

Distal Humerus Fractures



Johan Scheer
AO Advanced
Principles 2018

Non-op treatment (sling, cast, traction)

Historically:

1. **Malunion:** Poor ROM ($\approx 50^\circ$)
2. **Non-union:** Painful (20-30%)



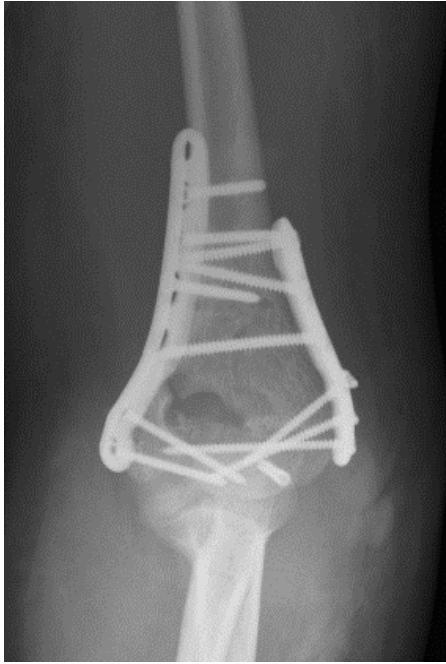
Watson-Jones 1960
Miller 1964
Zagorski 1986
Aitken 2015

Woman 28 years

Fall, closed injury

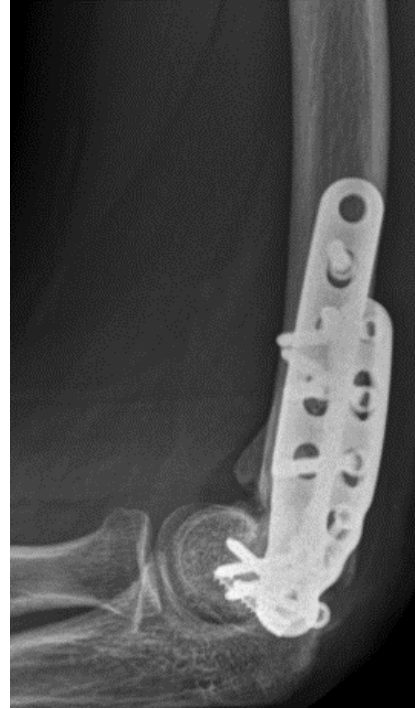


Own production 2007



6 months later

ROM 50-90°



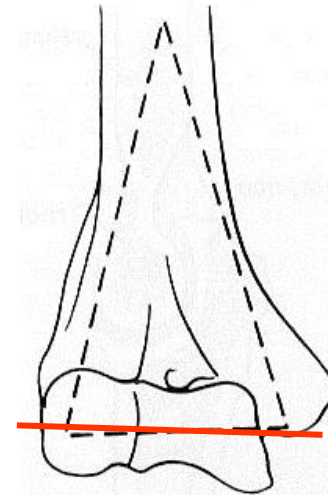
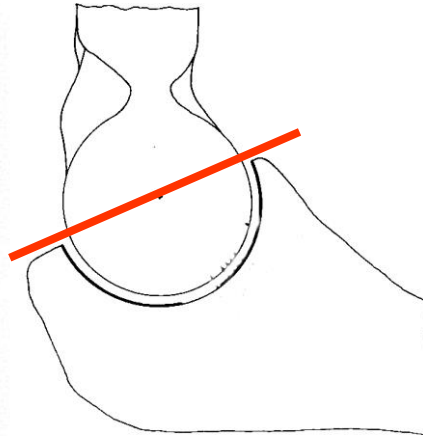
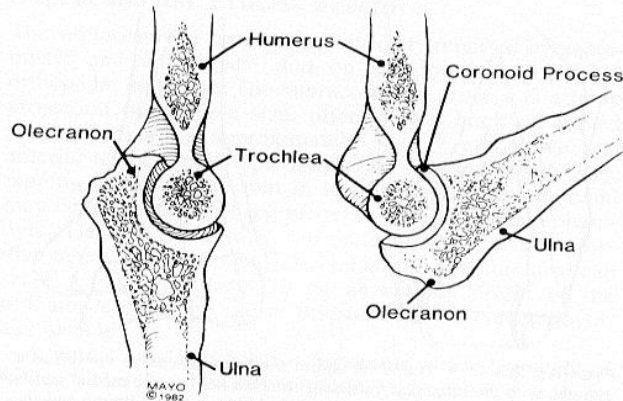
Who's doing the surgery and when?

