Palmar Plating of Distal Radius Fractures – Pearls and Pitfalls

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Disclosure

- Consultant – Biomet/Zimmer

Evolution in Treatment of Distal Radius Fractures

"I just evolved the opposable thumb, and I've already got carpal-tunnel syndrome!"
Percutaneous Pinning

Old ORIF concept:
- Dorsally displaced = Dorsal plate
- Palmarly displaced = Palmar plate
Goals of Treatment

- ORIF

Indications
- Displaced palmar intra and extra-articular fractures

ORIF

- Palmar Barton and Smith Fractures
- ORIF is accepted form of treatment
- Palmar plate is well tolerated
- Exposure radial to FCR has low morbidity
**Cohort Studies: Volar Fixed Angle**

- Kamano, M., Y. Honda, et al. (2002). 33 patients

Follows the contour of the subchondral bone

Pegs and screw locked into plate support articular surface when placed directed under the subchondral bone.
Distally angled pegs neutralize dorsal forces

- Volar buttress neutralizes volar forces

Volar locking plating indications

- Dorsal or palmar angulation
- Intra-articular fractures
- Comminuted fractures
- Osteopenia
3 Months Post OP

Wrist Fractures

ORIF
Complications – Wrong Fracture Type

- Diagnosis - Radial styloid fractures
  - Fracture displacement not well neutralized by volar plating
  - Radial fixation

Complications – Wrong Fracture Type
Complications – Wrong Fracture Type

- Persistently dorsally displaced or angulated
- Leads to prominence of distal plate at watershed line
Complications - Incomplete Reduction of Fracture

- Persistently dorsally displaced or angulated
- Leads to prominence of distal plate at watershed line

Complications by the Steps of the Procedure

- Intraoperative - Plate too distal
- Flexor tendon irritation/rupture

Distally angled pegs neutralize dorsal forces

- Volar buttress neutralizes volar forces
Complication – Plate in Wrong Position

- 68 y.o. man
- PMHx: s/p MI, IDDM, prostate cancer, COPD on steroids
- Right distal radius fracture
- Treated with ORIF (palmar plate by trauma orthopaedic surgeon)
“It doesn’t hurt that bad and I want to go fishing this summer. I don’t know how many summers I have left.”

PE: wrist ext 20°/flex 20°, minimal pain

Asked to return in fall or if pain got worse
“The pain is terrible. I hate the last guy for having done this to me. You got to help me.”

Treatment options?

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**RK - 9/21**

**Intraoperative Culture**

- Results
- **SPECIMEN DESCRIPTION:** RADIUS LEFT TSS
- **GRAM STAIN:** FEW WHITE BLOOD CELLS NO ORGANISMS SEEN
- **CULTURE RESULTS:** SUBCULTURED THROUGH BROTH STAPHYLOCOCCUS SPECIES COAGULASE NEGATIVE SUSCEPTIBILITY PATTERN CONFIRMED BY ALTERNATIVE METHOD NO ANAEROBES ISOLATED
Complications– Positioning Plate

- Intra-operative - Plate too proximal
  - Poor contact of locking screw/peg with subchondral bone
  - Leads to collapse which may lead to hardware failure
  - Drobetz (J Hand Surg Am 2006)
    - Placement of locking screw >4 mm proximal to subchondral bone led to 50% reduction in radial length and 50% reduction in rigidity of load to failure

Fixed Angle K-Wires

- Allows for provisional plate placement
- Maintains reduction
- Allows you to assess peg placement prior to drilling
Plate Too Proximal

Intra-operative:
- Ulnar screw in sigmoid notch
- Impingment of ulnar head on plate
- Radial screws intra-articular

Complications - Plate Too Ulnar
CB

- 32 yo female massage therapist
- S/p ORIF of distal radius 3 months ago
- Restricted, painful supination
- Placed in dynamic forearm brace

Intra-Articular Screw Placement

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Complications – Screws Too Long

- Irritation of extensor tendons
  - EPL most commonly ruptured
  - Causes, Benson (CORR 2006)
  - Postreduction bone spurs
  - Dorsal gapping
  - Prominent screw tips

Complications – Screws Too Long

- Difficult to determine screw length intraoperatively, Greenberg (J Hand Surg Am 2009)
- Fluoroscopy sensitivity in detecting cortical penetration
  - 82% sensitive in the radial-most position
  - 77% sensitive in the central position
  - 57% sensitive in the ulnar position

Complications – Screws Too Long

- Treatment
  - High index of suspicion
  - Undersize locking/screw peg
  - Remove hardware if irritation occurs
Complications – Screws Too Short

- Poor support with subchondral bone
- Locking screws/pegs need to be in contact with dorsal subchondral bone
- Locking screws/pegs need to be at least 75% of the AP diameter of the subchondral surface

Conclusion

- Volar locking plates have expanded the indications for ORIF of unstable distal radius fractures
- Not every operative distal radius fracture requires a volar plate
- Careful attention to surgical details is paramount to obtaining a good surgical result
Conclusion

- ORIF of distal radius has not become so easy that even a cave man can do it.

THANK YOU