Distal Radius Fractures: Complications & Limitations of the Volar Approach

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Disclosures

Journal Reviewer
Journal of Bone and Joint Surgery
Journal of Orthopaedic Trauma
Journal American Academy of Orthopaedic Surgery
Technique in Orthopaedics

Paid Faculty
Zimmer-Biomet

Distal Radius Fractures

• Volar plating complications
• Anatomic Considerations
• Volar plating Limitations
Evolution of Distal Radius Fracture Treatment

Chung Hand Clinics 2012

- Casting - Cotton/Loder Position
  - loss of reduction
  - stiffness
  - median nerve compression
- Pins & Plaster
- External fixation Loss of reduction
  - stiffness
  - CRPS
  - Pin tract infections
- Dorsal plating
  - extensor tendon complications

Operative Treatment of DRFx
Volar Plating ~ 16 years

Orbay – Tech Hand Upper Ext Surg 2001

Fixed Angle Volar Plates

Helford-Mavrany | JBJS Br 2014
Volar Locking Plate Complications

- Tendon related
  - Flexor Tendon rupture
  - Extensor tendon rupture
- Osseous Complications
- Nerve Injury
- CRPS

Volar Plate Prominence

- 4% Flexor tendon rupture
- 3% flexor tendon “irritation”

Soong JBJS 2011
Fracture determines plate placement
1. EDUCATE THE PATIENT
2. CLOSE FOLLOW UP IF PLATE IS GRADE 1 OR 2
3. PLAN FOR PLATE REMOVAL

Extensor Tendon Complications
Shape of radius → difficult to determine screw prominence

Anatomy Listers 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]
Osseous Complications
Avoiding intra-articular hardware

• Clinical Exam
• 20° tilt view
• PA of DRUJ
• Live fluoroscopy
• 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
[Dyer JHS 2008]

• 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]

Anatomic Considerations
• Anatomic Reduction and rigid fixation
  – lateral & intermediate columns
• Medial column stabilized as necessary
• Allows for early mobilization

Fracture Pattern ➔ Determines Fixation
LIMITATIONS TO STANDARD VOLAR PLATING
Understand:
- Dorsal Plating
- Distal Volar plates
- Fragment Specific fixation
- Dorsal bridge Plating
- External fixation
“Critical” Fragments

(Wolfe - OperTech Sports Med 2010)

Radiographic Evaluation

(Medhoff - Hand Clinics 2005)

What cannot be fixed with a standard volar plate?

• Volar ulnar corner fragment*
• Dorsal ulnar corner fragment
• Unstable radial styloid fragment
• Dorsal shear fracture (Barton’s)
• Articular shear fracture
Anatomy → Volar Ulnar Corner

Short Radio-lunate Ligament
ATTACHES TO VOLAR ULNAR CORNER
Corpus Follows this fragment

Volar Ulnar Corner
[Harness, Jupiter, Orbay et al - JBJS 2004]

Volar Ulnar Corner Fragment
Unstable Radial Styloid

Evaluate for associated injuries

Marginal Articular Fractures

Marginal Articular Fracture
+ metadiaphyseal extension
+ polytrauma

Marginal Articular Fractures

Dorsal Bridge Plate

- Internal External Fixator
- Commination + metadiaphyseal extension
- High Energy Polytrauma
- Early Weight Bearing
- Elderly [Ruch JHS 2012]
1 wk s/p injury – ORIF radius and ulna

Use external fixator for provisional reduction tool

Summary ORIF DRFx

1. Preop C-arm images
2. Know your implant system
3. Plate placement = determined by fracture
4. Have an ex-fix/DBP available

IN SUMMARY

• FRACTURE PATTERN DETERMINES PLATE PLACEMENT
• REMOVE HARDWARE IF NECESSARY
• CAREFUL INTRAOPERATIVE FLUOROSCOPY
Thank You