Distal Radius Fractures - Evaluation and Decision Making

Ryan Odgers MD

Hand, Upper Extremity, and Microvascular Surgery

OrthoArizona

Complete Musculoskeletal Care

Disclosure

- I have no relationships or financial affiliations related to the content of this presentation to disclose.

The Frequency and Epidemiology of Hand and Forearm Fractures in the United States

Kevin C. Chung, MD, Sandra V. Spilson, MPH, *Ann Arbor, MI*

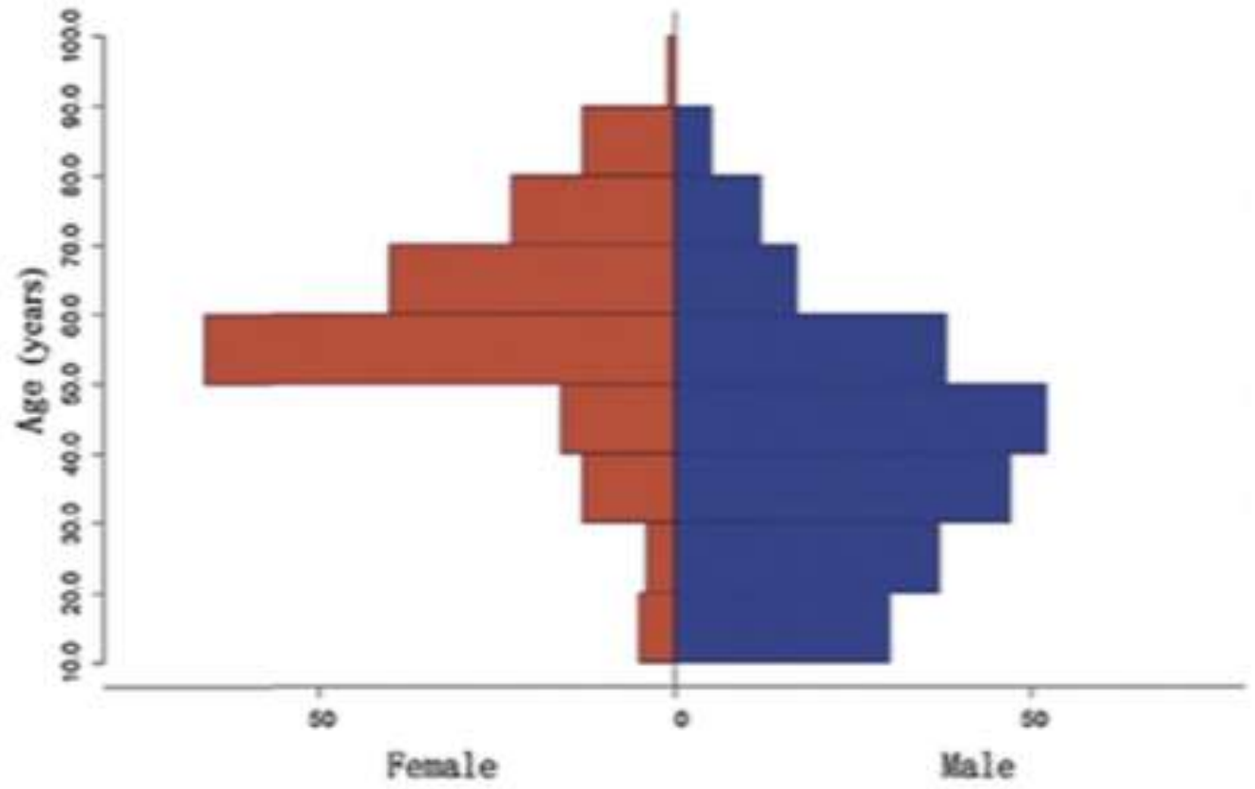
J Hand Surg 2001;26A:908-915

Table 1. Fracture Incidence by Anatomic Site

Anatomic Site	*No. of Fractures (%)/95% CI*
Radius and/or ulna	643,087 (44)/(584,712–701,462)
Phalanx/phalanges	341,305 (23)/(310,254–372,356)
Metacarpal(s)	264,642 (18)/(240,533–288,751)
Carpal	207,880 (14)/(188,910–226,850)
Multiple hand bones	8,960 (0.6)/(8,012–9,908)
Total	1,465,874 (100)/(1,333,002–1,598,746)

Distal Radius Fractures

- Bimodal Distribution
  - Young, high-energy, male.
  - Older, osteoporotic, female.



