

Olecranon Fractures



Trauma 101
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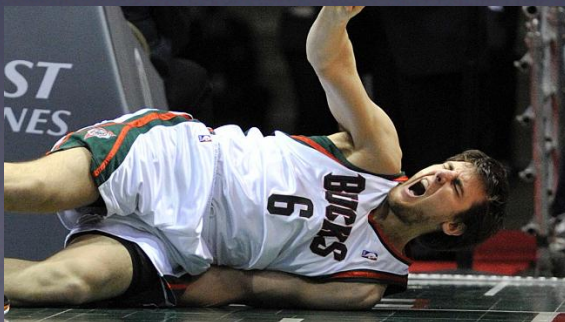
I have no potential conflicts with this presentation

My disclosures –Editorial board JOT and JBJS Am;
Reviewer JBJS, JOT, JAAOS; Consultant for Zimmer,
Radius; ABOS Oral Board Examiner; Chairman of
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Mechanism of Injury

- Acute Tension overload: Tension applied by the triceps with flexion of the elbow.
- Direct Trauma
- Chronic overload: stress fracture, osteopenia, pediatric injuries.



Evaluation

- Check integrity of skin
- Check extension of elbow
- Evaluate neurovascular status, especially ulnar nerve
- X-rays in three views (AP, Lateral, Oblique: -shows radial head in profile)

Imaging



AP View



Lateral View



Oblique View
(sometimes helpful,
good for Radial Head)

Classification

Numerous
classifications:

Colton

Morrey

Schatzker

AO/ASIF

OTA

Criteria

Displacement

Direction of fracture

Degree of
comminution

Percent involvement

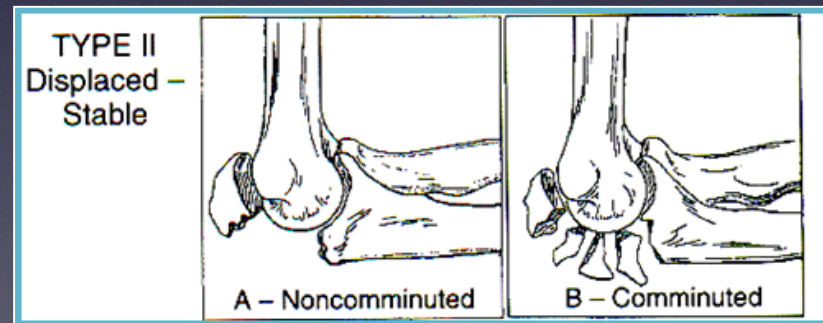
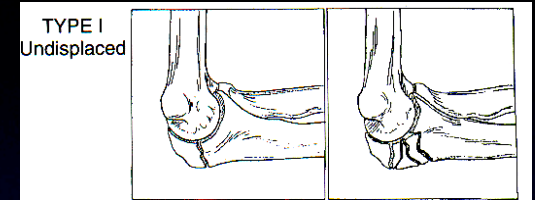
Associated injuries

Mayo Clinic Classification

- Type I: Nondisplaced 12%
- Type II: Displaced/ elbow stable 82%
- Type III: Elbow unstable 6%
- Both types II and III subdivided into:

–A: *noncomminuted*

–B: *comminuted*



Treatment Objectives

- Restoration of the articular surface.
- Restoration and preservation of the elbow extensor mechanism.
- Restoration of elbow motion and prevention of stiffness
 - Goal is to begin early ROM
- Prevention of complications.

Treatment Methods

- Nonoperative
 - **Renewed interest (especially elderly)**
 - Non-displaced with intact elbow extension
- Operative
 - **Open reduction and internal fixation**
 - **Tension band** wire with pins or intramedullary screws
 - Plate
 - Excision of olecranon and triceps repair
 - Comminuted, unreconstructable fractures
 - Elderly patients

Nonoperative Treatment

- Nondisplaced fractures (age dependent!)
- Long arm cast - complicated by stiffness
- Long-arm splint for 7-10 days followed by functional bracing for 4-6 weeks
 - complicated by loss of reduction
 - Goal to start motion! Less about displacement!

