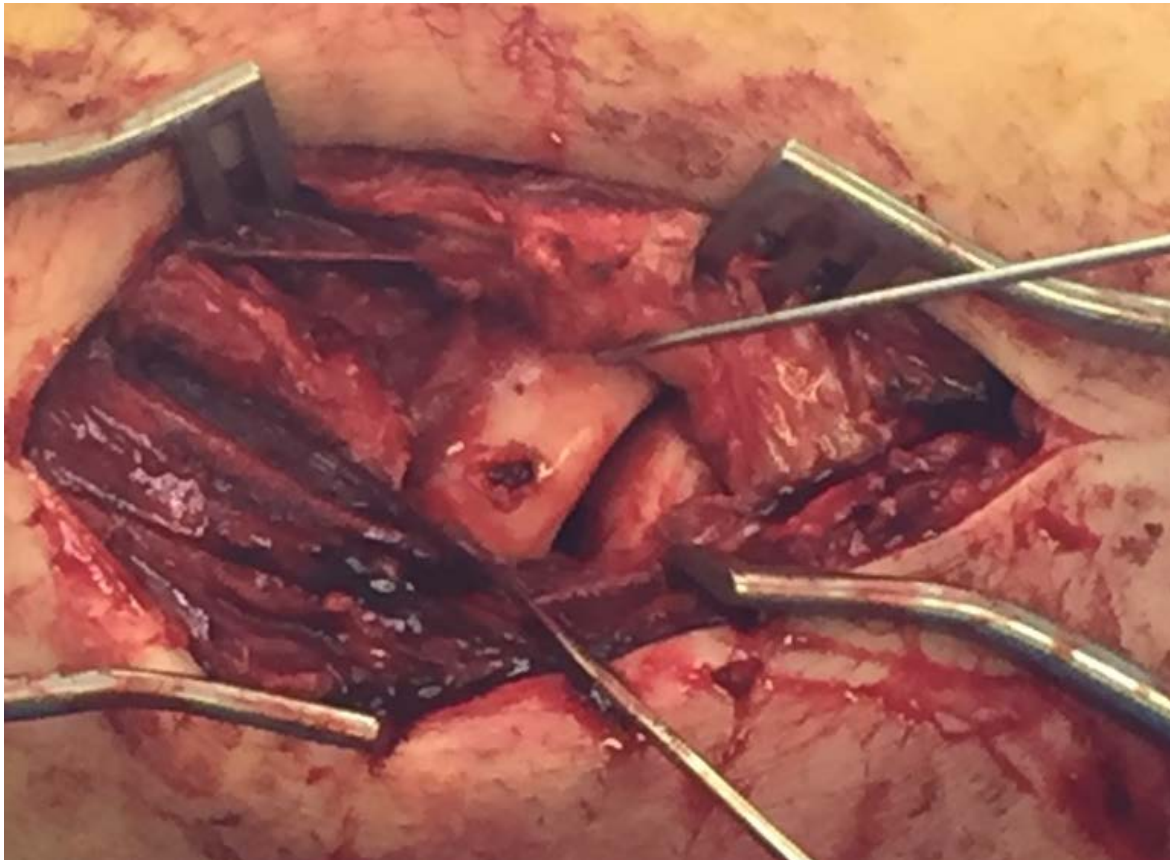
Keep Hardware in safe zone!

