Distal Radius Fractures: Which Need Surgery?

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Disclosures

- **I, Dr. Niloofar Dehghan, have no relevant financial relationships with ineligible companies to disclose.**

Objectives

- To review fracture patterns that meet surgical indications
- To understand what patient population can be treated non-operatively

Distal Radius Fractures

- Most common orthopaedic injuries
- 1/6 of all fractures seen in ER
- Bimodal distribution:
  - Young patient with high energy force
  - Elderly with falls
- Usually from FOOSH, isolated injuries

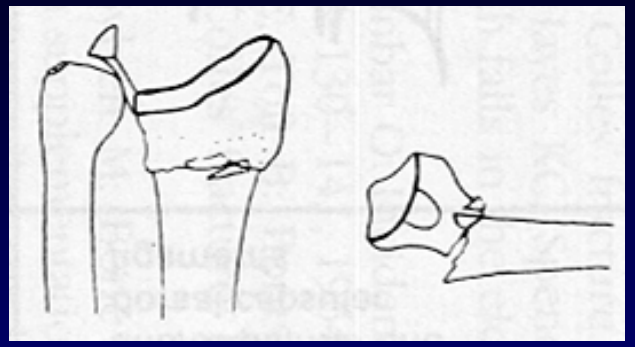
Fracture Patterns

- Intra-articular vs extra articular
- Comminuted
- Displaced
- Angulated

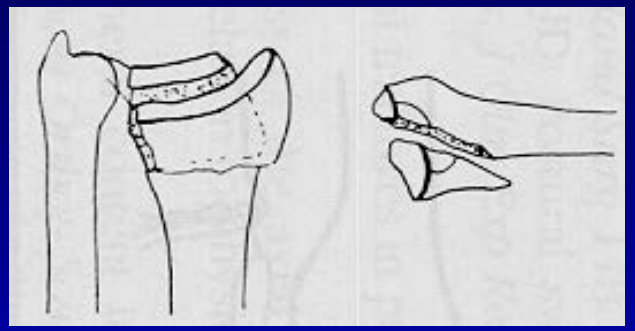
- Majority undisplaced: extra articular or min displaced intra articular
- About 30% more complex, comminuted, unstable

Classification – Fernandez (1997)

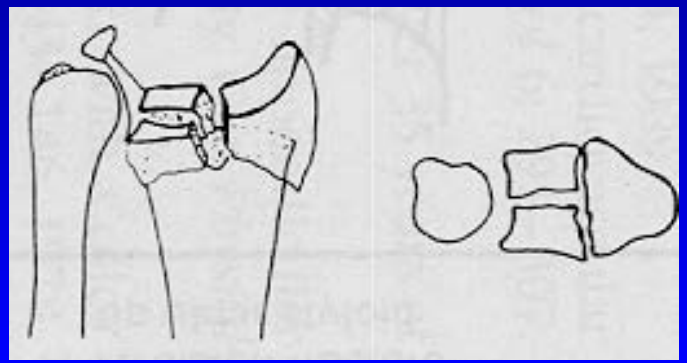
- I. Bending-metaphysis fails under tensile stress (Colles, Smith)



- II. Shearing-fractures of joint surface (Barton, radial styloid)



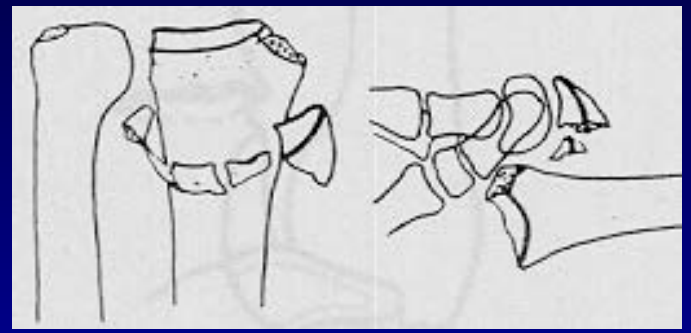
- III. Compression - intraarticular fracture with impaction of subchondral and metaphyseal bone (die-punch)



The Journal of hand surgery. , 1997, Vol.22(4), p.563-571

Classification – Fernandez (1997)

- IV. Avulsion- fractures of ligament attachments (ulna, radial styloid)



- V. Combined complex - high velocity injuries


V

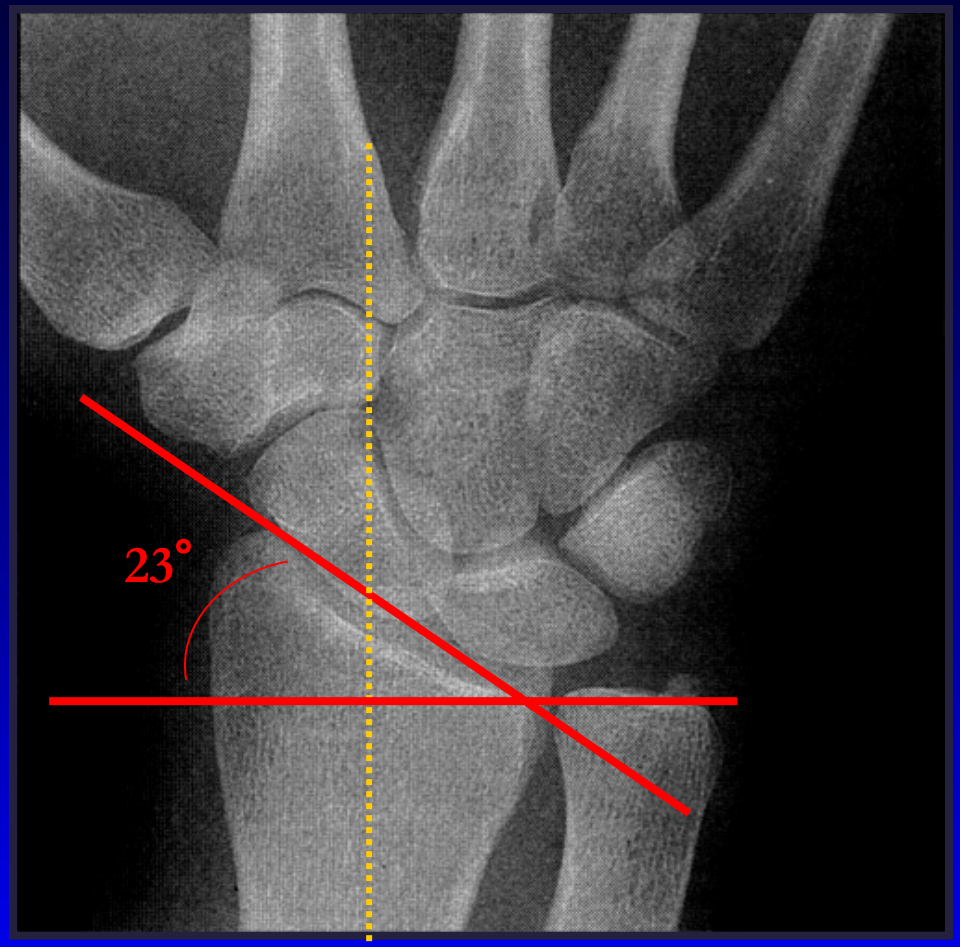
Volar subluxation of carpus with fracture fragment