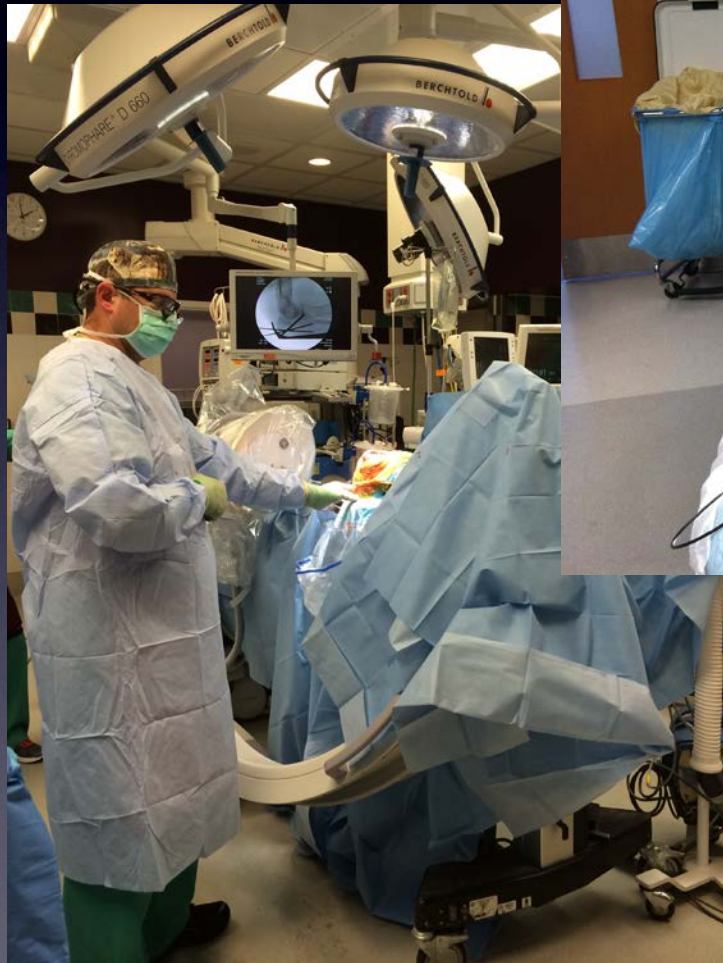
Indications for Surgery

- Disruption of extensor mechanism
 - Unable to actively extend elbow
- Articular incongruity
 - Any displaced fracture

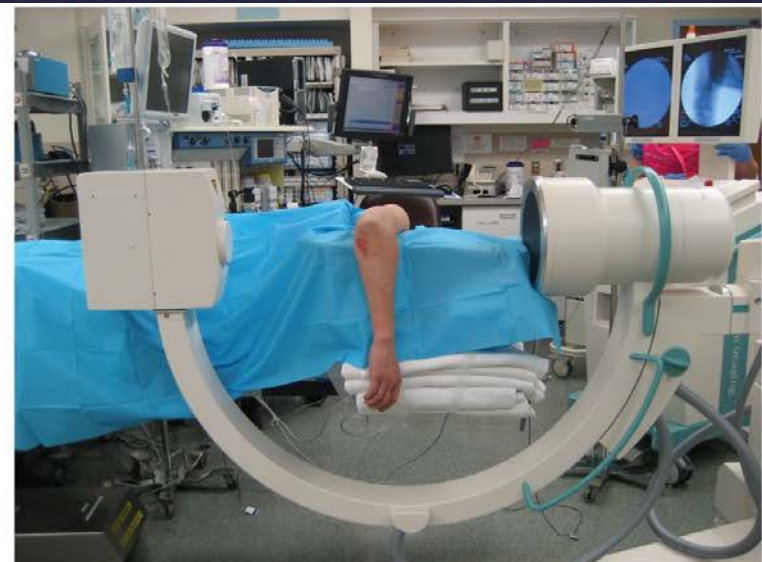
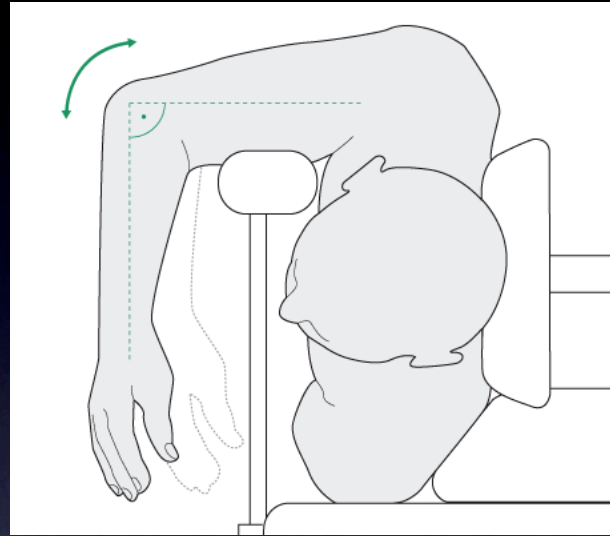
Patient Positioning – Which One?