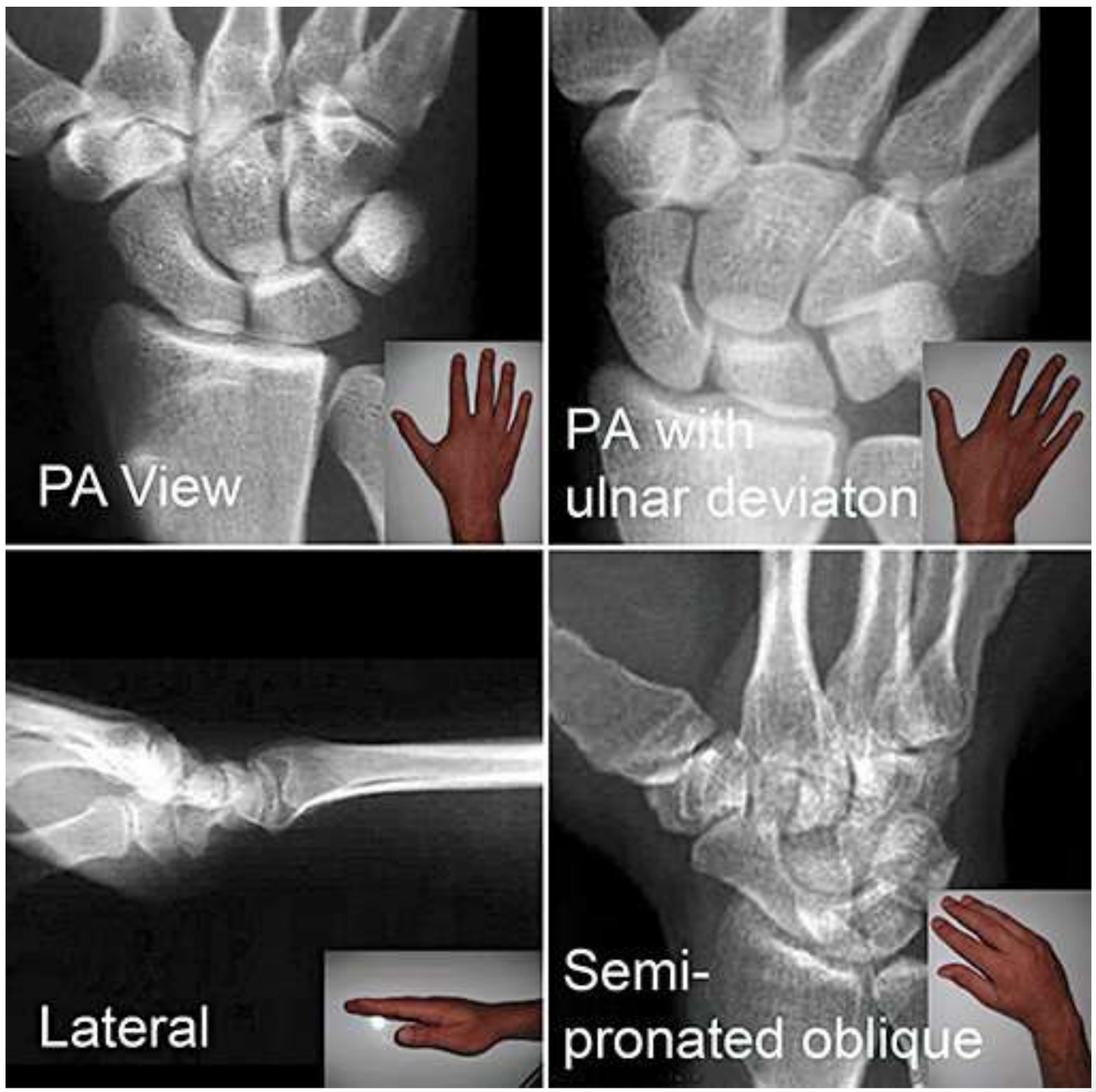
Koo KOT, Tan DMK, Chong AKS. Distal radius fractures: an epidemiological review. Orthop Surg. 2013;5(3):209e213.

Evaluation

- Limb above and below
  - Exam and Xrays
  - Associated injuries likely 70%+ of wrist fractures (both soft tissue and bony)
    - Likely more scapholunate injures than recognized.
- Open wounds
  - Be diligent but have common sense.
  - Commonly wound over ulnar styloid.
  - Manage appropriately.
- Sensation
  - On presentation
  - Prior to reduction
  - After reduction
    - Adjust splint
    - Avoid splinting in extreme positions

