Distal Radius Fractures: Current Concepts, What I do, and AAOS CPG’s

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Chapter 26
Fractures of the Forearm and Distal Radius

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Orthopaedic Knowledge Update Trauma 7

AAOS Clinical Practice Guidelines

No consensus on specific operative method for fixation
Operative treatment for patients > 55 y/o
Locking plates for patients > 55 y/o tx operatively
Rigid immobilization instead of removable splints for Displaced DRF
Removable splints ok for minimally displaced DRF
No reccomendation for elbow immobilization in DRF
Op. repair of (SLIL, LT, TFCC) at time of DRF fixation
Dx Arthro for wrist ligaments?
Dx CT for intra-articular fxrs
No recc for supplemental bone grafts w/ locking plates
DRF tx Non-op should have xray f/u at 3 wks, and end of immobilization
No recc for 2 or 3 K-wires for DRF fracture fixation
AAOS CPG
• Moderate evidence
  • > 3mm shortening, > 10 deg dorsal tilt, 2 mm art stepoff
  • Rigid immobilization, short casts not removable splints after closed reductionDRF
• Limited evidence
  • removable splints for stable DRFx
  • Arthroscopy
  • CT
  • Fixing ligament injuries

Considerations for Operative versus NonOperative Tx
• Patient age
• General health status
• Bone quality
• Functional requirements and living accommodations
• Concomitant injuries
• Intercarpal ligament injury
• Carpal translation
• DRIJ instability or incongruence

Column Analysis will define instability and surgical indication
• Radial Column
• *Intermediate Column*
  Most Important Lunate facet dorsal and palmar
• Ulnar Column
Lunate facet reduction critical for carpal stability and supination

DRUJ Congruence and Stability
Not determined by size of ulnar styloid fragment

Reduce Facets to Control Carpal Alignment
This is related to outcome

- Lunate facet reduction critical
- Get CT axial view to assess congruence
Carpus will follow articular facets

- Instability of facet fragments following closed reduction indicates ORIF

What I do

- Everyone gets a closed reduction attempt
- Try to get a volar hook of distal fragment palmar to proximal cortex
- If tilt cannot be restored to neutral to 5 degrees of extension fracture may be too unstable to treat closed
- Malunions can be acceptable as long as the patient understands they may lose supination permanently because of DRUJ incongruence
- Shortening of radius may be tolerable to 4 mm if the tilt is not excessive in a dorsal direction
- I get axial CT post closed reduction to insure a congruent DRUJ

What I do when ORIF is elected

- Get traction views of wrist to assess pattern and comminution
- Assess Carpal translation
- Know the optimal surgical approach to control facet displacement
- Manipulate Fx manually or with instruments to obtain reduction or flexor tenotomy when necessary
- Respect watershed line
Case
- 46 y/o RHD female dentist FOOSH L hand while dancing

Post-Reduction - Is it good enough?

1 Week Later - Is it good enough?
At 2 Weeks – There is still time for anything

Standard X-ray Indices for DRFx assessment
Not all equally important
- Radial length
- Radial inclination
- DRUJ congruence
- Articular step-off
- Articular tilt
- X-ray not sensitive to 30 deg rotation on AP - Tornetta et al

CT at 2 weeks - Now what?
At 2 Months

- Pronation: Left 0/70 Right 0/80.
- Supination: Left 0/60 Right 0/80.
- Flexion: Left 0/40 Right 0/60.
- Extension: Left 0/60 Right 0/60.
- Radial Deviation: Left 0/15 Right 0/20.
- Ulnar Deviation: Left 0/25 Right 0/30.

At Last OT F/U - 3 Months - Excellent outcome

- Pronation: Left 0/70 Right 0/80.
- Supination: Left 0/60 Right 0/80.
- Flexion: Left 0/40 Right 0/60.
- Extension: Left 0/60 Right 0/60.
- Radial Deviation: Left 0/15 Right 0/20.
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- Back to work as a dentist no complaints
- Flex/ Ext continues to improve up to 1 year - our study

Supination = Patient satisfaction

- Check axial CT of DRUJ.
- If tilt is less than 10 degrees dorsal then shortening of up to 5 mm is acceptable.
- Plain films may suggest lunate facet displacement if radius of curvature on lateral is much larger than the lunate contour.
- I will often check my patients after closed reduction to see if I can fully supinate them by providing slight traction and rotation only through the forearm not the hand.
- A block to full supination suggests DRUJ incongruity.
Case
- 38 y/o RHD university maintenance worker and former major league baseball pitcher fell down 6 stairs at home.