- Incidence 6/100000/year
- Difficult surgery

- Centralised locally to experienced surgeon
- Daytime surgery

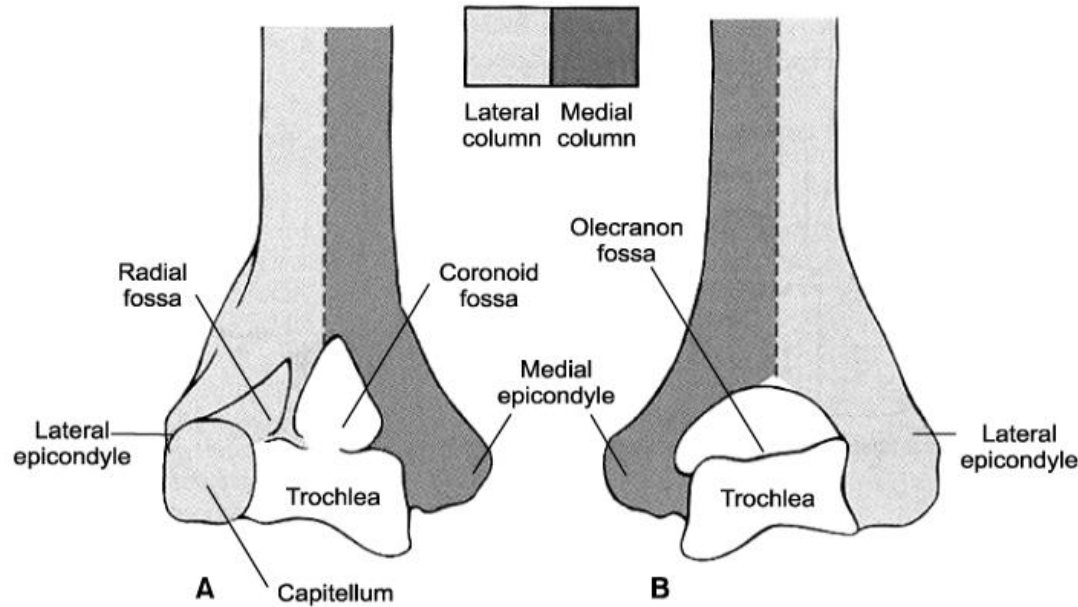
The hinge joint

- Olecranon embraces trochlea 180°
- **Functional ROM 30-130°**

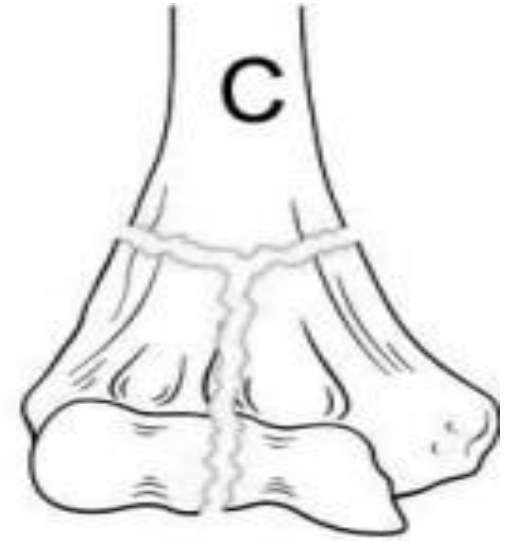
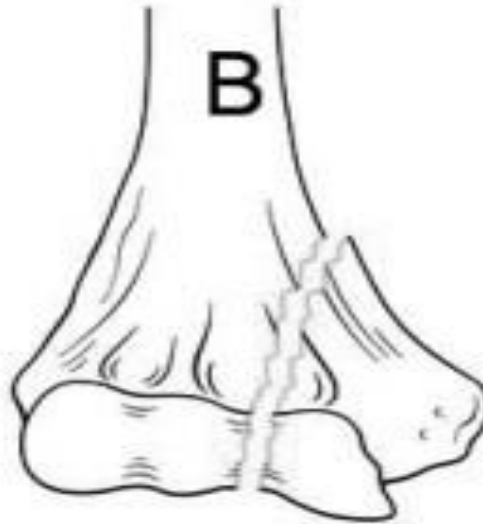
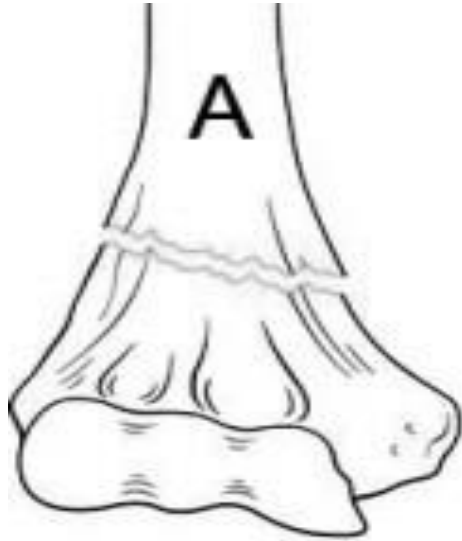


Bony anatomy

One foundation – two pillars



Classification distal humerus fractures



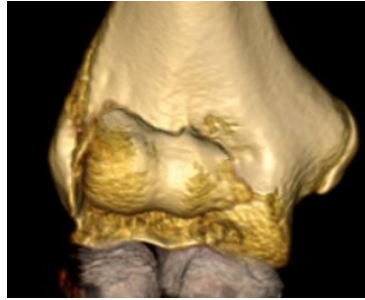
Classification dictates approach and principles of fixation