Evaluation

- Xray
  - At least 3 views
  - Beam centered on capitate

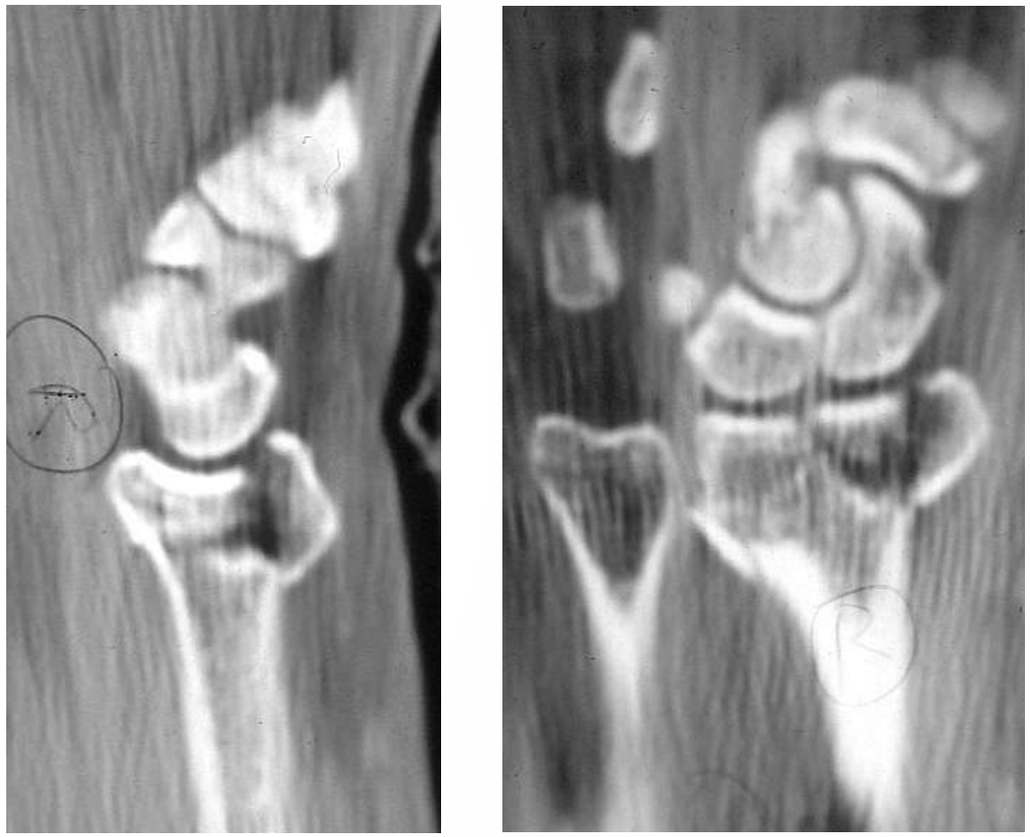


Computed Tomography

- Intra-articular fxs with multiple fragments
- Centrally impacted fragments
- DRUJ incongruity

- 19 consecutive fx, CT had better sensitivity for intraarticular fragments
- management change in 5 pts

- For me, used to better decide between surgery and no when borderline



Cole et al: J Hand Surg, 1997

Initial Mangement

- To Reduce or Not Reduce

REDUCE!!!

Initial Mangement

- To Reduce or Not Reduce
  - Hematoma block/sedation
    - Studies have shown similar (low) pain during and after block with significantly shorter ER stay with hematoma block.
    - 10cc Lido/marcaine dorsally injected at fracture site.
  - Hang in fingertraps
    - Leave for 15-20 min for muscle relaxation
    - Hang weights from elbow (saline bottles in Stockinette)
  - Recreate injury, distract, reduce
  - Splint but avoid extreme positions

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Do Not Block Finger Motion!

Definitive Management

- Factors to Consider
  - Age
  - Activity Level
  - Comorbidities
  - Energy level of trauma
  - Open/Closed Fracture
  - Associated injuries/symptoms
  - Radiographic appearance

Predictors of Instability

- Lafontaine M, Hardy D, Delince P. Stability assessment of distal radius fractures. Injury. 1989;20:208-10.
  - 1 page article (2nd page is pictures).
  - Retrospective review of 112 cases.
  - Criteria adopted from previous papers
    - Dorsal angulation more than 20°
    - Dorsal comminution
    - Radiocarpal Intra-articular fracture
    - Associated ulnar fracture
    - Age over 60 years
  - Correlated number of risk factors to Stewart score of initial, reduction and final assessment radiographs

Outcome following nonoperative treatment of displaced distal radius fractures in low-demand patients older than 60 years * ** * **

Burt T. Young MD, Ghazi M. Rayan MD

- Twenty-five sedentary, low-demand patients older than 60 years were retrospectively evaluated for function and radiographic results following nonoperative treatment of displaced distal radius fractures.
- The mean age was 72 years and the average follow-up period was 34 months.
- Functional outcome was satisfactory in most cases; a high level of personal satisfaction and return to previous activity level was observed, regardless of the radiographic result.