How deformed is it?

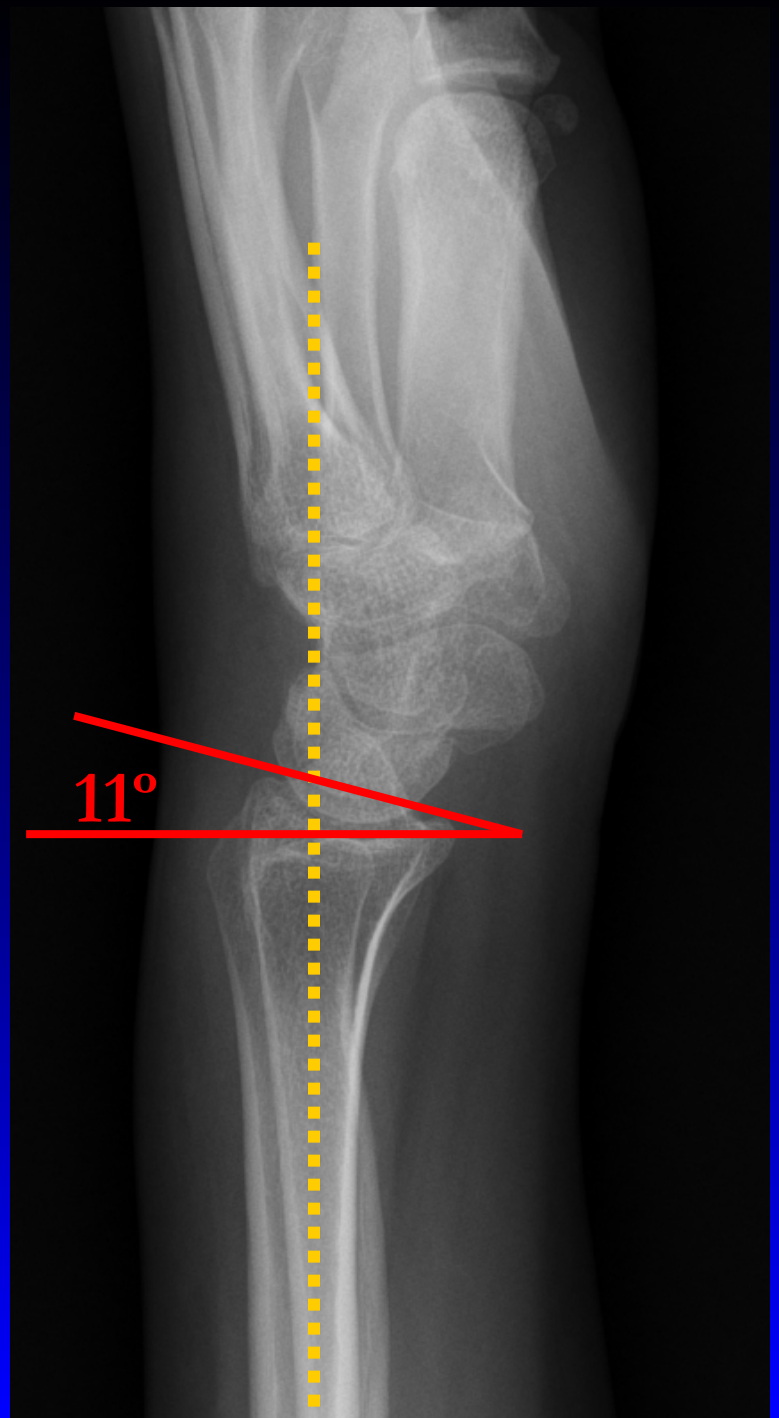
Some measurements used to determine extent of deformity:

1. Radial inclination
2. Volar tilt
3. Radial height
4. Ulnar variance
5. Articular surface step deformity

Radial inclination

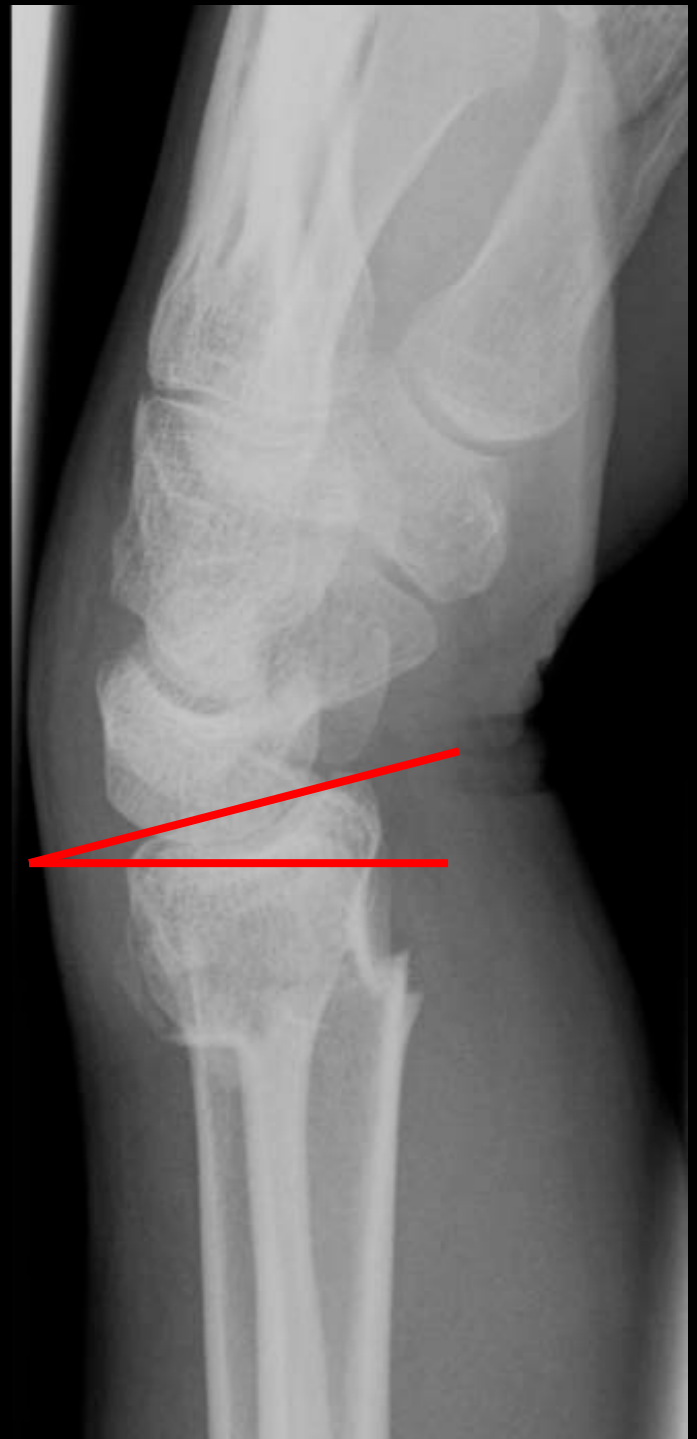


- PA view
- Average 23° (16-28)
- Compare to other side
- Acceptable angle is >15°
  - >5° loss is unacceptable
- Loss of inclination →
  - Increased load across lunate
  - radio-lunate OA & pain (esp if also dorsal inclination)

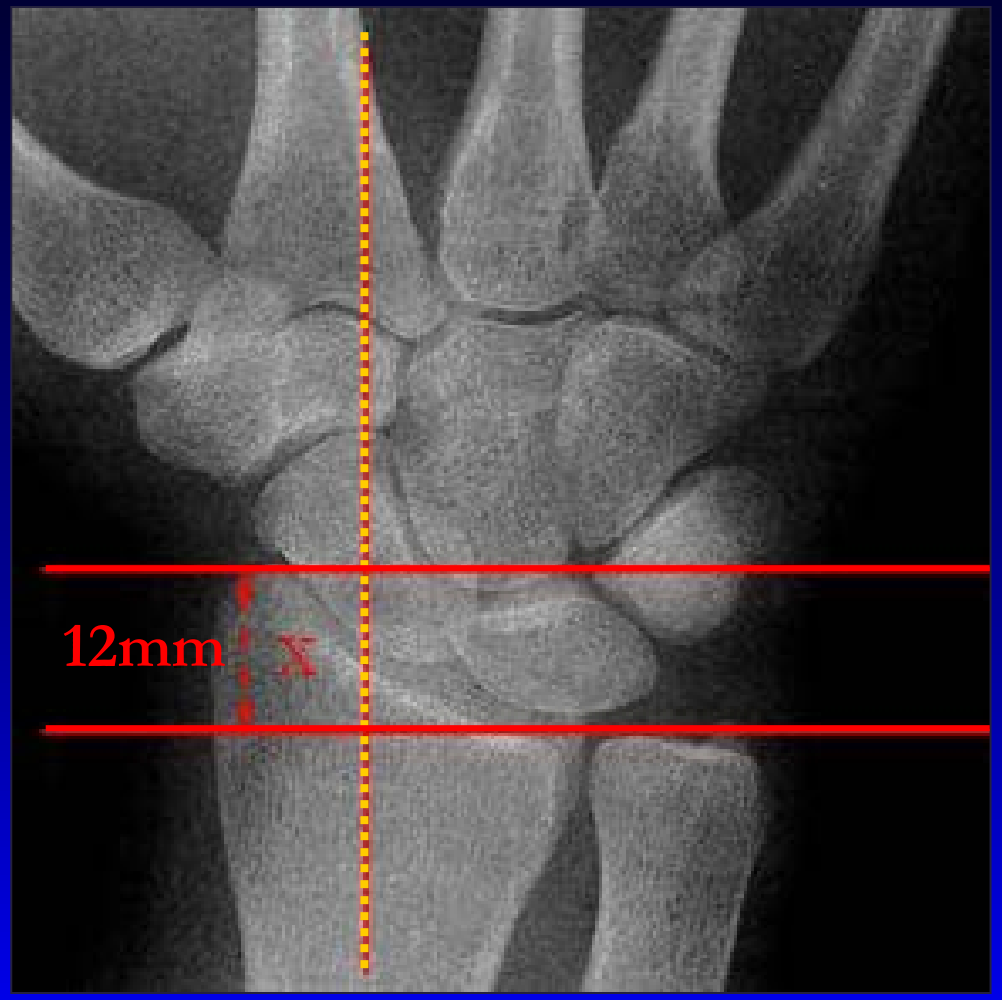


Volar Tilt

- On lateral view
- Average is 11º volar (compare to other side)
- Doral tilt increases axial load directed onto ulna
  - Decreases moment arm of finger extensors, making wrist less efficient.
  - Increases pain and ↓ grip strength
- Unacceptable position:
  - >10º of dorsal tilt from neutral (>20º from “normal” anatomic)