A



- Posterior approach
- **Triceps on**
- Double plating

B



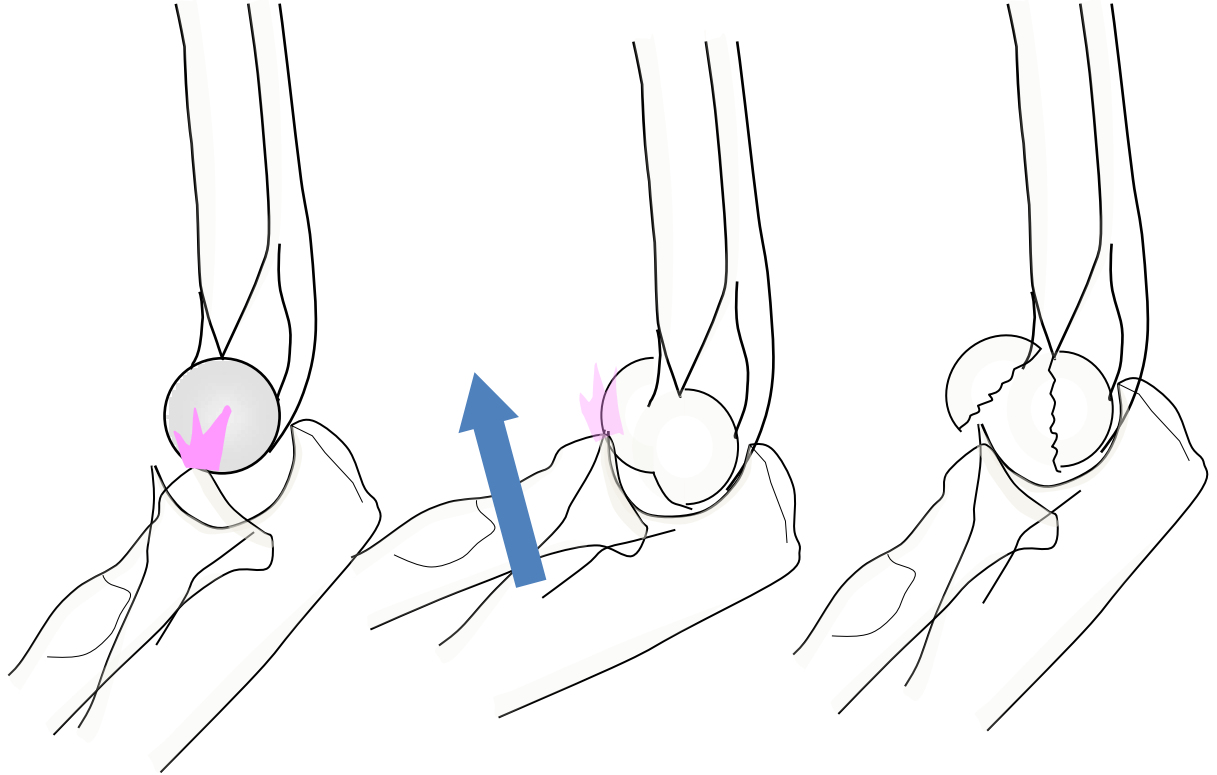
- Lateral/extensive approaches
- Screws only or single plates

C

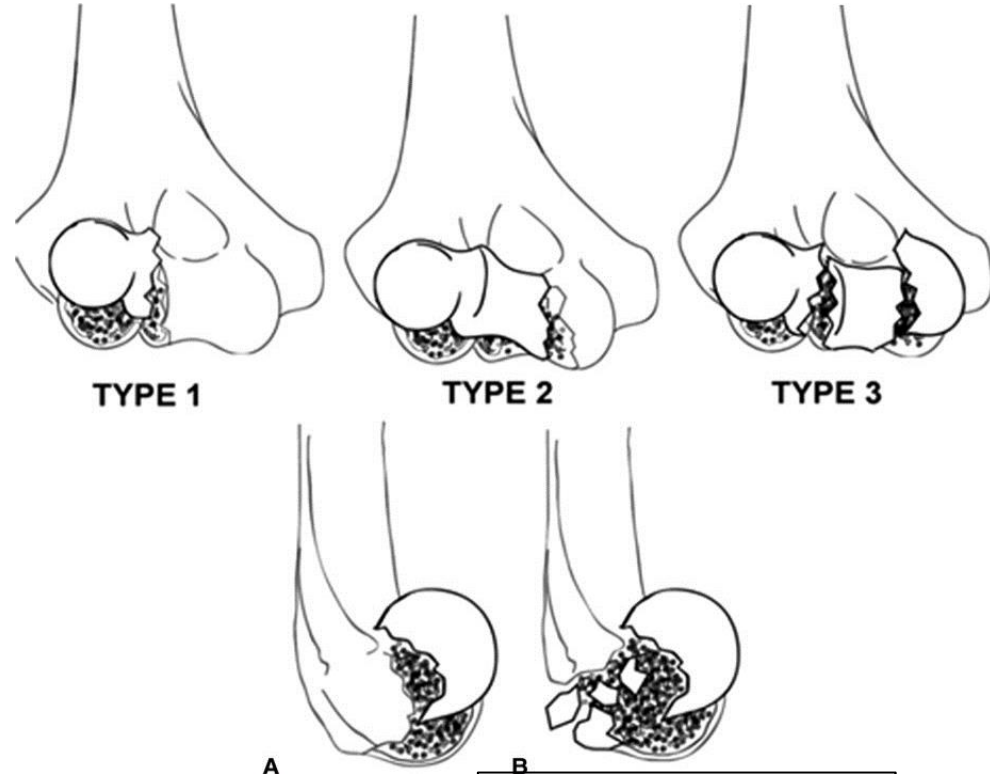


- Posterior approach
- **Triceps "off"/chevron**
- Double plates/Elbow arthroplasty

Coronal shear



Dubberly Classification



- A. Without posterior comminution
- B. With posterior comminution

[Dubberly JBJS 2006]

Fixation – coronal shear

Dubberly type A

- Headless screws from **anterior to posterior**

[Elkowitz et al 2002]



Dubberly type B

- Posterior plate and screws
- Elbow arthroplasty >65 years?