J Hand Surg Eur Vol. 2018 Feb;43(2):142-147. doi: 10.1177/1753193417727139. Epub 2017 Sep 4.

Intra-articular distal radius fractures in elderly patients: a randomized prospective study of casting versus volar plating.

Martinez-Mendez D[1], Lizaur-Utrilla A[1,2], de-Juan-Herrero J[2].

- Randomized 100 fractures in individuals 60 and older.
- Functional outcomes and quality of life were significantly better after volar plating fixation compared with conservative treatment.
- Restoration of the articular surface, radial inclination, and ulnar variance affected the outcomes, but the articular step-off did not.
- Twenty-five per cent of the patients with conservative treatment had secondary loss of reduction.
- Conclusion - surgical plating leads to better outcomes than conservative treatment for elderly patients with intra-articular distal radius fractures.

Predictors of Functional Outcomes After Surgical Treatment of Distal Radius Fractures

Kevin C. Chung MD, Sandra V. Kotsis MPH, H. Myra Kim ScD

- Prospective cohort study designed to identify predictors of hand outcomes after DRF treatment.
- At 3 months after surgery, radiographic incongruity (step + gap) was a significant predictor after controlling for age, fracture type, dorsal–volar tilt angulation, and income. Patients with increased incongruity reported lower MHQ scores (worse functional outcomes).
- At 1 year after surgery, only age and income were significant predictors after controlling for fracture type. Increased age and decreased income were associated with lower MHQ scores.
- Hand dominance, gender, AO classification, and radiographic parameters have limited predictability for functional outcome.

Assessment of instability factors in adult distal radius fractures

Kristin S. Nesbitt MD [a], Joseph M. Failla MD [a], Clifford Les DVM, PhD [a]

TABLE 2. Risk of Displacement With Age and Time From Reduction

Age, y	Risk of Displacement (%)	
	Immediately After Reduction	1 Wk After Reduction
30	17	6
40	27	10
58	50	25
70	66	42
80	77	57

Definitive Management

- FRACTURE EVALUATION
  - Classification Systems
  - Poor inter- and intra- observer reliability
  - Poor predictability

Society Recommendations

- www.orthoguidelines.org
- AAOS
  - Clinical Practice Guideline - 2009
  - Appropriate Use Criteria - 2013

CPG

- We suggest operative fixation for fractures with post-reduction radial shortening >3mm, dorsal tilt >10 degrees, or intra-articular displacement or step-off >2mm as opposed to cast fixation.
    - Strength of Recommendation: Moderate

- We suggest adjuvant treatment of distal radius fractures with Vitamin C for the prevention of disproportionate pain.
    - Strength of Recommendation: Moderate