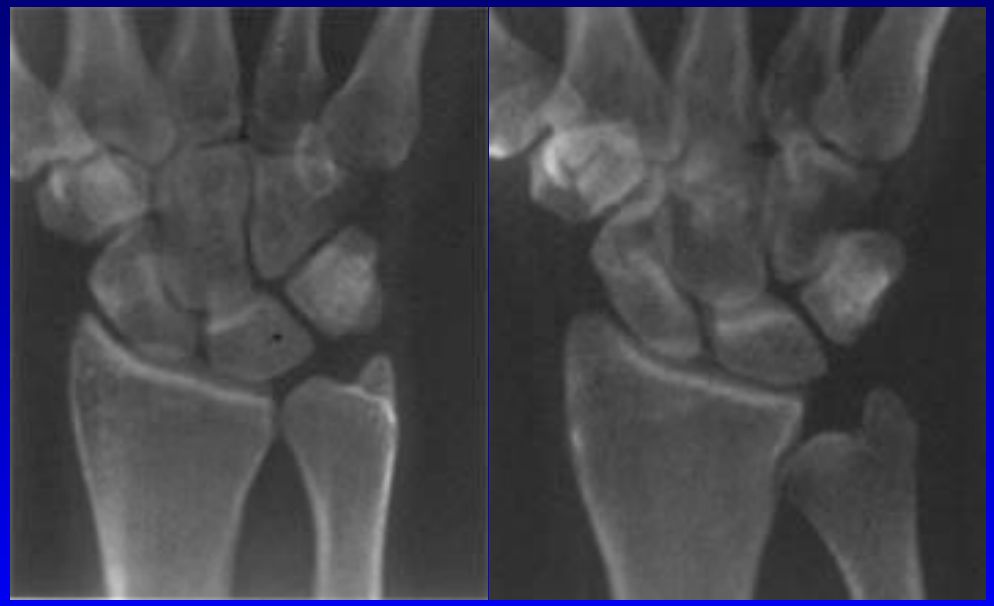


Radial height



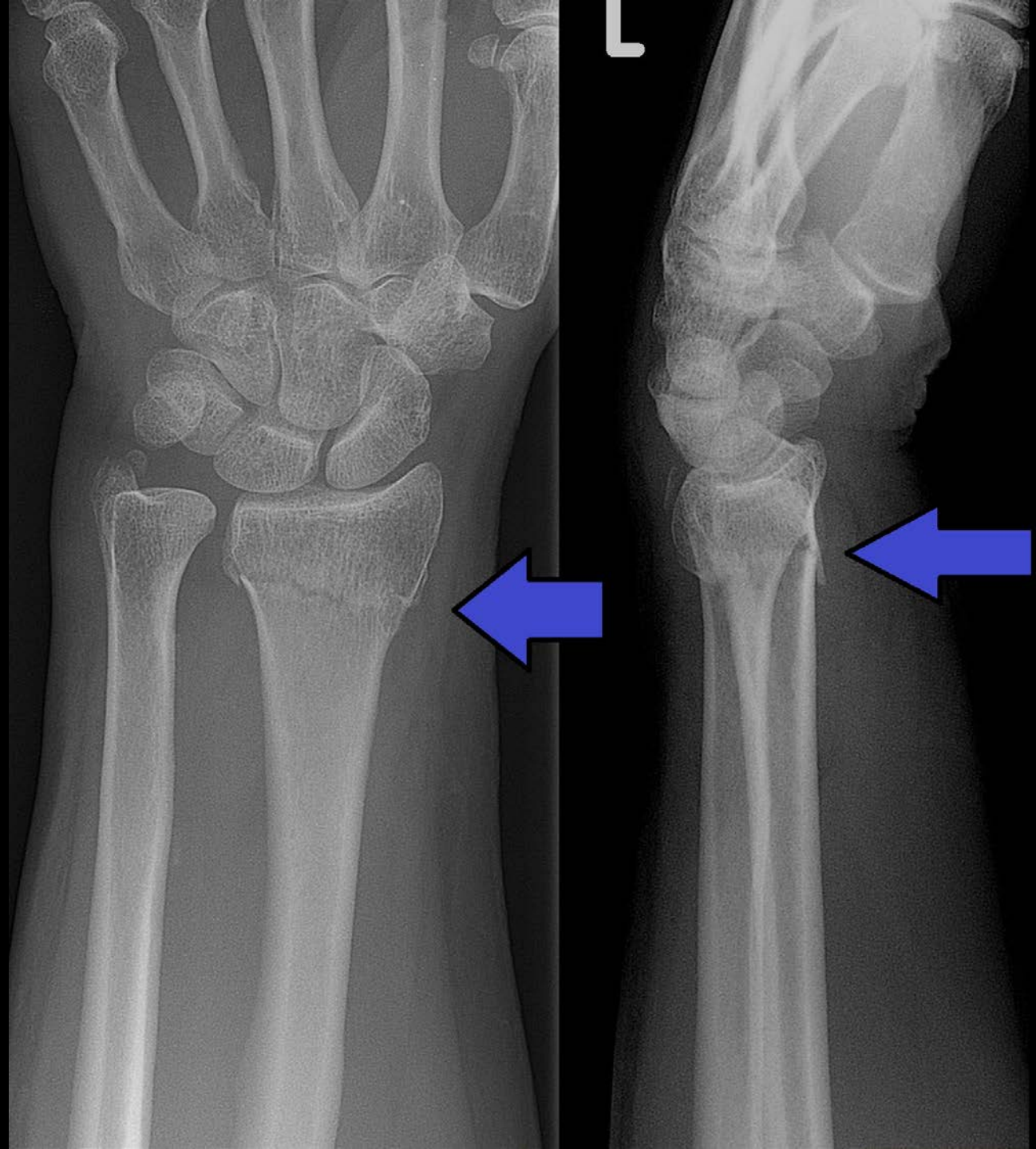
- PA
- Average 12 mm (compare to other side)
- Shortening results from extensive comminution/impaction into metaphysis
- Is worst than angulation deformity
- Unacceptable >5mm
  - Weakness and pain
- Loss pronation/supination