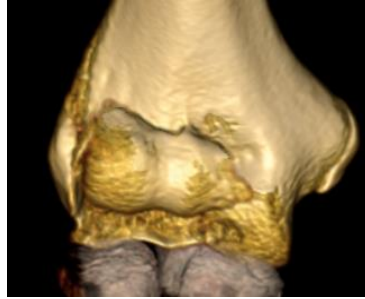
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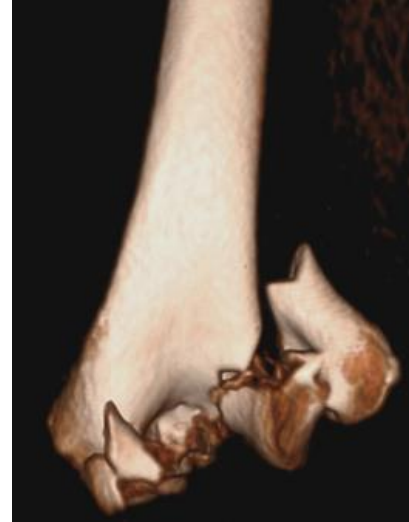
C



- Posterior approach
- **Triceps "off"/chevron**
- Double plates/Elbow arthroplasty

Is the fracture fixable?

- 70 female
- Trochlea in 6 fragments



Elbow arthroplasty - Non fixable fractures

Linked total elbow

- Efficient in a PRT
[McKee 2009]



Hemiarthroplasty

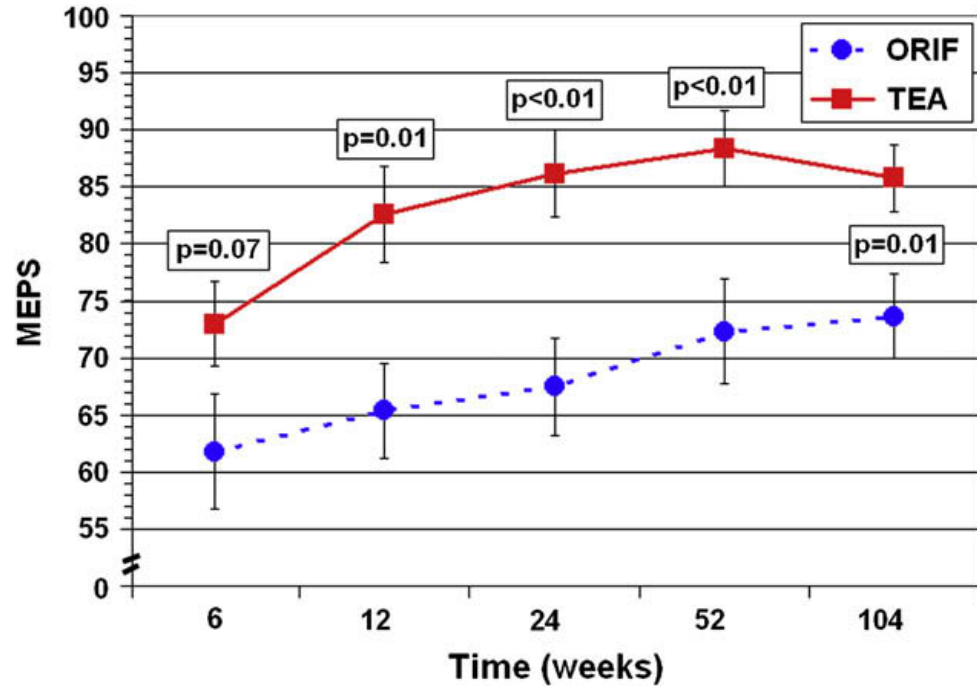
- New concept *[Nestorson 2015]*
- Requires collateral ligament attachment



McKee et al

ORIF vs TEA

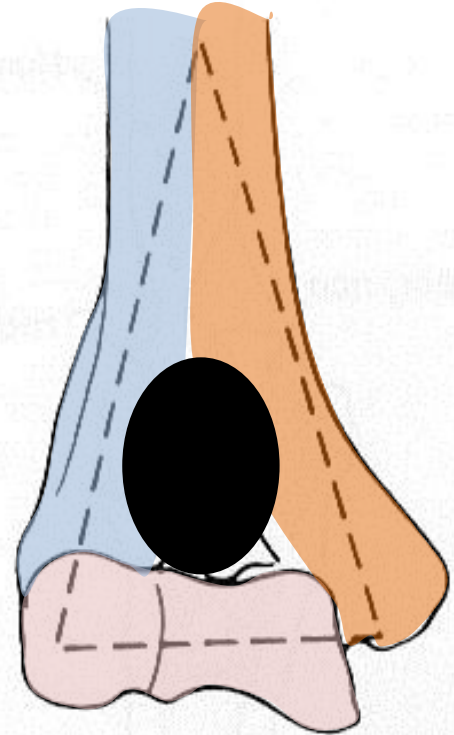
- 40 pats
- Mean age 77
- MEPS=Mayo Elbow Performance Score



A and C fractures ORIF

Surgical goals

1. Anatomical reduction and absolute stability
2. One plate on each pillar
3. Compression ORIF in the pillars
4. Stable fixation between pillars and joint block