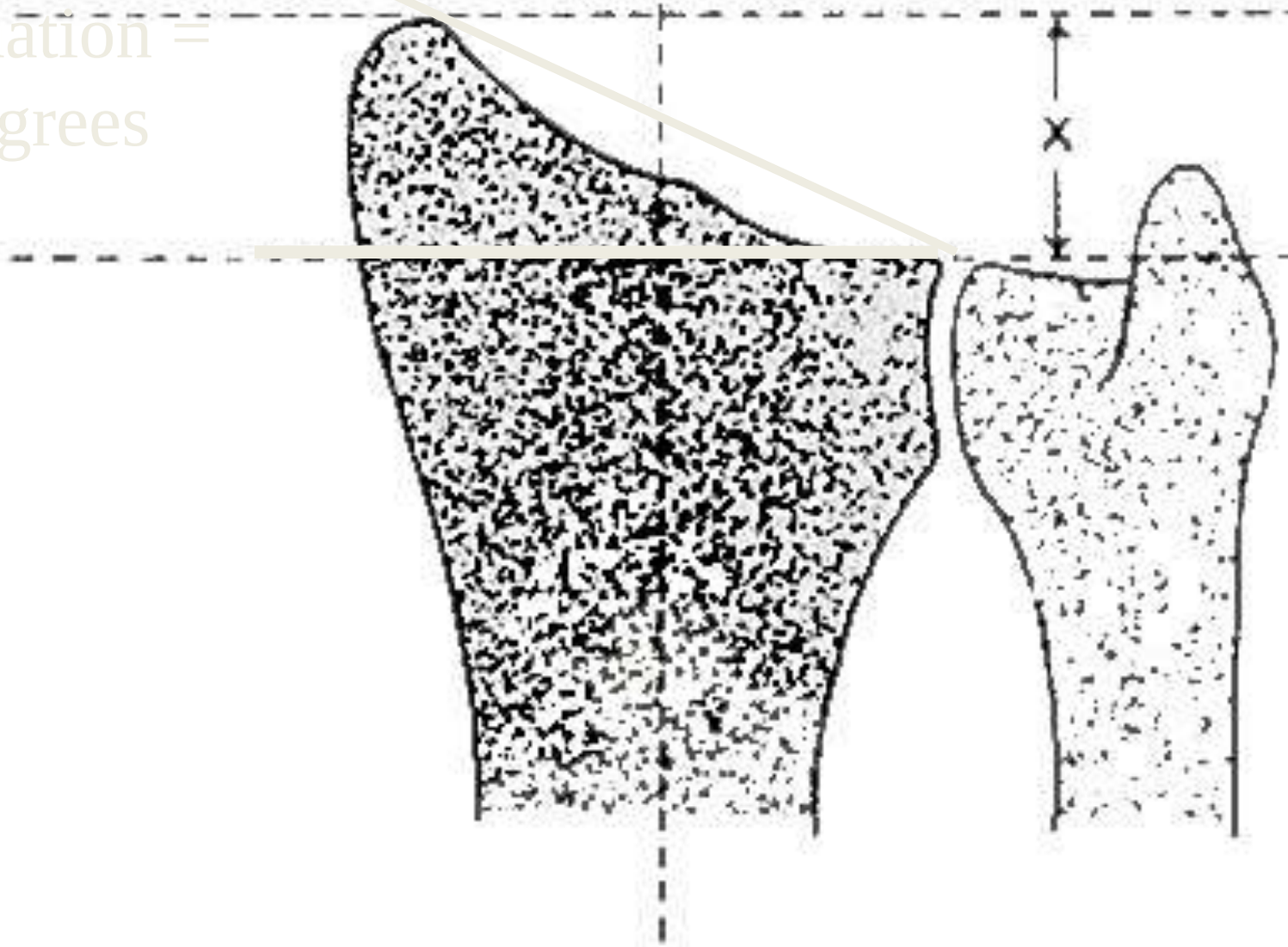
- Practitioners should generally follow a Moderate recommendation…
- Practitioners should feel little constraint in following a recommendation labeled as Inconclusive…

Distal Radius Fractures

- Knirk JL, Intra-articular Fractures of the Distal End of the Radius In Young Adults, JBJS, 1986
  - Recommendation to treat fractures with more than 2mm of step-off.
  - Retrospective Review of 43 fx in 40 adults
  - 21 casted, 17 pins and plaster, 2 ex-fix, and 3 ORIF
  - Restoration of dorsal tilt and radial length were not critical.