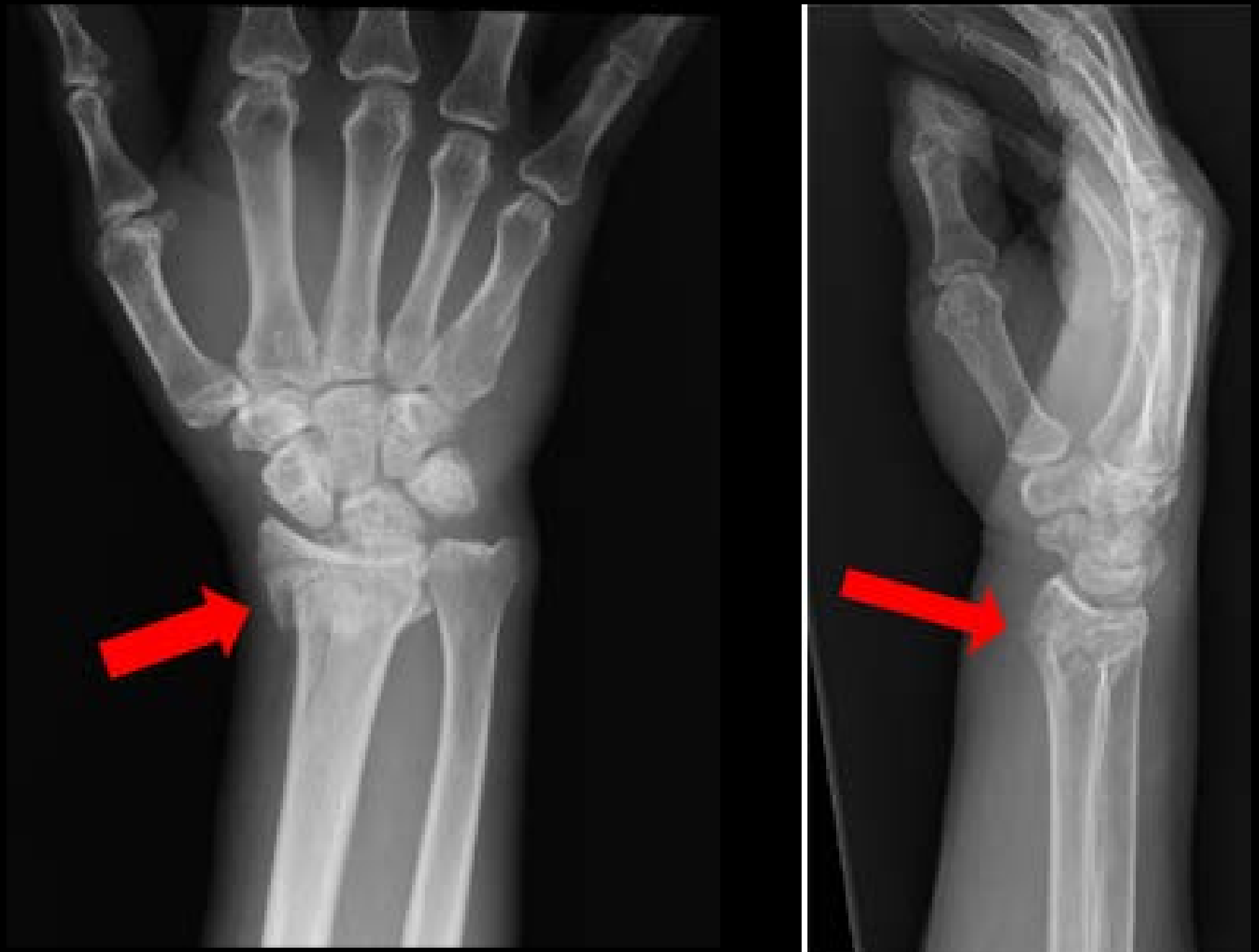
Ulnar Variance



Positive ulnar variance Negative ulnar variance

- Average mean ulnar variance = 1 mm (compare to the other side)
- In neutral variance:
  - 80% of load is born by radius and 20% by ulna
- 2.5 mm increase in ulnar variance
  - Increase load ulno-carpal joint to 40%
- Increased variance can also cause impingement





Treatment

- Goals:
  - Restore articular congruity, radial anatomy, radio-ulnar relationship
  - Obtain union
  - Restore ROM

- Surgery :
  - Unstable/displaced/ intra-articular fractures
  - Young, active patient
  - Anatomic reduction and stable internal fixation

- Non-operative:
  - Stable fracture pattern
  - Elderly

Which fractures need fixation?

Fracture pattern

Patient factors

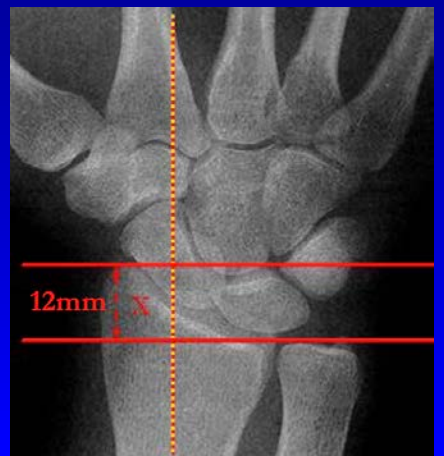
Fracture characteristics

- Fracture can be treated non-op if:
  - Closed
  - Minimally displaced
  - Good alignment
  - Stable