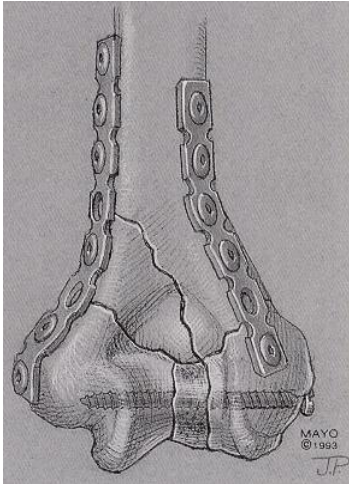


Principles of ORIF

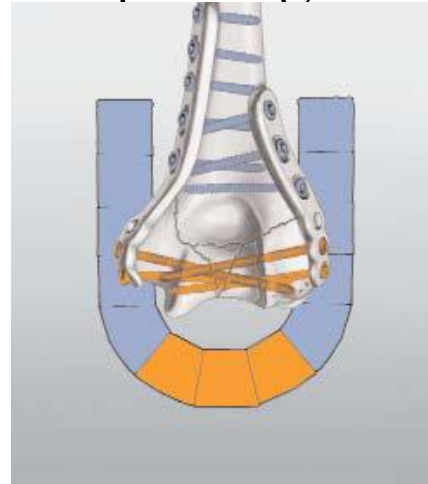
AO

Mayo

- 1-2 screws in trochlea
- Orthogonal plates

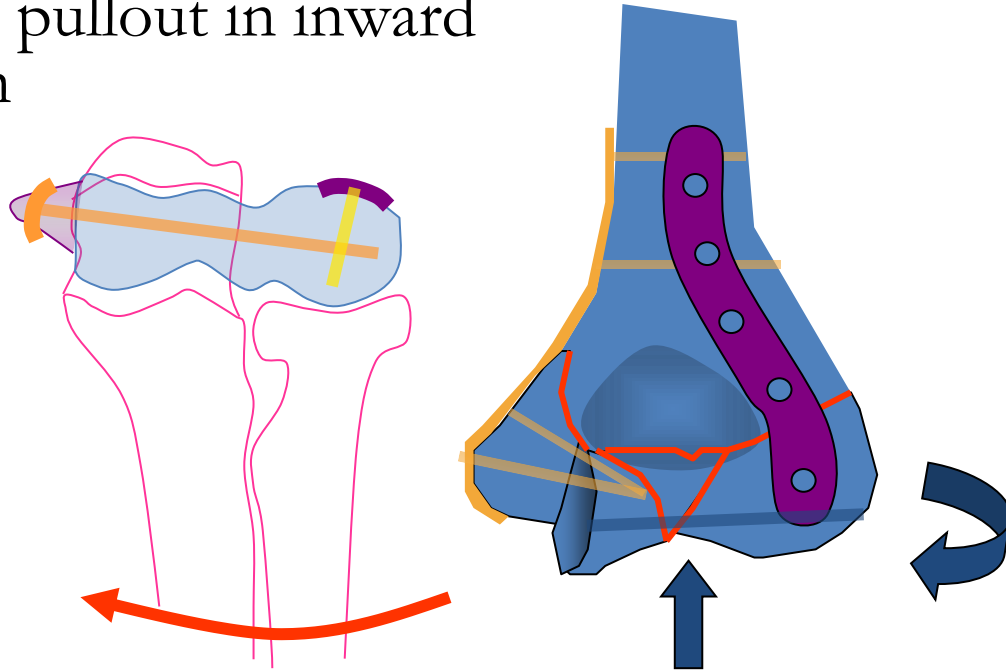


- Parallel plating (160 deg)
- All distal screws through a plate passing the fracture

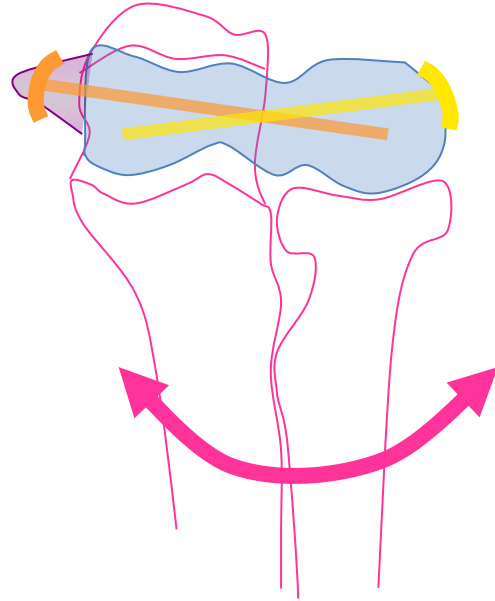
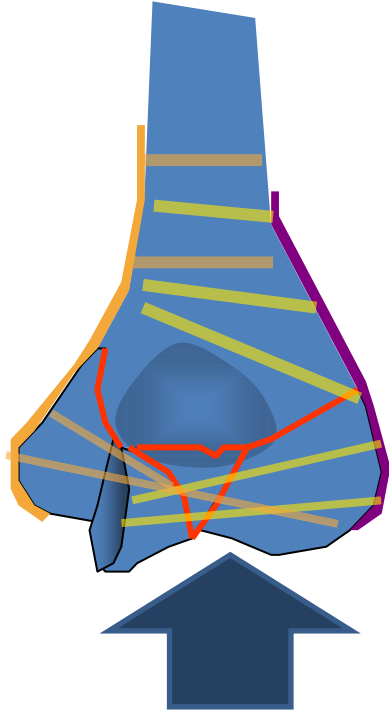


