Distal radius fractures
The unrecognized and unreduced

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1) The obvious and basic
   a) Basic parameters
      i) Radial inclination
      ii) Volar tilt
      iii) Length (eg, ulnar variance)
      iv) Joint congruency

2) Extra-articular fractures – Red flags
   a) Fracture complexity / comminution
   b) Degree of DRUJ disruption
   c) Proportion of contact between distal and proximal fragments
   d) Segmental fractures of dorsal or palmar wall

3) Intra-articular fractures fragmentation pattern
   a) Fragmentation pattern
      i) Radial column
      ii) Ulnar corner
      iii) Volar rim
      iv) Dorsal wall
      v) Free impacted articular component
4) Carpal facet horizon
   a) ‘Articular surface’ on the AP view
   b) Represents volar rim if in volar tilt
   c) Shows dorsal rim if in dorsal tilt
   d) Used to identify rim reduction and differentiate between volar and dorsal marginal fragments

5) Areas of limited purchase
   a) Volar rim of lunate facet – ‘critical corner’
      -- Often overlooked
   b) Dorsal corner sigmoid notch
   c) Radial styloid

Critical corner

Limited purchase sites
6) Concentricity / congruency

a) Definitions
   i) Concentric – common centers
   ii) Congruency – uniform joint interval

b) Flattened surface or incongruency on lateral view suggests coronal split between dorsal and palmar facets

c) Incongruency / widening of DRUJ suggests ligamentous disruption and implies instability

7) Unreduced radial translation of distal fragment

a) May contribute to residual instability of DRUJ

b) Correct radial wall offset and DRUJ widening by translating distal fragment ulnarly
8) Teardrop angle / lateral carpal alignment

a) Teardrop angle – normally 70°, greater than 45° implies malreduced volar rim of lunate facet

b) Lateral carpal alignment
   i) Center of capitate base aligned on lateral x-ray with volar radial shaft
   ii) Wrist position between 5° palmar flexion and 15° dorsiflexion

![Teardrop angle](image1)

![Lateral carpal alignment](image2)

c) Volar instability pattern
   i) Teardrop shortened and shifts into volar soft tissue
   ii) Lateral carpal alignment volarly displaced
   iii) Teardrop angle normal

![Volar instability pattern](image3)

d) Axial instability pattern
   i) Pathologic dorsiflexion of volar rim lunate facet
   ii) Depressed teardrop angle (<45°)
   iii) Lateral carpal alignment dorsally displaced

![Axial instability pattern](image4)
9) Beware rare associated rupture of intraosseous membrane

Examples of intraosseous membrane disruption

10) Specialized radiographic techniques

a) True lateral: pisiform overlies distal pole of the scaphoid

b) 10° lateral x-ray to assess teardrop, congruency, position of hardware

c) Axial tangential view
Radial inclination (°) | Radial Height (mm) | Ulnar Variance (mm) | Radiocarpal interval (mm)
---|---|---|---
Avg | 23.6 ± 2.5 | 11.6 ± 1.6 | -0.6 ± 0.9 | 1.9 ± 0.2
Women | 24.7 ± 2.5 | 11.2 ± 1.5 | -0.6 ± 0.8 | 1.9 ± 0.2
Men | 22.5 ± 2.1 | 12.0 ± 1.5 | -0.6 ± 1.0 | 1.9 ± 0.2

Volar tilt (°) | AP distance (mm) | Teardrop angle (°)
---|---|---
Avg | 11.2 ± 4.6 | 19.1 ± 1.7 | 70.7 ± 4.2
Women | 12.2 ± 5.6 | 17.8 ± 1.0 | 70.8 ± 4.7
Men | 10.2 ± 3.2 | 20.4 ± 1.1 | 70.5 ± 3.7
P Value | .035 | < 0.01 | 0.87

Bibliography