Spectrum of Fractures

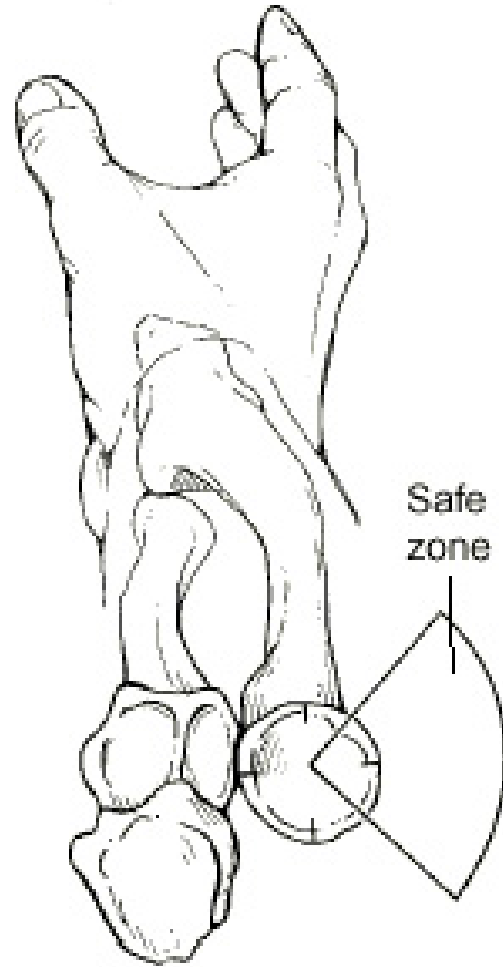




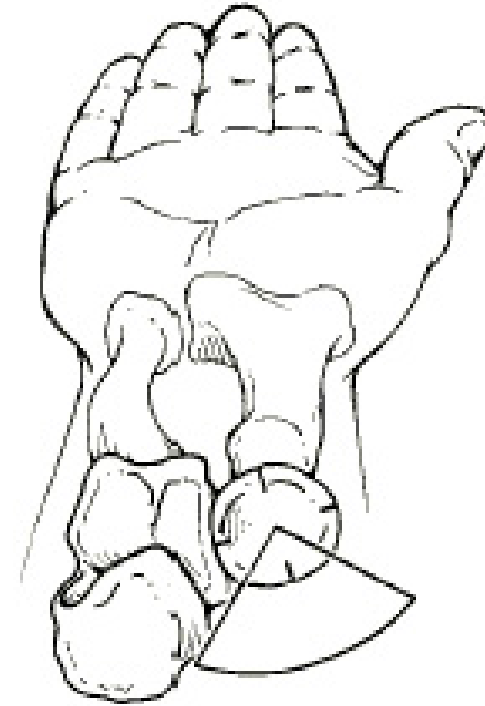




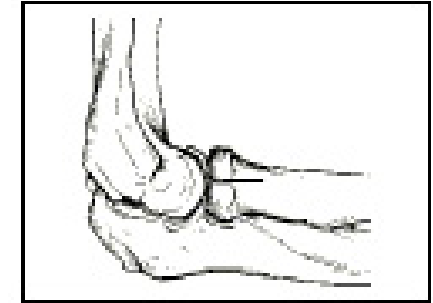
Safe Zone



Neutral



Supination



Pronation

Hotchkiss RN.

J Am Acad Orthop Surg. 1997 Jan;5(1):1-10.

**X-ray tip:
partially
close for
final
flouro
shots**





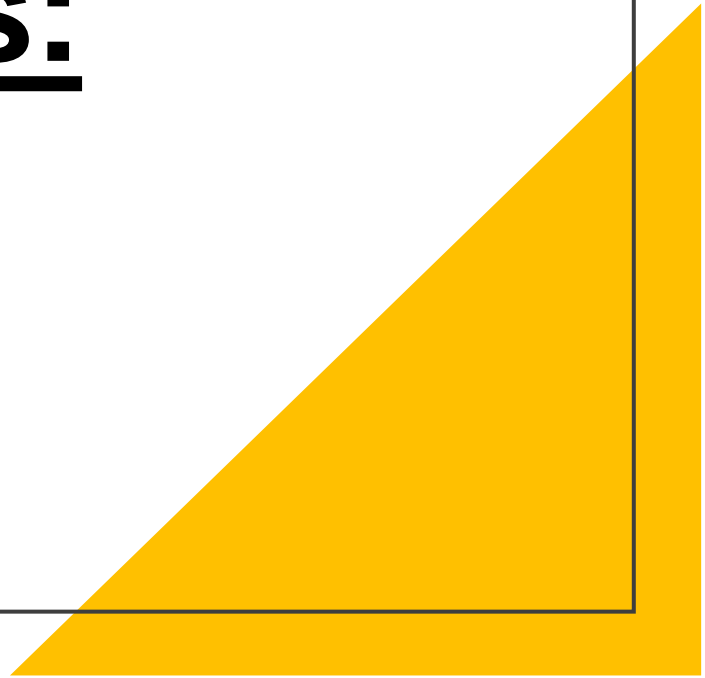


Post op-ORIF

- Early ROM
- POD #1
- PT prescription on D/C
- Dynamic Splint if slow to progress
- Edema Glove