AO

- Few screws in the distal fragment
- Risk of pullout in inward rotation



Mayo

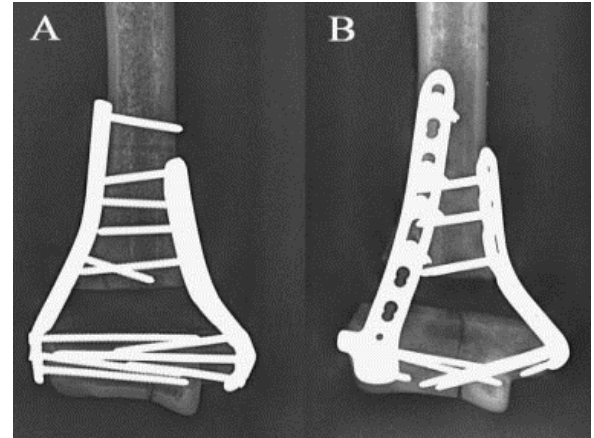


Comparison AO – Mayo

1. Biomechanical studies [*Vennettilli JHS 2012*]
 - Eight studies: 6/8 favour parallel plating
2. One clinical randomised study [*Shin JSES 2010*]:
 - 2/17 Orthogonal failed laterally
 - 0/18 Parallel failed

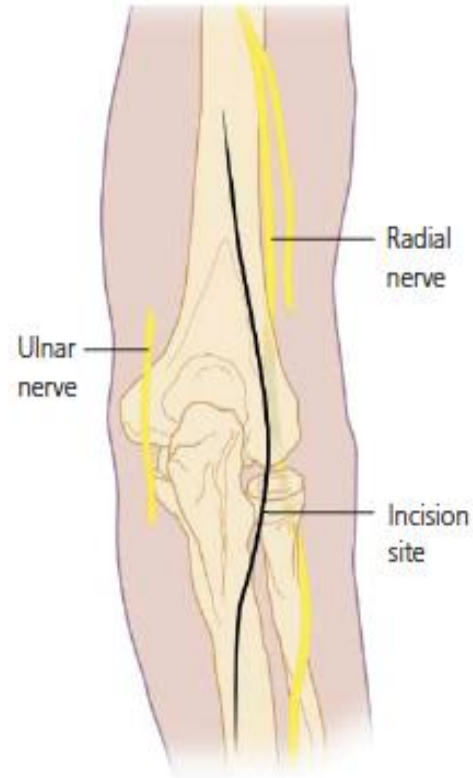
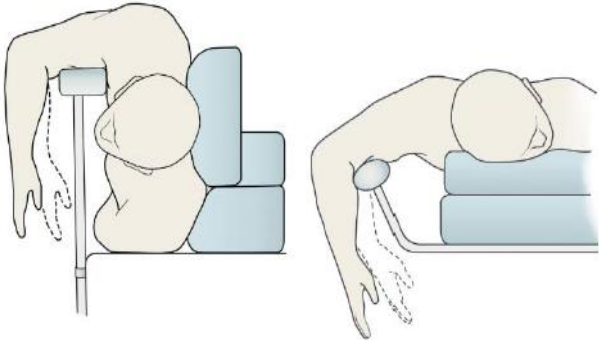
Conclusion:

Parallel plating seems safer in osteoporotic bone

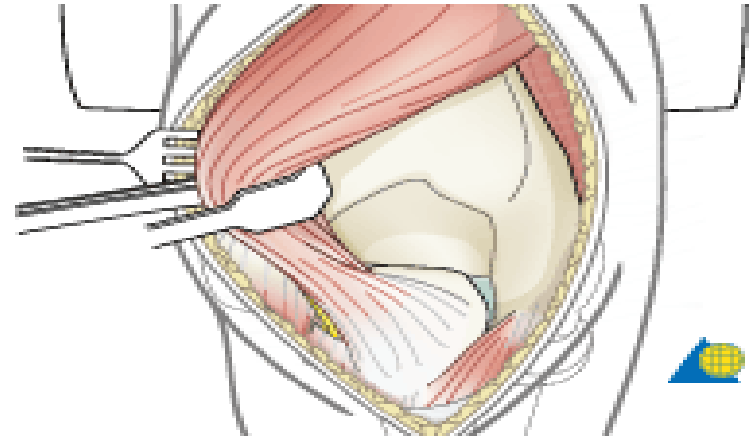
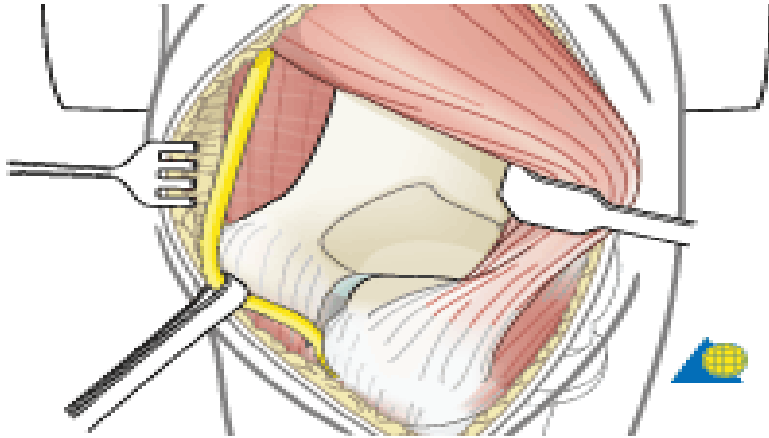