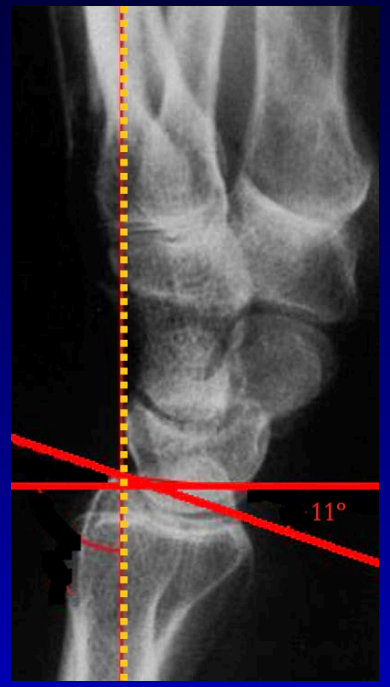
Acceptable reduction

- Radial inclination > 15 °

- Radial shortening < 5 mm



- Dorsal angulation < 10°



- Articular step-off < 2mm

Indications for Surgical Treatment

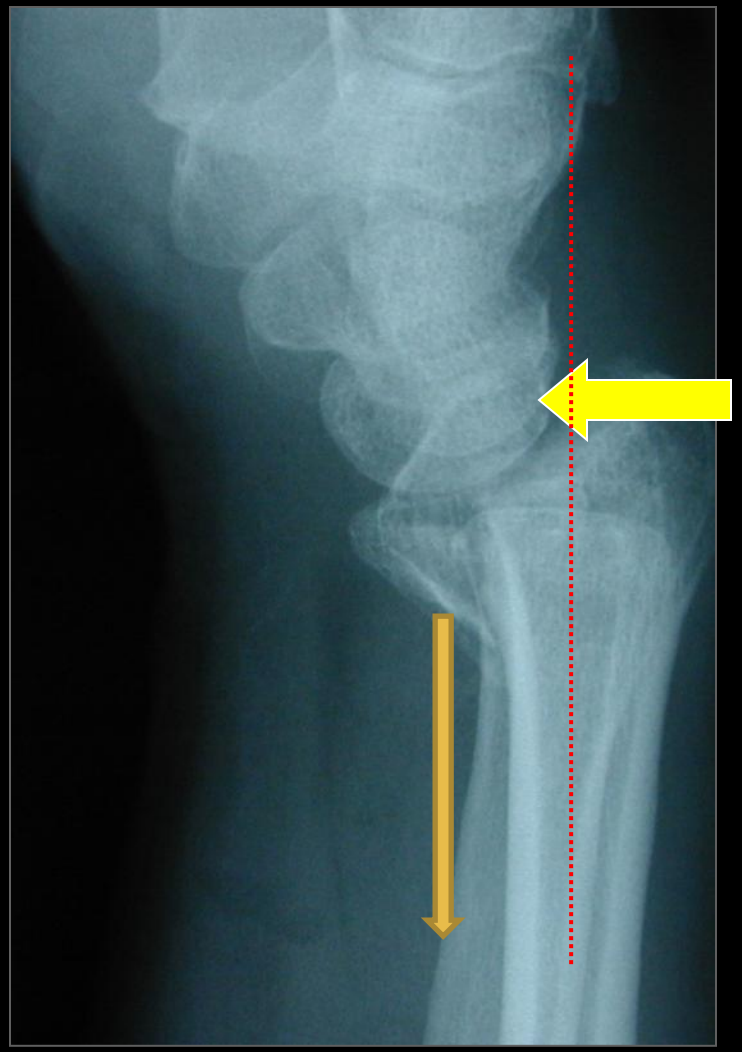
- Open injury
- Volar shear
- Unstable fractures
  - (Radial inclination < 15°, Dorsal tilt > 10 °, shortening >5mm)
- Fracture dislocations
- Articular step-off >2mm

Unstable fractures

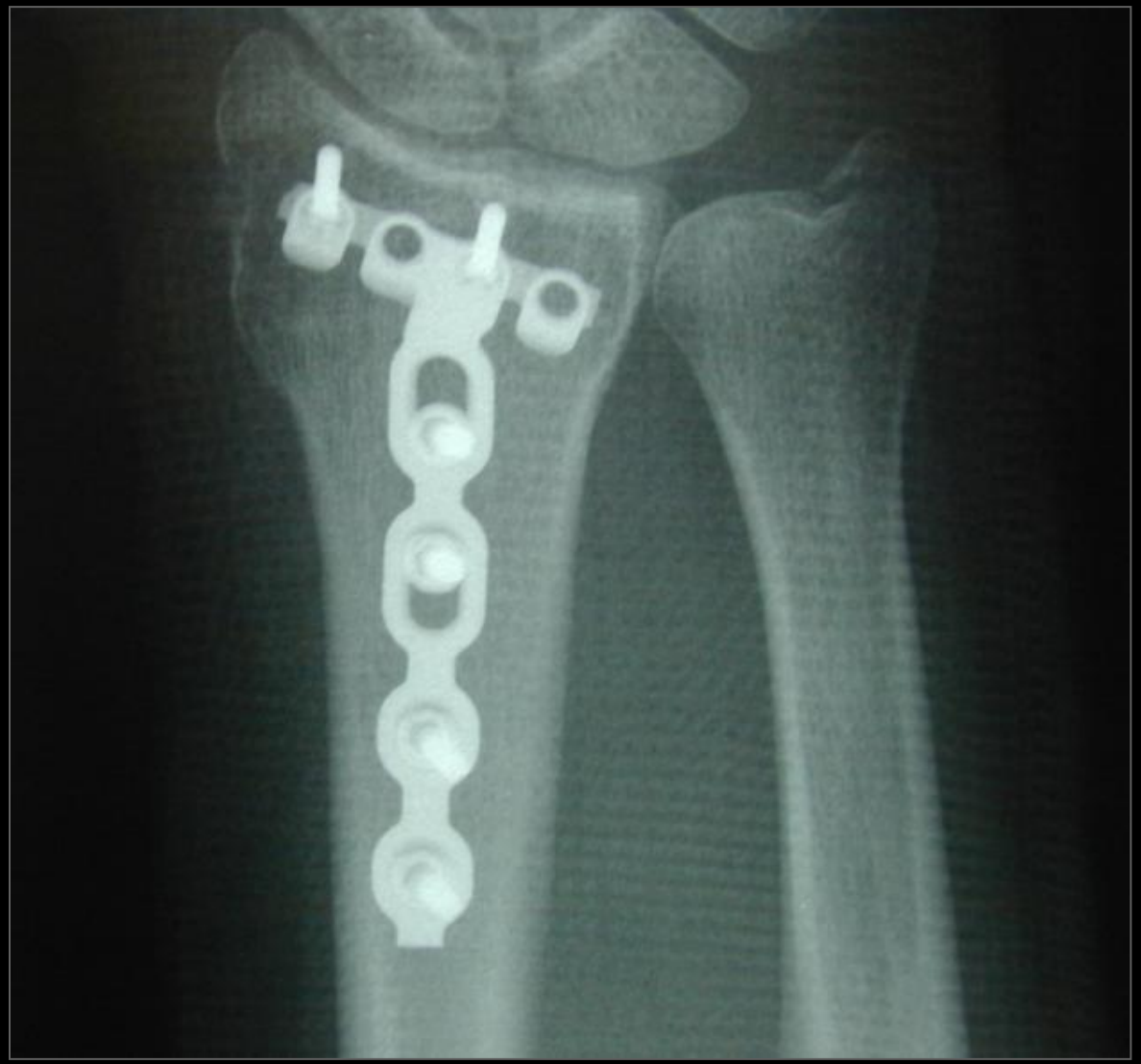
- Very displaced intra-articular fractures
- Gross initial displacement
- Volar/dorsal comminution
- Dorsal angulation > 20° from normal
- Shortening >5mm
- Volar shear fracture

- May benefit from surgical fixation, depending on patient factors


V



Carpal subluxation



What about patient factors?