Measurement of Radial Length and Inclination

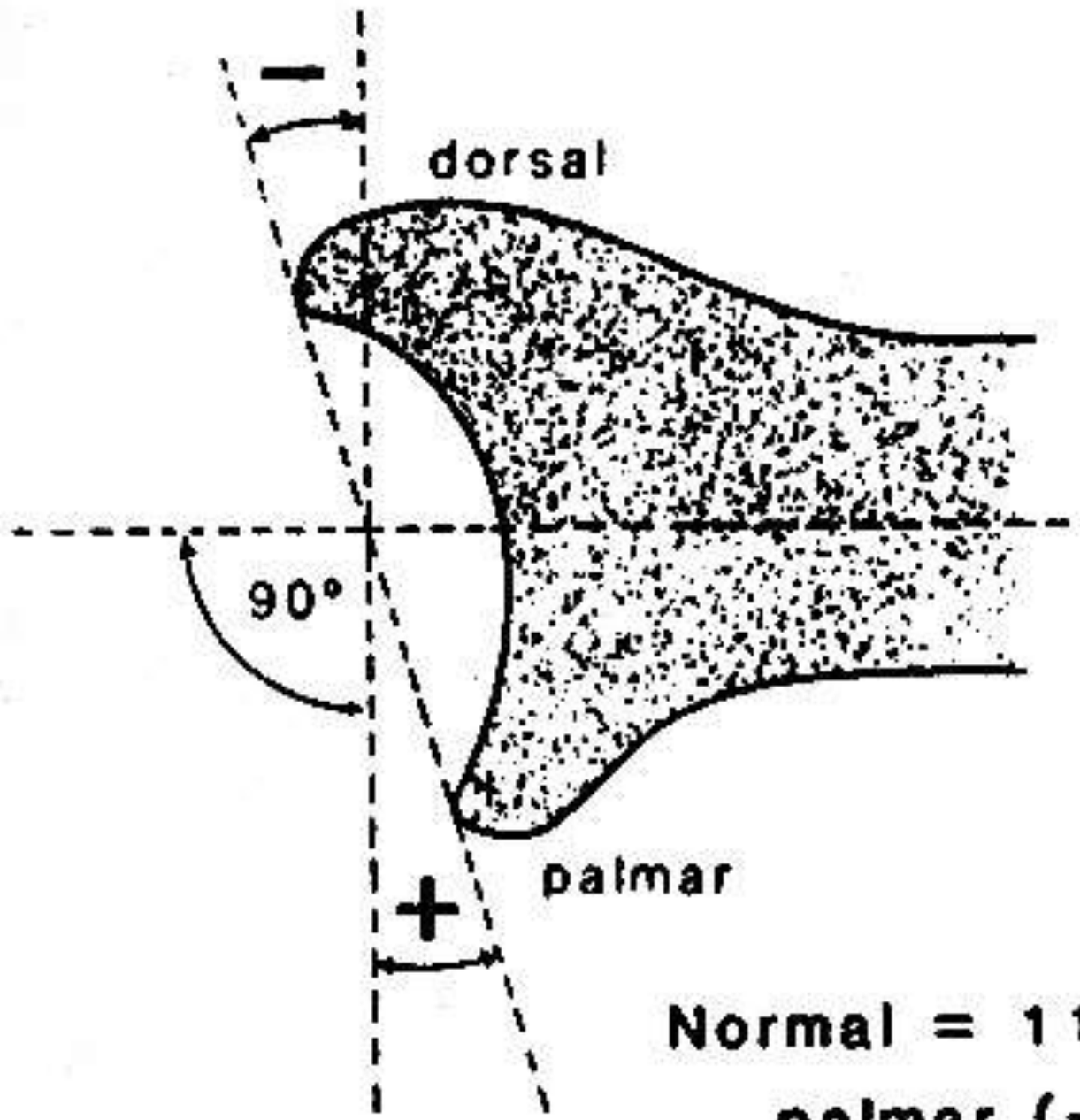
Inclination =
23 degrees



Normal x = 11-12 mm

range 8-18 mm

PALMAR TILT



Normal = 11-12°

palmar (+) tilt

range 0-28°

Radiographic Considerations for Management

- Displacement
- Articular involvement
  - Dorsal/volar lip
  - Die punch
- Comminution
- Shear versus angular deformity
- Involvement of distal radioulnar joint

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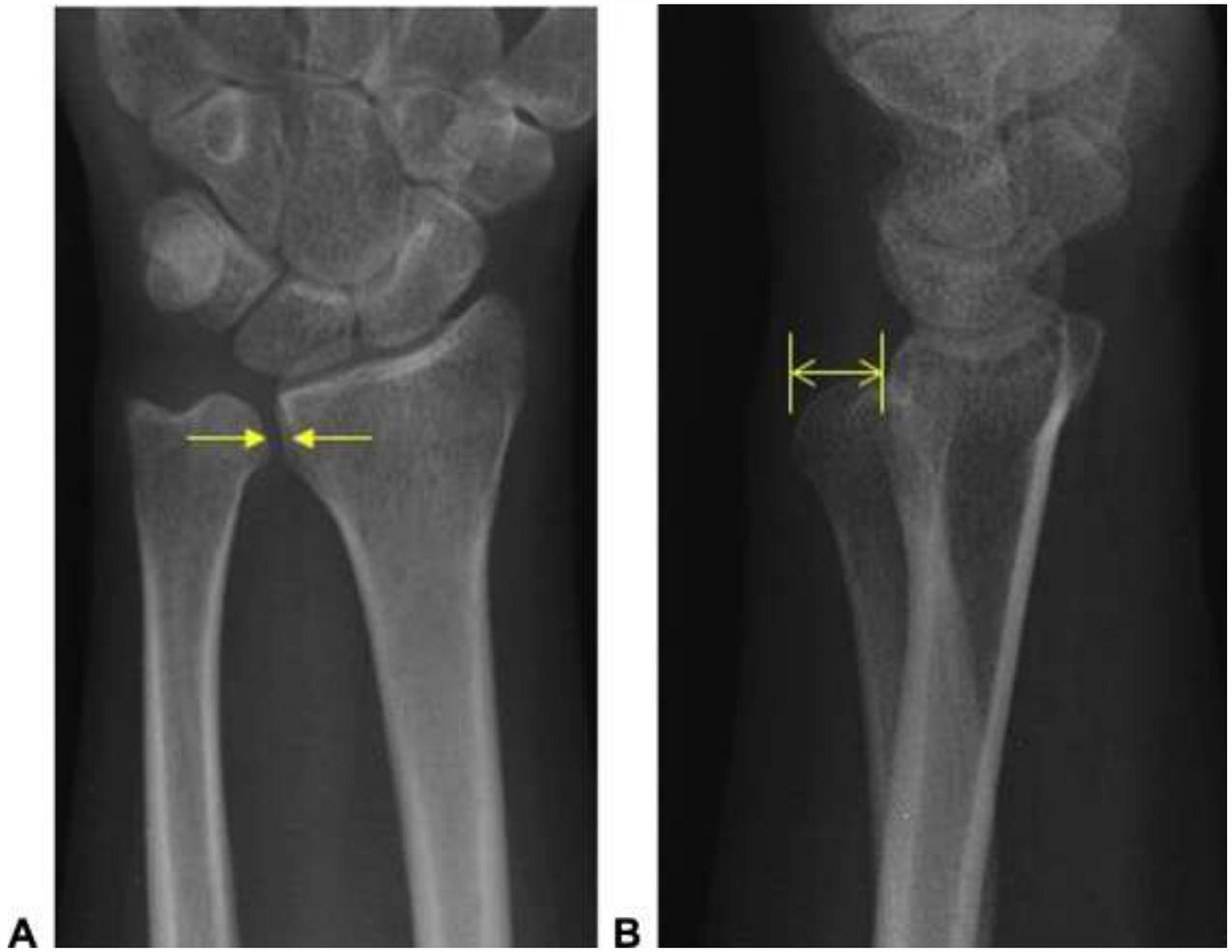