Approach A- and C-injuries

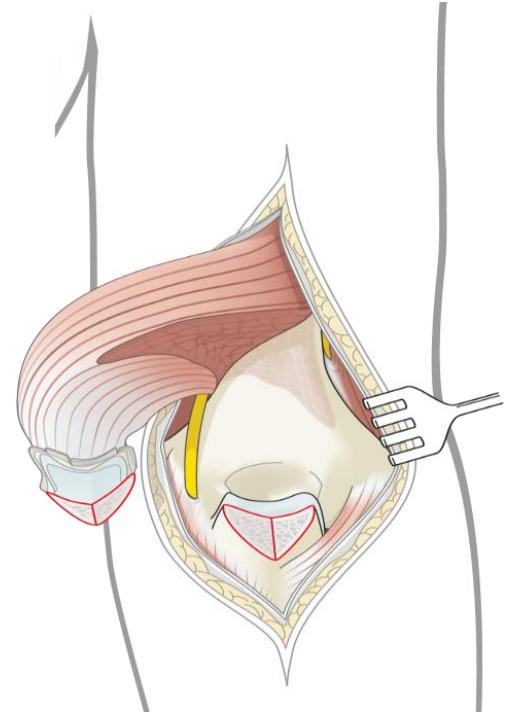
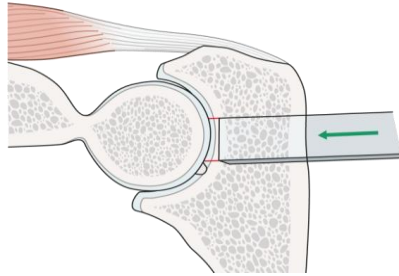
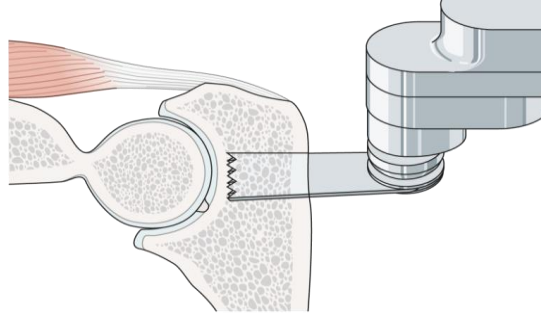
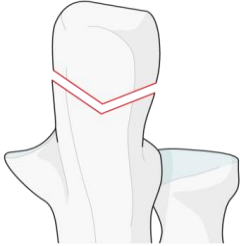
- Handling of triceps
 - A. Triceps on
 - C. Osteotomy (chevron) or triceps off



Triceps on – A-type fractures



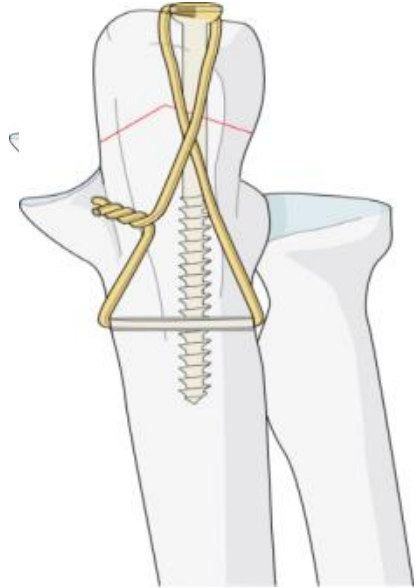
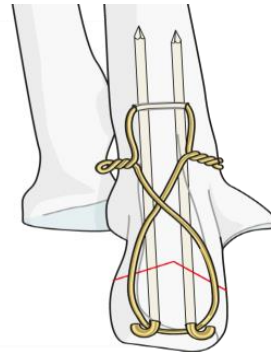
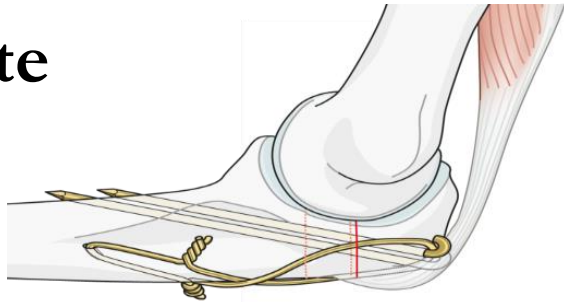
Osetotomy – C-injuries