- Elderly with distal radius fractures
  - Elderly >65 years tolerate poorer radiological outcome well
  - no clear evidence of the clinical superiority of distal radius fracture surgery among older adults at one year.

JAMA Surg. 2021 Mar 1;156(3):229-237. doi: 10.1001/jamasurg.2020.5672.

Surgical Plating vs Closed Reduction for Fractures in the Distal Radius in Older Patients: A Randomized Clinical Trial

Combined Randomised and Observational Study of Surgery for Fractures in the Distal Radius in the Elderly (CROSSFIRE) Study Group;
Andrew Lawson [1,2], Justine M Naylor [1,2], Rachelle Buchbinder [3,4], Rebecca Ivers [5], Zsolt J Balogh [6,7], Paul Smith [8], Wei Xuan [9], Kirsten Howard [10], Arezoo Vafa [1], Diana Perriman [8], Rajat Mittal [2], Piers Yates [11], Bertram Rieger [11], Geoff Smith [12], Sam Adie [12,13], Ilia Elkinson [14], Woosung Kim [14], Jai Sungaran [15], Kim Latendresse [16,17], James Wong [18], Sameer Viswanathan [19], Keith Landale [19], Herwig Drobetz [20], Phong Tran [21], Richard Page [22,23], Sally Beattie [23], Jonathan Mulford [24], Ian Incoll [7,25], Michael Kale [25], Bernard Schick [26], Trent Li [26], Andrew Higgs [27], Andrew Oppy [28], Ian A Harris [1,2,29]

Affiliations + expand

PMID: 33439250 PMCID: PMC7807386 DOI: 10.1001/jamasurg.2020.5672

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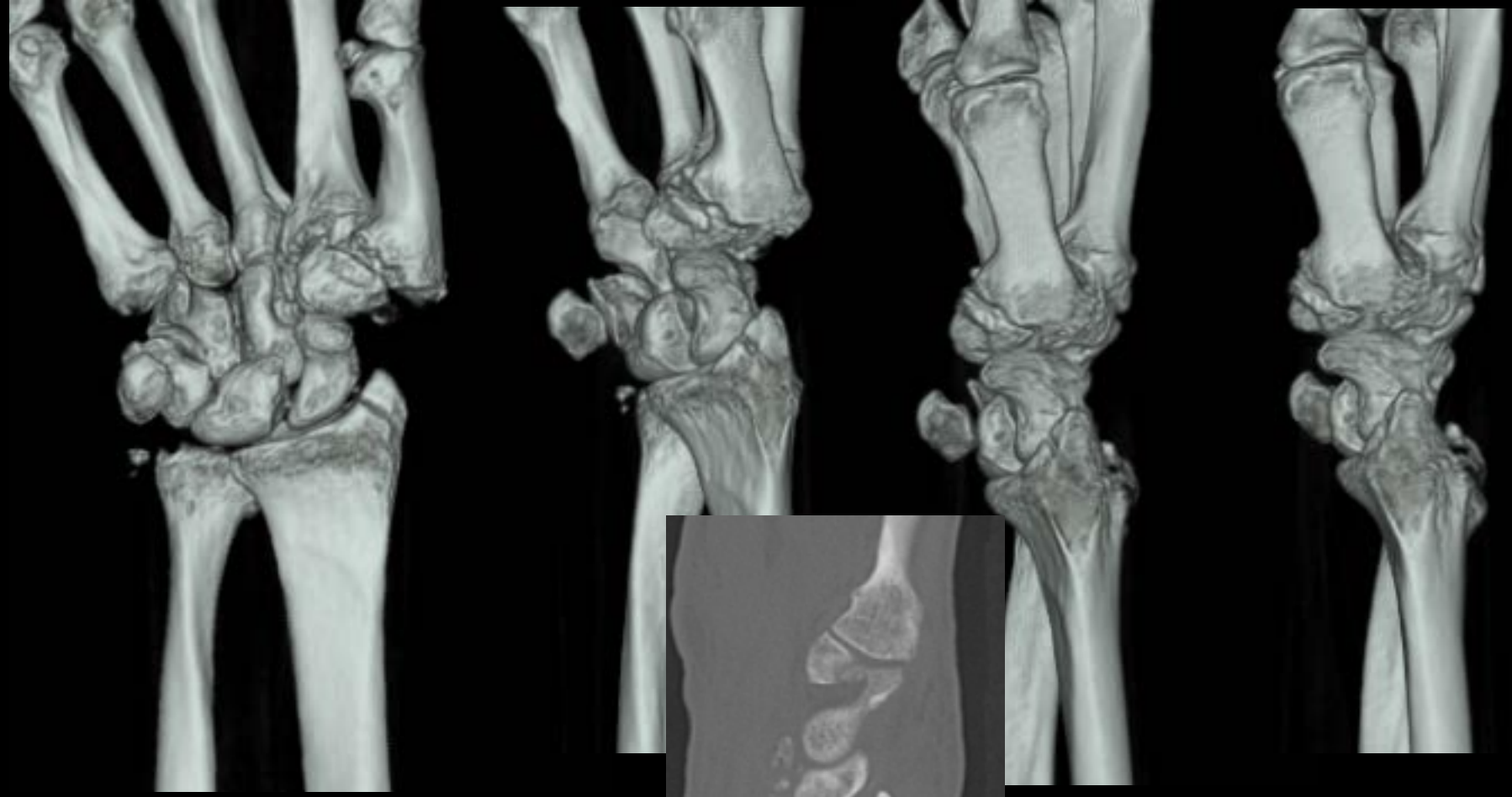
- 300 study participants, Mean age, 71 years
- Initial fracture displacement: >10° dorsal angulation, >3-mm shortening, or >2-mm articular step

