Fractures of the Distal Radius: Volar, Dorsal, or Both?

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DISCLOSURES

- Hassan R. Mir, MD, MBA, FACS
  - Paid Consultant for a Company or Supplier
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    - Zimmer Biomet
    - Trice Medical
  - Stock or Stock Options
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Evolution of Distal Radius Fracture Treatment

[Chung Hand Clinics 2012]

- Casting - Cotton-Loder Position
- Pins & Plaster
- External Fixation
Evolution of Distal Radius Fracture Treatment

- Non-Locked Plating
- Fixed Angle Volar Plates

Operative Treatment of DRFx
Volar Locked Plating ~ 20 years

Fixed Angle Volar Plates
What We Do Know…

Surgical Fixation of Fractures with:
- Post-Reduction Radial Shortening of >3mm
- Dorsal Tilt >10 Degrees
- Intra-Articular Displacement or Step-off >2mm
Volar Locking Plate Complications

- Tendon Related
  - Flexor Tendon Rupture
  - Extensor Tendon Rupture
- Osseous Complications
- Nerve Injury
- CRPS

Volar Plate Prominence

Soong JBJS 2011

4% Flexor tendon rupture
3% Flexor tendon "irritation"

Soong JBJS 2011
Fracture Dictates Plate Placement

1. EDUCATE THE PATIENT
2. CLOSE FOLLOW UP IF PLATE IS GRADE 1 OR 2
3. DISCUSS POSSIBLE PLATE REMOVAL

1 yr.

Extensor Tendon Complications

Shape of Radius → Difficult to Determine Screw Prominence

Anatomy Lister’s Tubercle

[ Clement JHS 2008]

Height (H3) : 4-10 mm
AVOIDING Extensor Tendon Complications

- Dorsal Tangential View [Babst JHS 2014]
- Supinated & Pronated Oblique Views [Maschke Hand 2007]
- Know standard screw lengths
- Locked unicortical distal screws > 75% length [Calfee JHS 2012]
- Unicortical Drilling [Al-Rashad JBJS Br 2006]
Supinated & Pronated Oblique Views
[Maschke Hand 2007]

**Osseous Complications**
Avoiding Intra-Articular Hardware

- Clinical Exam
- 20° Lateral Tilt View
- PA View of Joint/DRUJ
- Live Fluoro
- Arthroscopy
- Arthrotomy

**Neurologic Complications**

- Median Nerve
- Retraction Injury
  - Create Mobile Window
  - Blunt Retractors
  - Release Frequently
- PCBMN at Risk with Exposure
  - 8-11% within FCR sheath
  [Hutchinson ASSH 2008]
Acute Carpal Tunnel Syndrome

- Occurrence 5.4% of DRFx
- #1 Risk: Fracture Translation
- Numbness from Swelling/Splint
- Pre-existing CTS
- Release – Avoid CRPS

CRPS

- It sees you more than you see it.
- 10-37% of DRFx
- Female, Older Age
- Intra-Articular Fractures
- TYPE 2 – Associated with CTS
  - CTR if Symptomatic
- Vitamin C – No Benefit [Evaniew JOT 2015]

Fracture Considerations

- Anatomic Reduction and Rigid Fixation
  - Lateral & Intermediate Columns
- Medial Column (Ulna) Stabilized as Necessary
- Allows for Early Mobilization
Fracture Pattern → Determines Fixation

LIMITATIONS TO STANDARD VOLAR PLATING

Helpful Tools:
Dorsal Plating
Distal Volar plates
Fragment Specific Fixation
Dorsal Bridge Plating
External Fixation

“Critical” Fragments
[Wolfe - Oper Tech Sports Med 2010]

Radiographic Evaluation
[Medhoff - Hand Clinics 2005]
BEWARE with **Standard** Volar Locked Plating

- Volar Ulnar Corner Fragment*
- Dorsal Ulnar Corner Fragment
- Unstable Radial Styloid Fragment
- Dorsal Shear Fracture (Barton’s)
- Marginal Articular Fractures

New Technologies

- Variable Angle Locking Plates
  - Distal Screws have +/- 15° spread with Locking Capability
- Better Contour
- Lower Profile
- Fragment Specific

Anatomy → Volar Ulnar Corner

- Short Radio-lunate Ligament
- ATTACHES TO VOLAR ULNAR CORNER
- Capus follows this fragment
Dorsal Ulnar Corner

BEWARE – Flexor Tendons & Median Nerve

Evaluate for Associated Injuries

Dorsal Shear Fracture

Unstable Radial Styloid

Evaluate for Associated Injuries
Marginal Articular Fractures

Marginal Articular Fractures

Dorsal Bridge Plate

- Internal External Fixator
- Communion + Metadiaphyseal Extension
- High Energy Polytrauma
- Early Weight Bearing
- Elderly (Ruch, JHS 2012)

Zero bone-to-bar distance
Marginal Articular Fractures

Marginal Articular Fracture + Metadiaphyseal Extension + Polytrauma

DBP → Outcomes at 1 year

[Hanel JHS 2015]
Conclusions

1. Careful Evaluation of C-arm images +/- Contralateral Films
2. Know Your Implant System
3. Implant Placement (Volar/Dorsal/Both)
   = Determined by Fracture(s)
4. Have a DBP Available

THANK YOU