Post-Reduction - Is this acceptable?

1 Week Later- Is this acceptable?
CT at 2 weeks - Is this acceptable?

Healed @ 6 weeks - Outcome?

At 2.5 Months - nearly full motion, no pain, full function
Outcomes

Prediction of Instability in Distal Radial Fractures

- Data on 4000 DRFx's prospectively recorded
- Pt age, metaphyseal comminution, ulnar variance were most consistent predictors of outcome
- Dorsal angulation not significant
- Maintain supination and patient usually satisfied

Case

- 81 y/o woman s/p fall on dominant wrist

Closed reduction—? Acceptable alignment
Conclusions
• Even among highly active older adults, distal radius malunion does not affect functional outcomes
56 y.o. F S/P fall
Fx deceptively benign in appearance

Articular surface distal radius looks congruent
? RX closed vs open

If carpus translated lunate facet unstable
Motion will be lost especially in supination
Must Medialize plate to capture lunate facet

One approach won't do it for all fracture patterns

- Trans FCR utilitarian
- Volar lunate facet - midline/CT approach
- Radial column - through 1st DC
- Dorsal facet - between 4th-5th DC

Case: Volar Barton’s Fx
54 y.o. Physician fell while rollerblading
Despite casting, Fx displacement with stable plate.

Lunate Facet Escape.

FCR approach requires lots of traction to see medially- good for screws not for median nerve.
Median nerve is behind this Weitlander

Pearl
- Take down of pronator quadratus should be performed with 1/3 of the adjacent and contiguous brachioradialis tendon
- This will make a secure repair over the plate achievable

This plate is not medial enough and single screw may not hold this lunate facet

Midline approach for displaced Volar Barton's

Modified Carpal Tunnel Approach

- Division of transverse carpal tunnel ligament
- Division of fascia between finger flexors and FCU
- Divide pronator quadratus from ulnar attachment
- Mobilize other tissues as necessary

Midline approach allows precise plate placement
CT scan with screws in ideal position

CT scan demonstrating subchondral support preventing dorsal collapse

Axial CT medial screw capture of sigmoid notch
Case: 63 yo RHD F. fall- volar Barton’s
Don’t forget about DRUJ stability

Always Test DRUJ stability after radius ORIF

ORIF then DRUJ stress testing
If unstable, repair TFCC attachment
suture anchor looped around TFCC
Don’t Forget the Dorsal Lunate Facet

- Volar plate even with locking screws may not control thin, comminuted, osteoporotic fragments
- Screws cannot be bicortical dorsally because of tendon rupture
- Consider second incision and dorsal facet plate along with a primary volar locking plate
- Especially so when the volar cortex is either unbroken or nondisplaced
- This occurs with die punch injuries
- Go where the money is – Sutton’s Law

Case: 50 y/o F s/p fall
Dorsal displacement with intact volar cortex

Approach?

- Mostly it can be captured by a well placed volar locking plate
- However you cannot achieve bicortical purchase for fear of tendon irritation/rupture
- In thin osteopenic cortices it may be necessary to make a dorsal incision between 4th and 5th DC and place a small buttress plate
- Also in the dorsal die punch injury the volar radial cortex is unbroken and so primary dorsal approach is indicated after elevation of articular fragment
My Preferred Approach to the Dorsal Lunate Facet

Dorsal Approach to the Wrist for Lunate Fossa Fractures and DRIU Pathology

- Incision along ulnar border of distal radius
- Divide retinaculum between EDM and EDC
- Subperiosteal elevation under EDC for lunate fossa fractures
- Create window between EDM and ECU for DRIU pathology

For late fracture 2-3 weeks- Liftoff Technique

wires parallel to deformity and plate when brought to bone recreates the tilt

6 month follow up: DASH=5.0
Reduction must be obtained for plate to sit properly and thus avoid encroachment of tendons.

Plate must not encroach watershed line.

5 yrs s/p ORIF – FPL rupture

Screws must look short on lateral or they are out.

- Make screws short to avoid tendon injury.
- However facet capture may be inadequate.
Tendons do not tolerate screw prominence

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