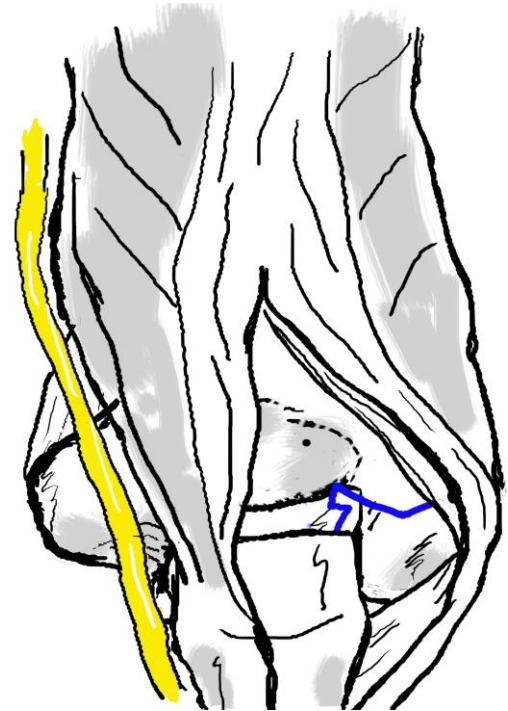
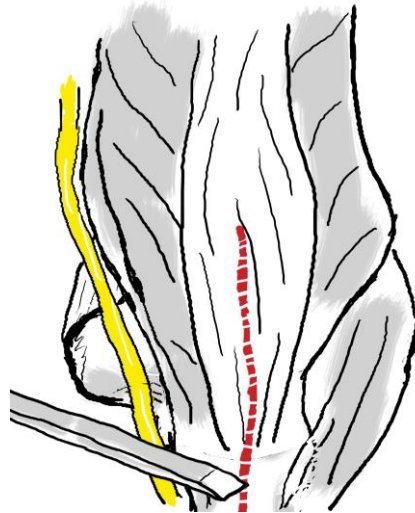
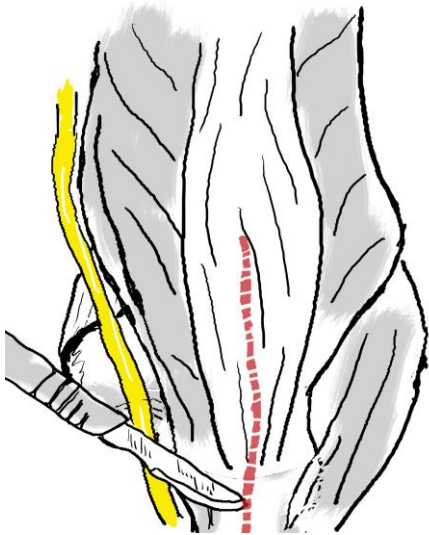
Chevronosteotomi – Repair

- Fixation alternatives:
 - Long 6.5 mm screw + cerclage
 - Tension Band Wire
 - **Plate**

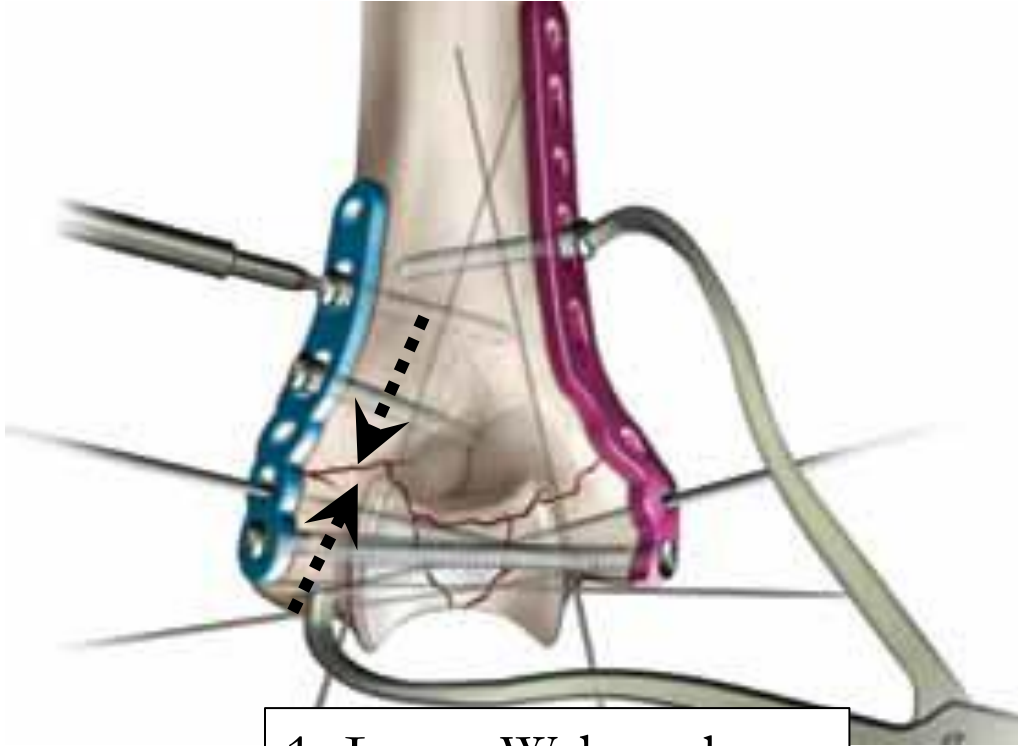
0-10%
Failure



Partiell triceps off – C-type frx



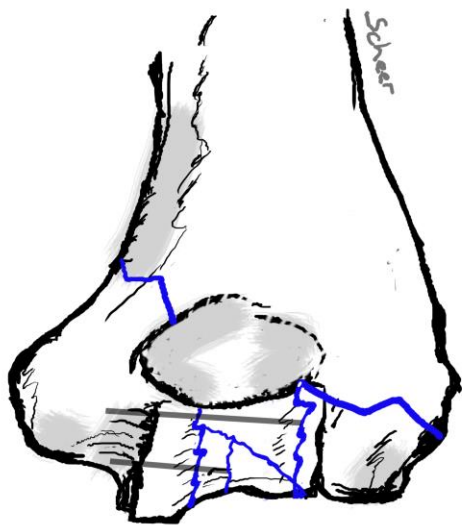
Compression of pillars



1. Large Weber clamp



2. Compression screw



Distal humerus fractures— Principles of treatment

Daytime surgery by an experienced surgeon

AO typ A och C

- Posterior approach
- Double parallel plating

AO type B

- Rare injuries
- Various approaches
- Various fixation techniques

Elbow arthroplasty should be considered in
osteoporotic patients