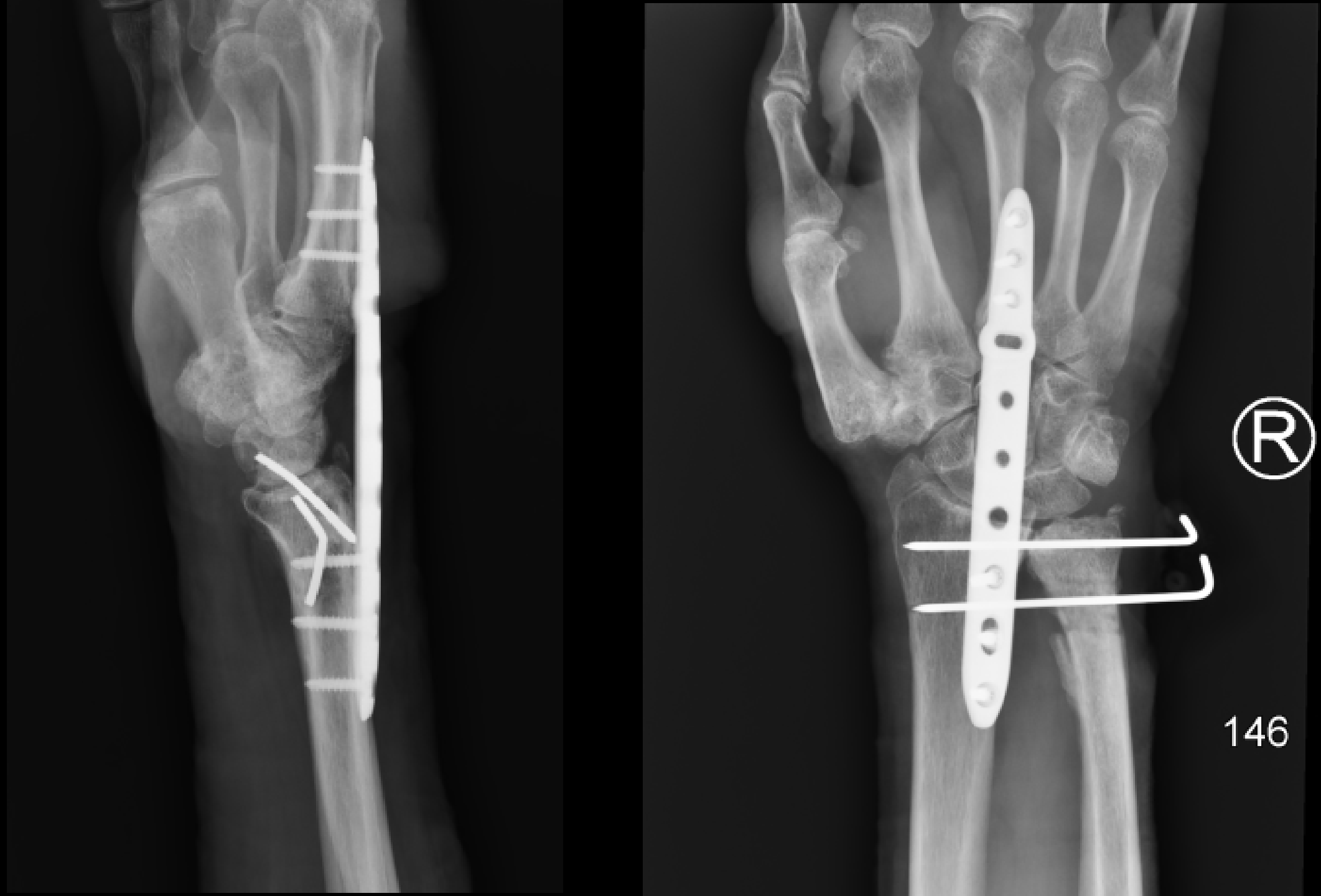
- **Results**:
  - No clinically important difference in 12-month Patient-Rated Wrist Evaluation scores (mean 20 for ORIF, 22 for non-op)
  - No clinically important differences were found in quality of life, wrist pain, or bother at 3 and 12 months.
  - No significant difference was found in total complications

- **CONCLUSIONS:** no differences in improvement in wrist pain or function at 12 months from surgical fixation over closed reduction for displaced distal radius fractures in older people.


Case

- 70 year old male
- Fall from height
- Hip fracture, and wrist injury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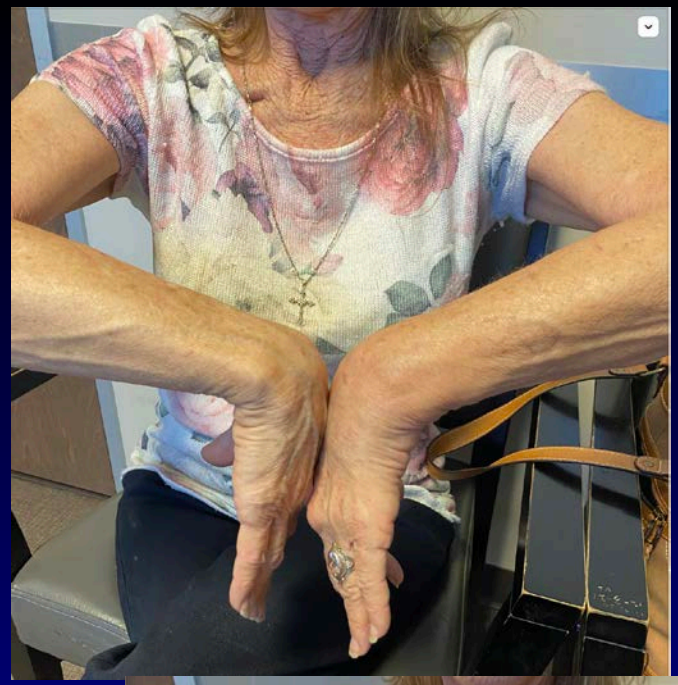
Case

- 80 F
- 65 M tennis player
- 45 F alcoholic
- 22 M
  - schizophrenic under psych admission

What to check at post-op visit?


OEC

Summary

- Surgical fixation
  - Young, healthy, active
  - Unstable fracture
  - Loss of reduction
  - Volar shear
  - Open
- Non-op treatment:
  - Stable or well reduced
  - Most elderly

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