- Supine
- Prone
- Lateral

Supine With Imaging



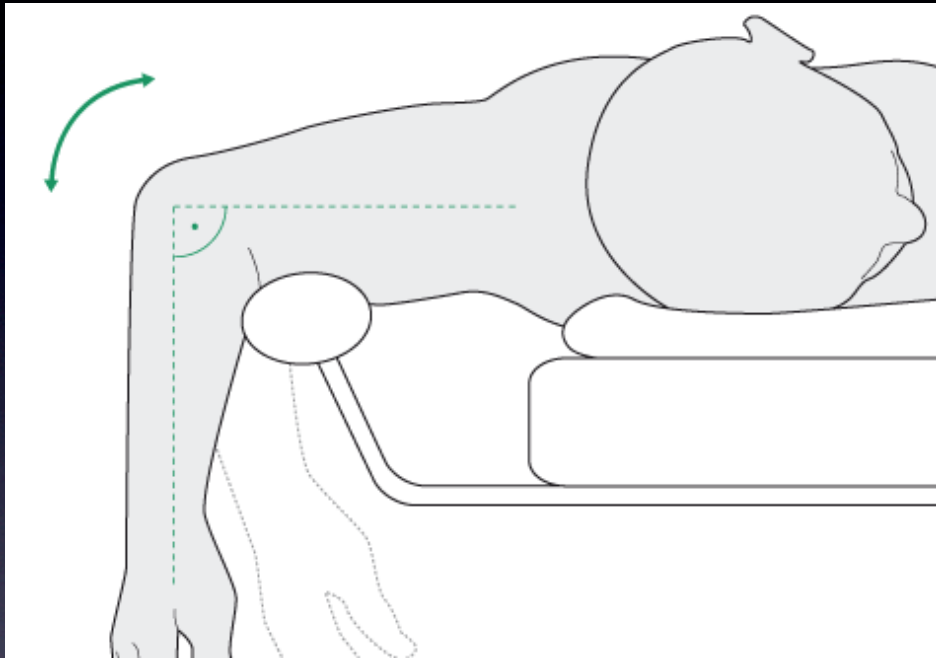
Lateral



Prone Position



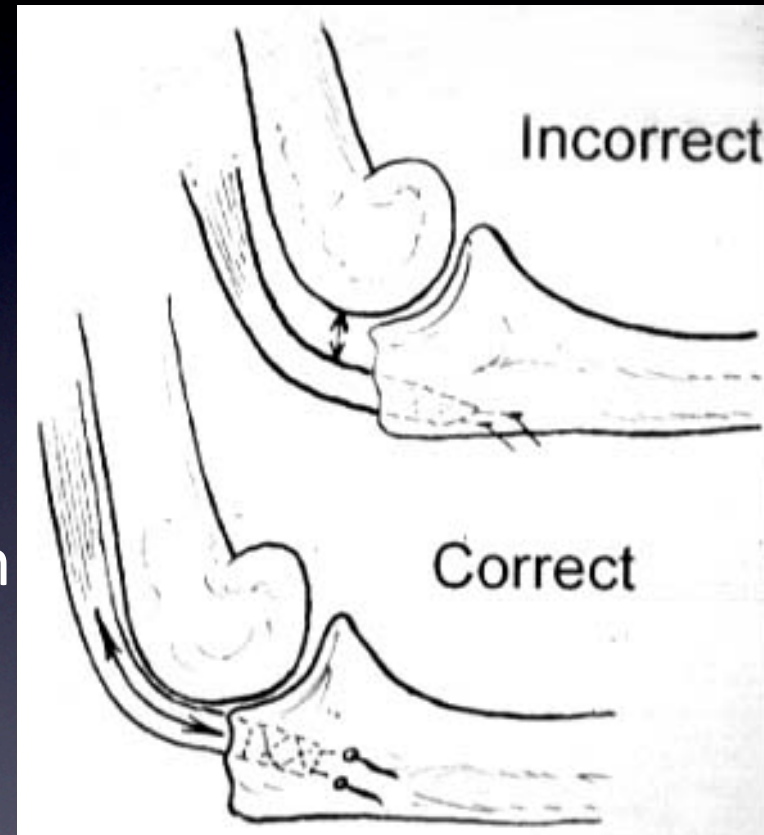
Prone Positioning



Note flexion may be limited here versus lateral

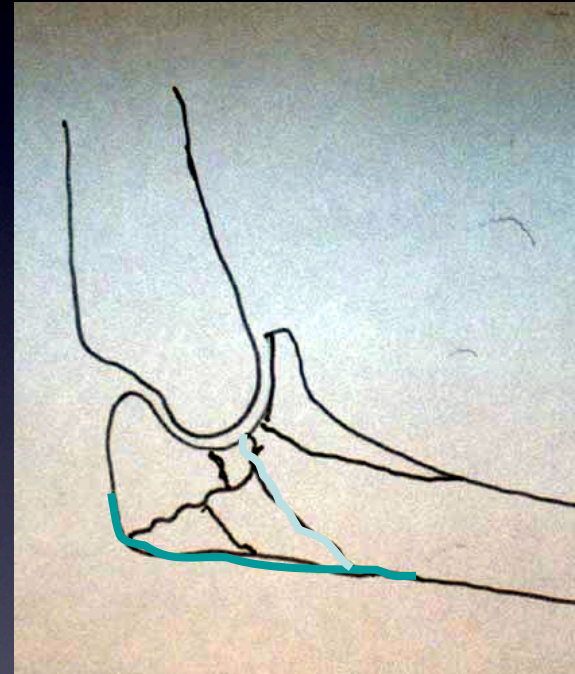
Olecranon Excision

- **Elderly patients**
 - those with osteoporosis
 - involving <50% of joint
- Re-attach triceps anteriorly
 - At joint surface
- No difference in isometric strength but fewer complications in the excision group



ORIF: Surgical Technique

- Evaluate comminution of dorsal cortex
 - If intact: tension band wire appropriate
 - If comminuted, plate appropriate
- Evaluate orientation of fracture line
 - Transverse: tension band wire
 - Oblique, complex → plate