May not always be this obvious!
In UE we usually have a control to compare - Xray the other side!

Considerations for Management

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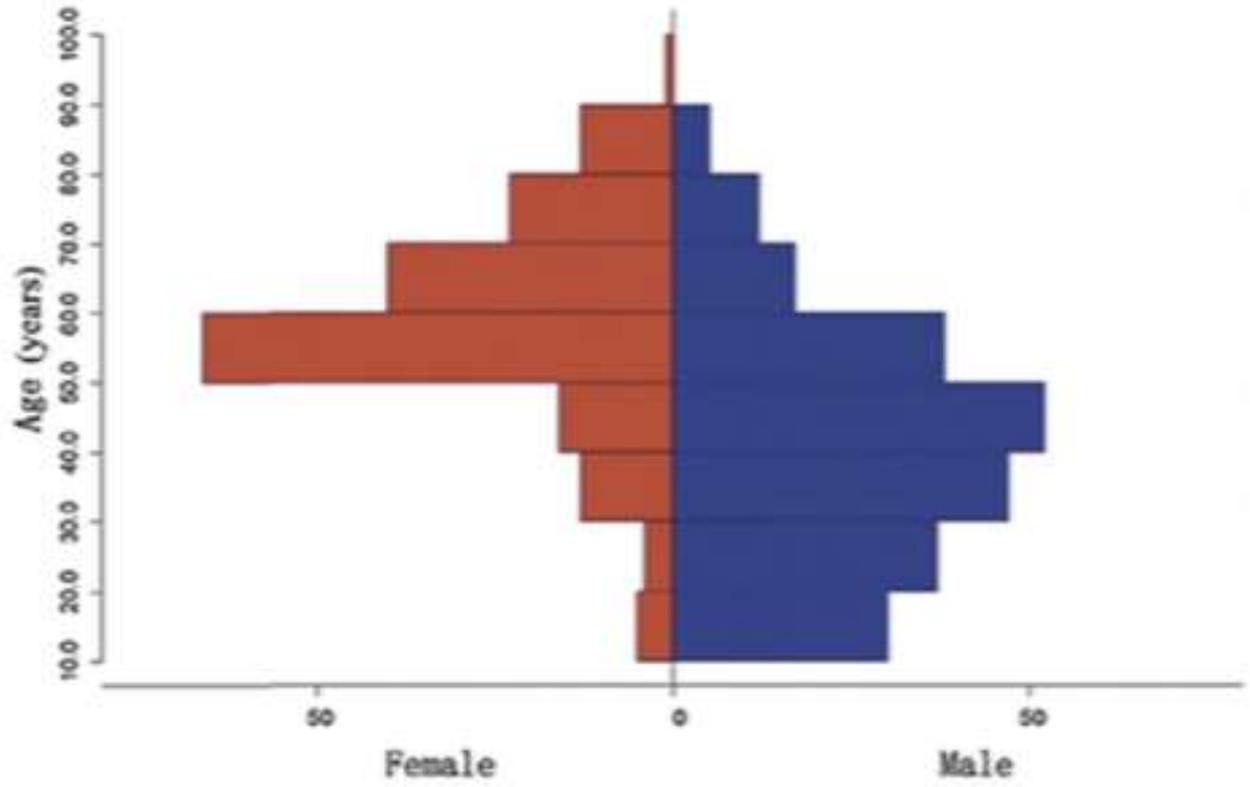