Spectrum of Fractures:
More Comminuted





Injury

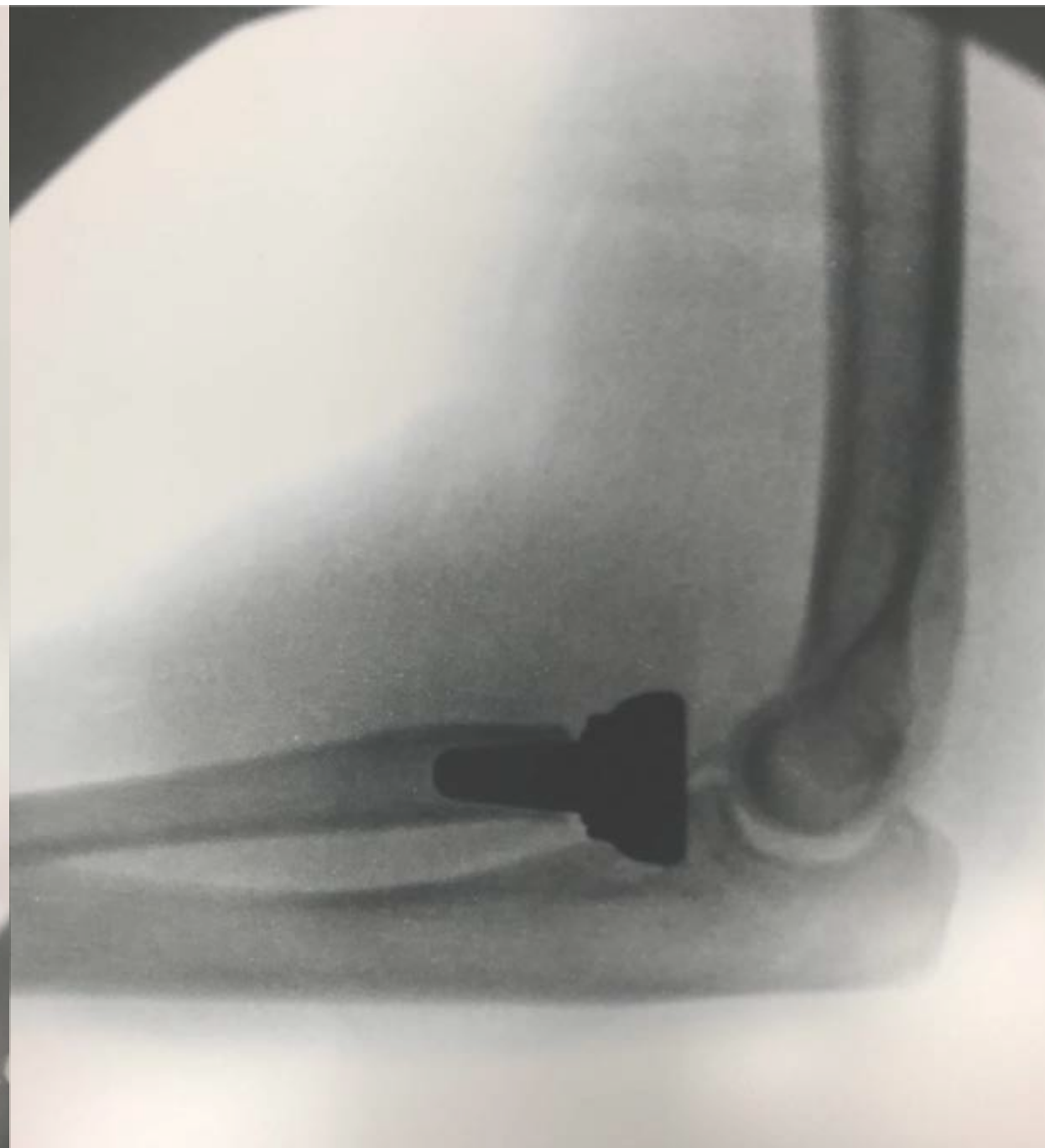






**Remember
the Basics!**





Complications

Improperly placed hardware

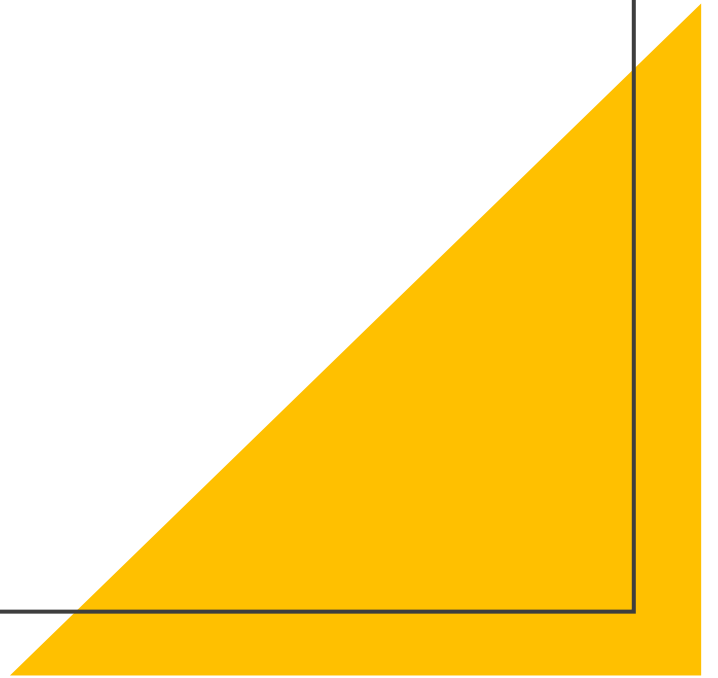
Loss of fixation

PIN injury

Elbow stiffness

HO

Terrible Triad



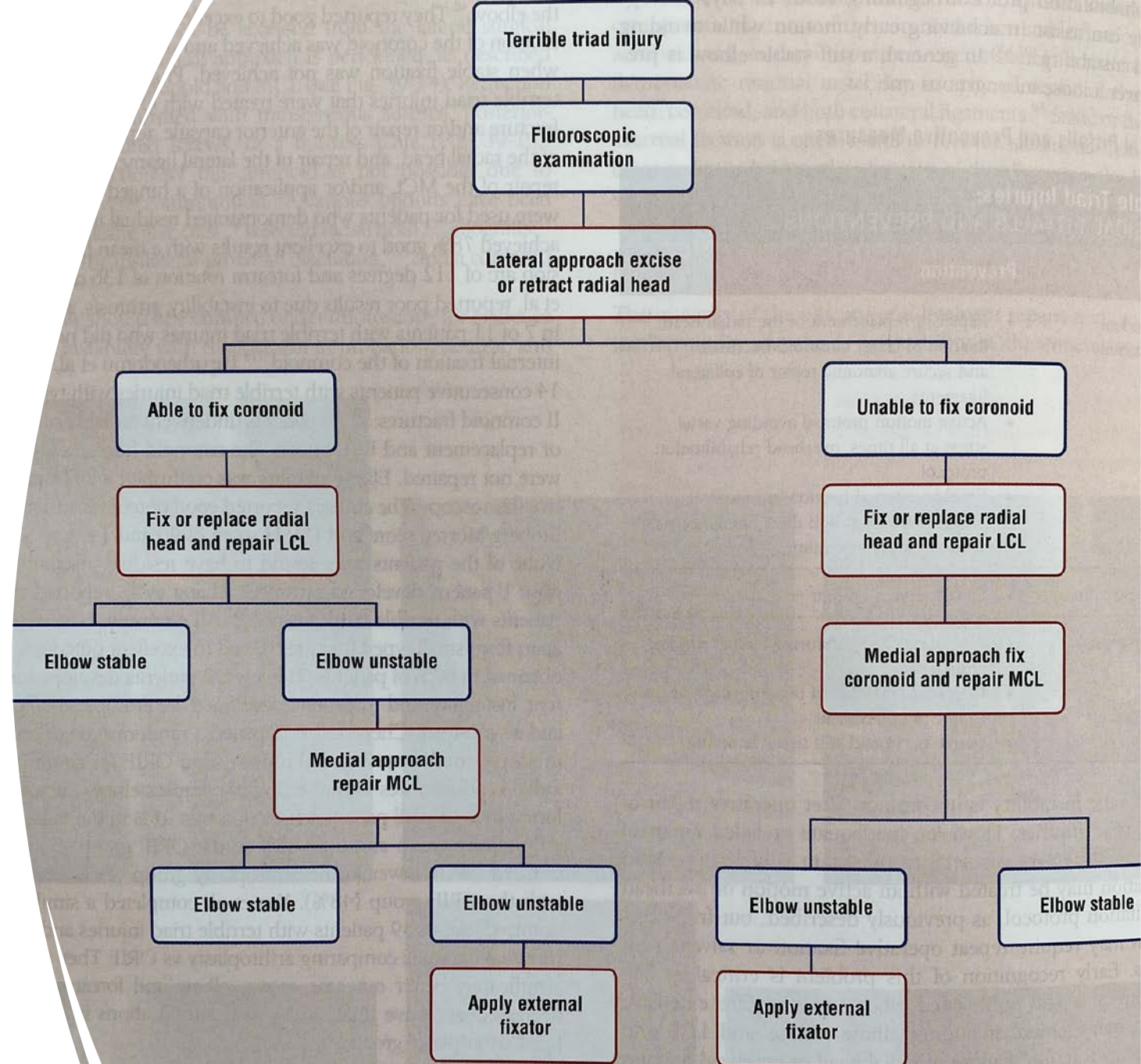


What is it?

- **Posterior dislocation**
- **Radial head fracture**
- **Coronoid fracture**

Decision making

- King G, Beingessener D, Pollock J. Chapter 39. In: Tornetta P, Ricci WM, eds. *Rockwood and Green's Fractures in Adults, 9e.*



Algorithm 39-3. Author's preferred treatment for terrible triad injuries.

POSTERIOR DISLOCATION OF THE ELBOW WITH FRACTURES OF THE RADIAL HEAD AND CORONOID