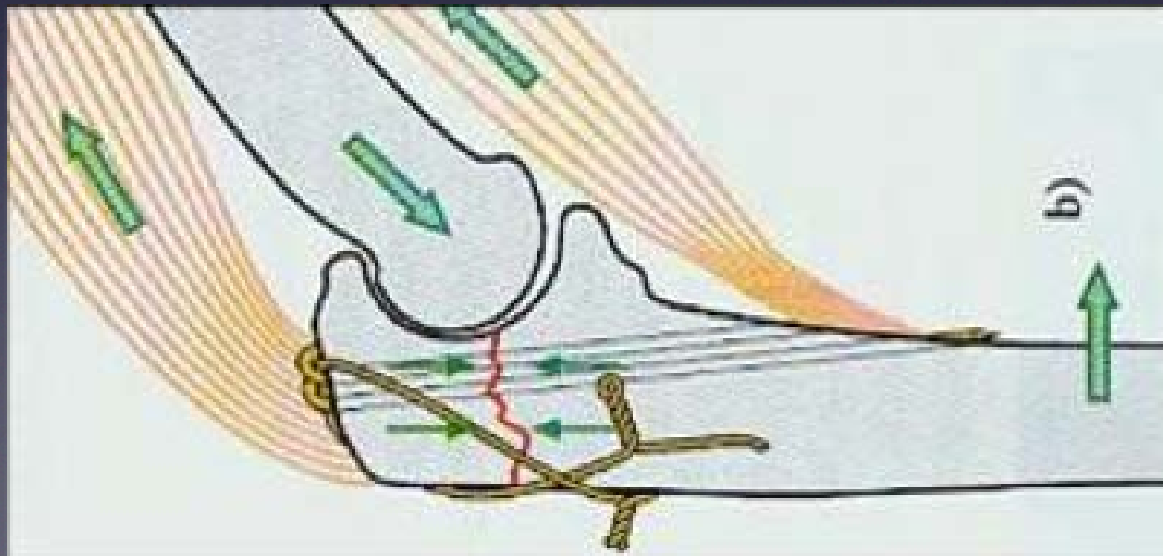
*Tension band: prerequisites for use:

Fractured bone must be eccentrically loaded

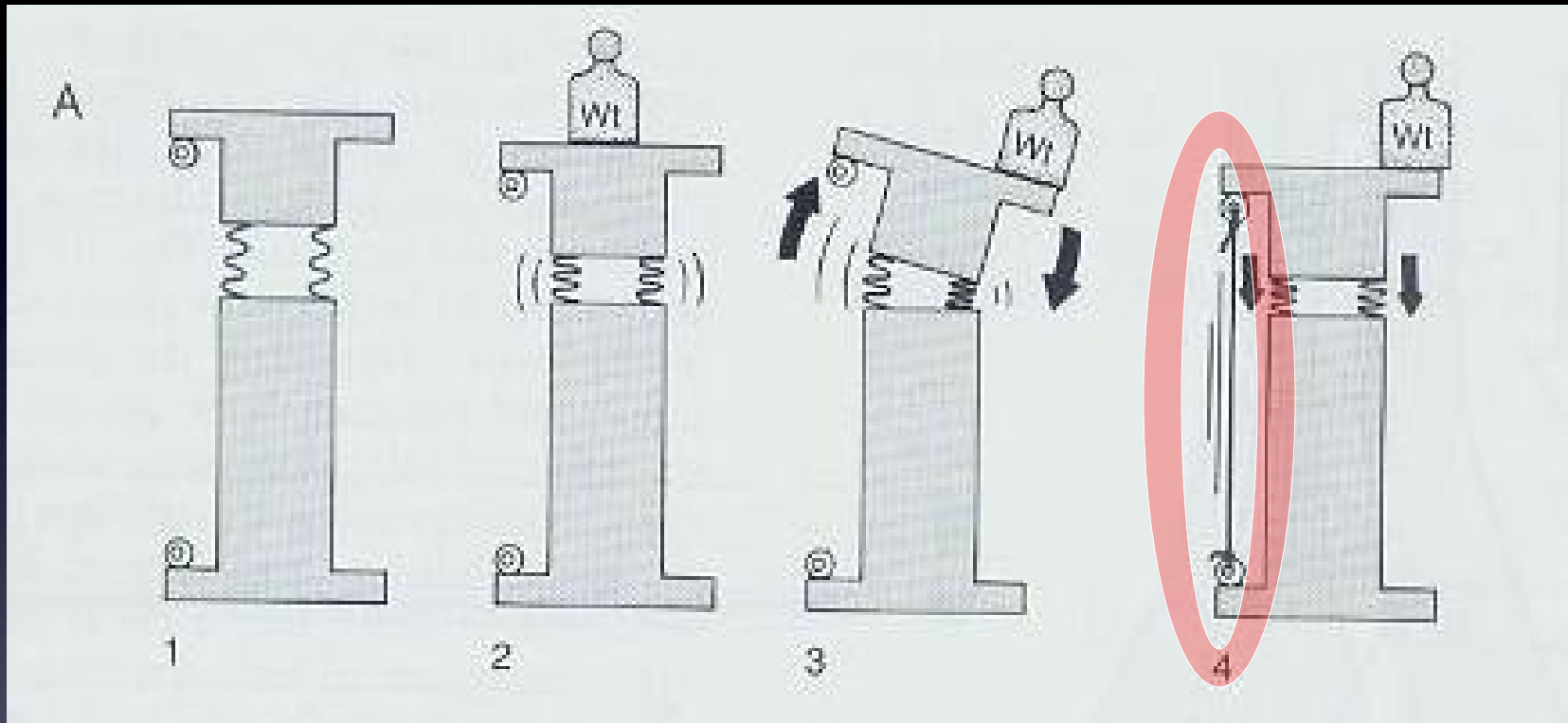
Implant must be on tension side

Bone must be able to withstand the compressive forces (comminution bad)

Far cortex must be intact

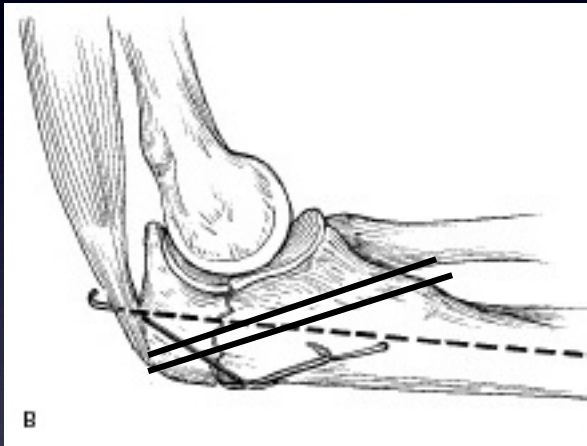


Tension band principles



The tension band converts the distracting force into a compressive force

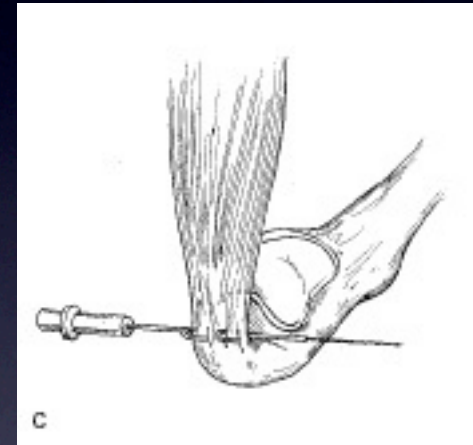
Tension Band Wire



Reduce fracture

-hold with tenaculum

Place K-wires across
fracture -engage
anterior cortex



Pass Tension wire
deep to tendon with
angiocath – two knots
over dorsal cortex

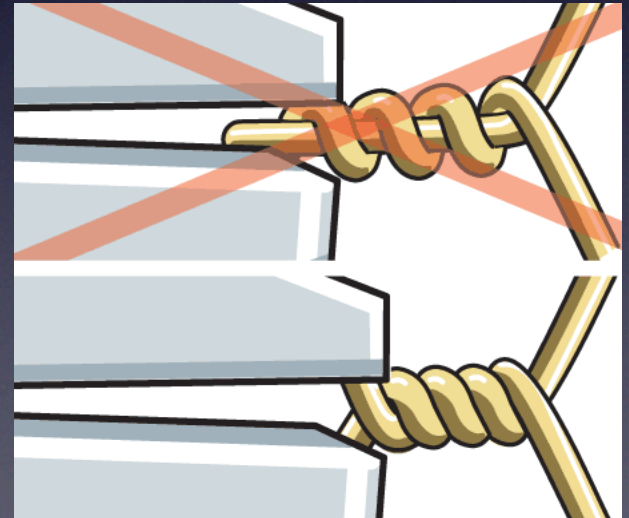
Olecranon fractures: pearls for tension band use