AAOS Appropriate Use Criteria (AUC)

Indication Profile

AO/OTA Fracture Type

- (•) Type A AO/OTA Fracture
- ( ) Type B AO/OTA Fracture
- ( ) Type C AO/OTA Fracture

Mechanism of Injury

- ( ) High-energy Fracture
- (•) Low-energy Fracture

Activity Level of Patient

- (•) Normal Activity Level
- ( ) High Functional Demands
- ( ) Independent
- ( ) Home-bound

Patient Health

- (•) ASA 1-2-3
- ( ) ASA 4

Other Injuries (in addition to distal radius fracture)

- ( ) Median nerve injury
- ( ) Gustilo Grade I or II Open Fracture
- ( ) Gustilo Grade III Open Fracture
- ( ) Other Ipsilateral Injury
- (•) No associated injuries

Submit

Procedure Recommendations

Click Procedure of Interest to View Interactive Literature Review

✓	**Reduction and Immobilization** + 8
✓	**Percutaneous Pinning** + 7
✓	**Volar Locking Plate** + 7
✓	**Fragment Specific Fixation** 7
✓	**Intramedullary Nail** 7
!	**Spanning External Fixation** 6
!	**Non-spanning External Fixation** 6
!	**Dorsal Plate** 6

AUC - DEFINITIVE MANAGEMENT OPTIONS

✓ Reduction and Immobilization +	! Spanning External Fixation
8	6
✓ Percutaneous Pinning +	! Non-spanning External Fixation
7	6
✓ Volar Locking Plate +	! Dorsal Plate
7	6
✓ Fragment Specific Fixation	✗ Immobilization without reduction +
7	1
✓ Intramedullary Nail	✗ Distraction Plate
7	3

CPG

- We are unable to recommend for or against casting as definitive treatment for unstable fractures that are initially adequately reduced.
    - Strength of Recommendation: Inconclusive

- We are unable to recommend for or against any one specific operative method for fixation of distal radius fractures.
    - Strength of Recommendation: Inconclusive

- Practitioners should generally follow a Moderate recommendation…
- Practitioners should feel little constraint in following a recommendation labeled as Inconclusive…

Distal Radius Fractures

- Kreder HJ, Hanel DP, Agel J, et al. Indirect reduction and percutaneous fixation versus open reduction and internal fixation for displaced intra-articular fractures of the distal radius. J Bone Joint Surg Br. 2005;87(6).
  - Randomized
  - 179 patients
  - Ex-fix and pinning versus ORIF.
  - Outcomes: Musculoskeletal Function Score, SF-36.
  - 3-6 month improved MFS scores in external fixation group.
  - After 6 months no significant difference in outcomes scores

Distal Radius Fracture

- Wei DH, Unstable Distal Radius Fractures Treated by External Fixation, Radial Column Plate, or a Volar Plate, JBJS, 2009
  - Randomized
  - 46 patients
  - Average age 55, but inclusion criteria included all 18+ with unstable distal radius fracture.
  - Ex-Fix with pins versus ORIF (including volar plate and radial column)
  - All three produced functional outcomes not different from the general population at 1 year.
  - DASH significantly better with volar plate at all times, most notably at 3 months.
  - Notable that study was powered for DASH score, not for functional outcomes.

Summary of Management

- Closed Treatment
  - If reduction performed, maintain in reduction splint for 2 weeks, then transition to brace, splint, or cast for 4 weeks.
  - Check radiographs weekly for first 2-4 weeks (variable).
  - Avoid “routine” radiographs- we are looking for displacement to a level where a change in treatment would be indicated. If there is no chance that treatment would be changed, or low likelihood of displacement, there is no need to frequently re-radiograph (or at all). This doesn’t necessarily mean don’t see them back.

Summary of Management

- Operative management
  - Volar plate in most situations but try to avoid tunnel vision.
  - Don’t underestimate the power ligamentotaxis and spanning fixation.
  - Regional block - significant improvement in pain control in first 24 hrs and significant decrease in narcotic use postoperatively.
  - You’ll never make them exactly as they were before, but you can make them better than they are now.

IF YOU GET NOTHING ELSE TODAY:

- FINGER MOTION!!!!
  - EARLY AND OFTEN
  - PUTTY IS OK, BUT NO “SQUEEZY” BALLS OR GRIP STRENGTHENERS
  - THEIR GOAL IS TO MAKE A FIST AND STRAIGHTEN THEIR FINGERS
  - SLOW CONTINUOUS PRESSURE, NOT BOUNCING MOTIONS.
  - OK TO PUSH PAIN TO 5/10.
  - IT WILL HURT, BUT YOU ARE NOT HURTING THE FRACTURE.