BY DAVID RING, MD, JESSE B. JUPITER, MD, AND JEFFREY ZILBERFARB, MD

- **11 patients with terrible triad**
- **Anterior capsule attached to fragment**
- **7 re-dislocated in splint or cast**
- **5 re-dislocated after surgery**
- **Radial head resection rather than replacement or ORIF**
- **Didn't repair the coronoid or the LCL then**
- **Only 4 patients with satisfactory results**

Standard Surgical Protocol to Treat Elbow Dislocations with Radial Head and Coronoid Fractures

Surgical Technique

By MICHAEL D. MCKEE, MD, FRCS(C), DAVID M.W. PUGH, MD, FRCS(C), LISA M. WILD, BScN,
EMIL H. SCHEMITSCH, MD, FRCS(C), AND GRAHAM J.W. KING, MD, MSc, FRCS(C)

- **36 Patients**
- **Standard surgical protocol**
 - **Routine fixation of coronoid**
 - **Routine fixation/replace radial head**
 - **Routine reattachment of LCL**
- **One subluxation**

Post Op Routine



- **Avoid varus stress (shoulder abduction) for 3-4 weeks.**
- **Active, active-assisted elbow flexion and extension and forearm rotation are the key. Patients do the exercises**
- **Realistic expectations including “it hurts”**

Summary

- **Thorough evaluation so as not to miss associated injuries**
- **Surgical options**
- **Proper technique**
 - **Plate placement**
 - **Radial head arthroplasty**
- **Post op regimen crucial for success**





Thank You!

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