Pull and twist to properly coil and tension

Drill hole for tension band bicortical

Less likely to fracture out

Tension band as close to bone tendon interface as possible, under triceps



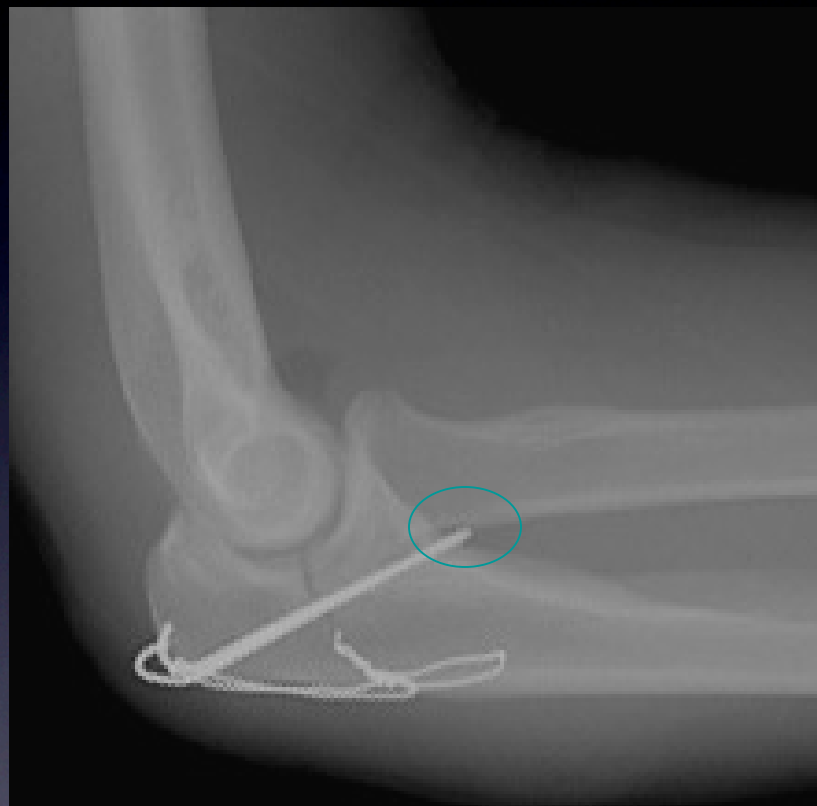
Simple Olecranon fractures



****Tension band wire as close to bone tendon interface as possible

Case Example - Transverse Fracture





Engage anterior cortex

Intramedullary Screw ?

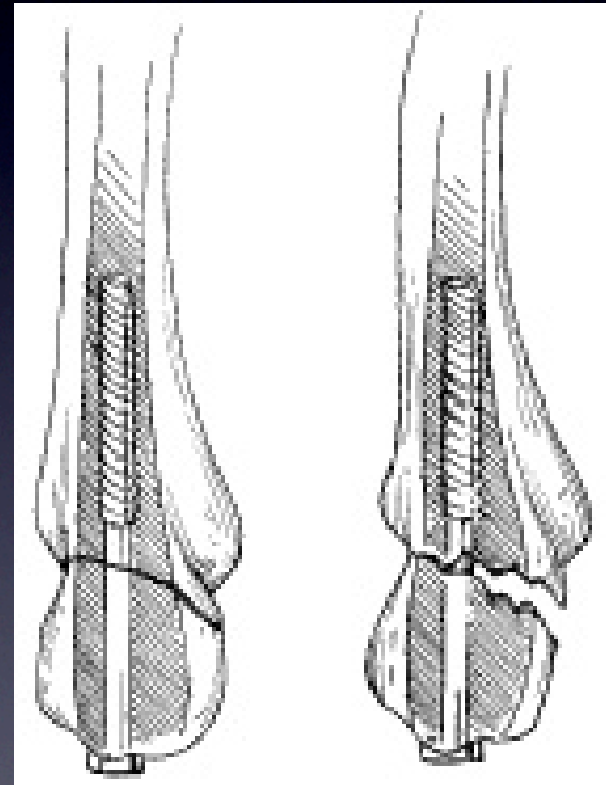
- Need to add tension band wire
- Long/large screw required
 - 6.5mm cancellous
 - 85-110 mm long



Beware of Mal-reduction!

Anatomy of the Proximal Ulna

- Beware of the bow of the proximal ulna, which may cause a medial shift of the tip of the olecranon if a long screw is used.



From Hak and Golladay, JAAOS, 8:266-75, 2000

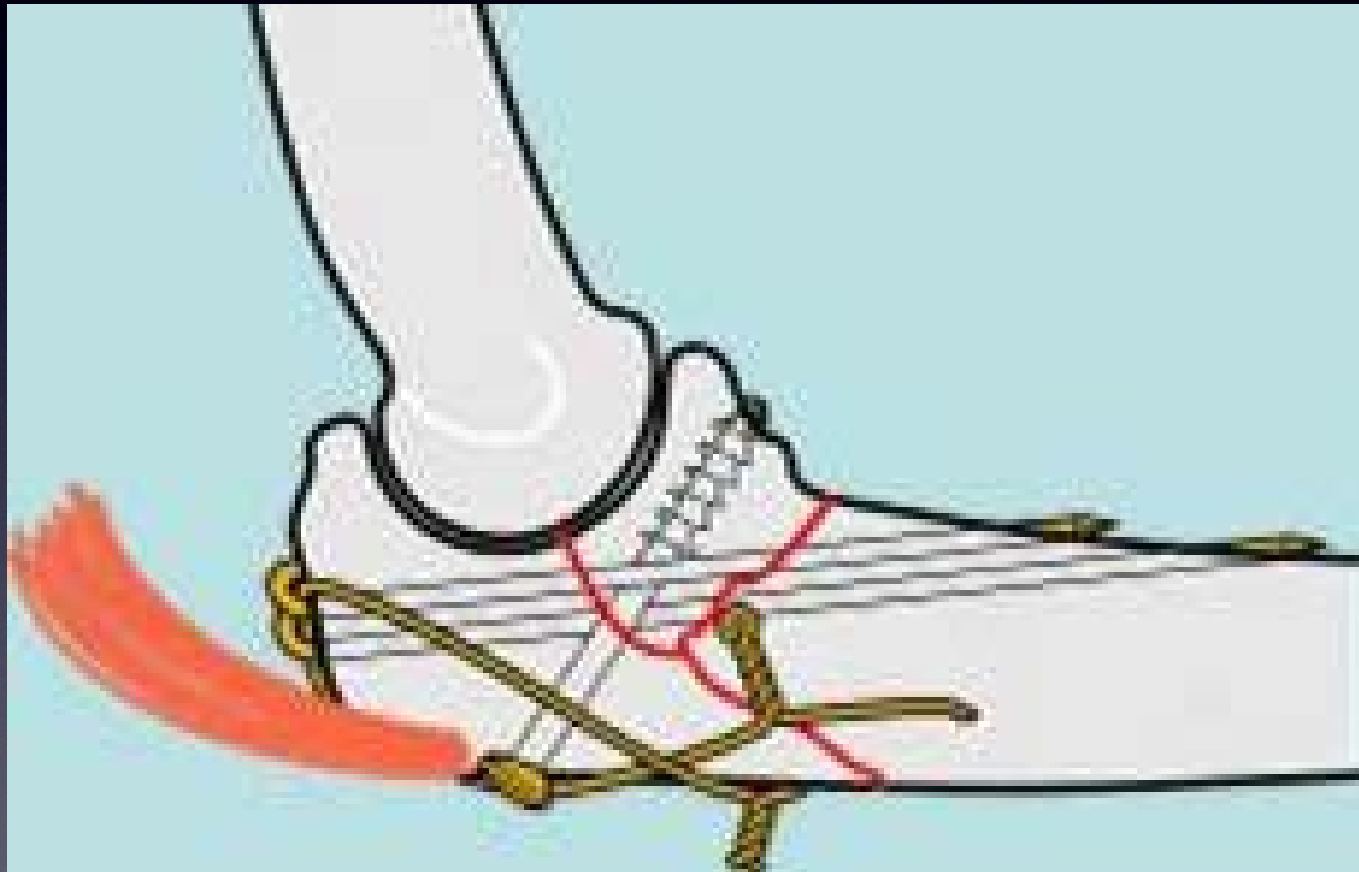
JTC 2010



Complex Olecranon fractures

Some examples and solutions....

Conversion of a complex pattern into a simple pattern – then tension band



Joint depression: elevate, graft, and mini fixation prior to tension band



Plate Fixation

- Use for comminuted fractures, fractures with shaft extension, or oblique fracture line:
 - DCP
 - Plates designed for proximal Ulna
- Screw placement crucial for stability



Tension side comminuted: use of a plate to maintain reduction, resisting tension by restoring an intact tension side “cortex”



Complex Olecranon Fracture

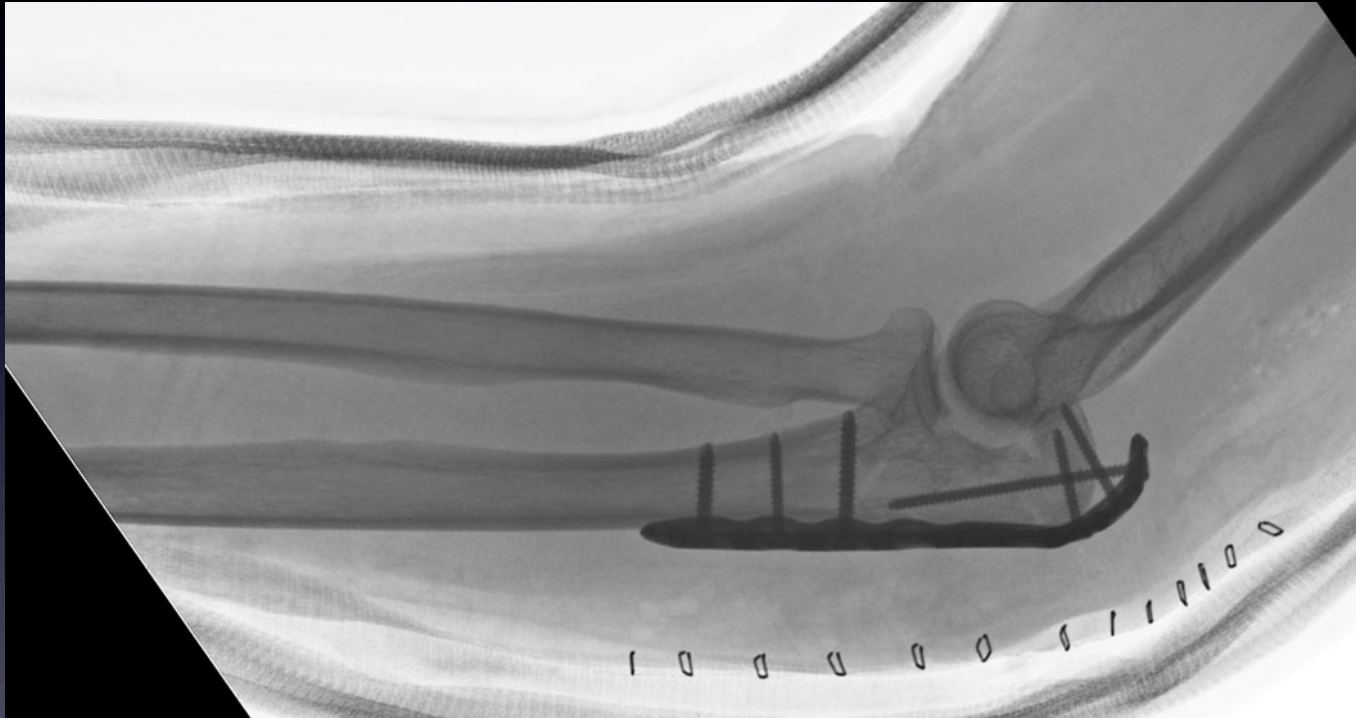


As fracture becomes more distal and oblique- *more amenable to plate fixation*

Plate Fixation

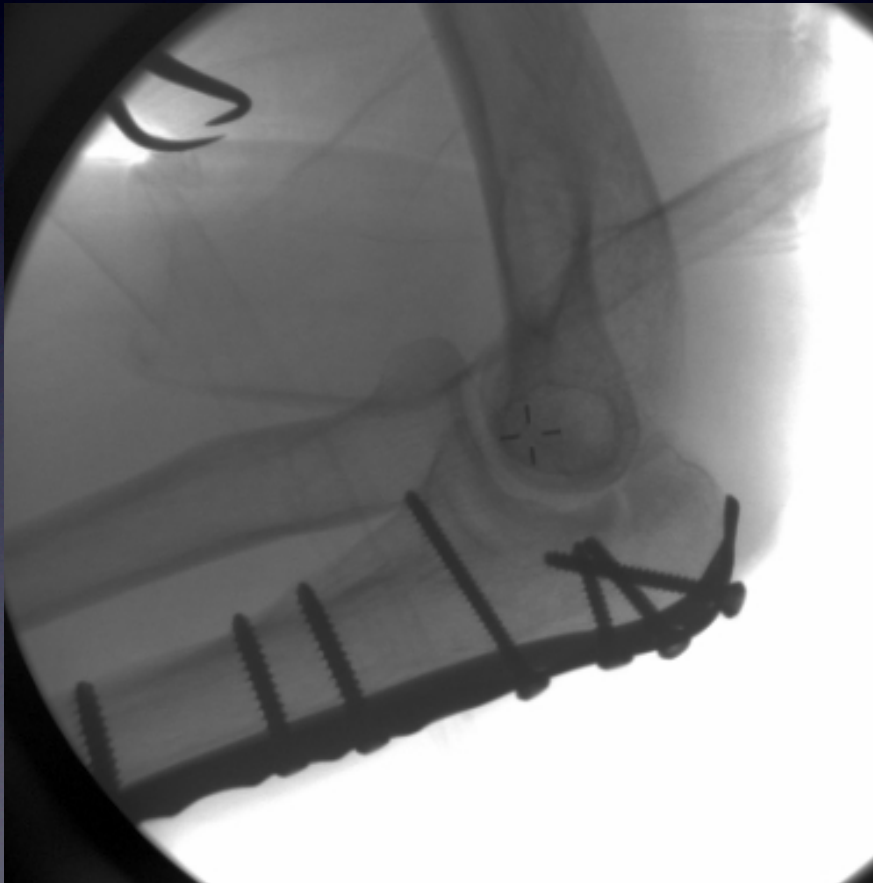


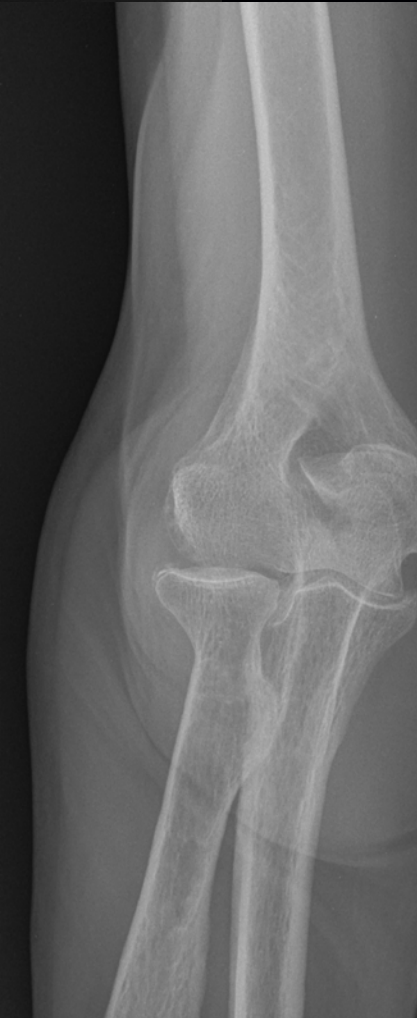
Locking plate fixation may also be used



Olecranon Fractures

- Peri-plate locking?
- What is the problem with this fixation?





12 weeks post-op



Summary of goals

Restore articular congruity

Achieve absolute stability

Allow early motion

Summary of treatment

- Convert complex patterns to simple patterns whenever possible
- Excision and tendon repair for unreconstructable fragments
- Elderly low demand closed tx with early motion

Thank you