Case Presentation: Comminuted Radial Head Fracture

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Disclosures
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Case: 55 y/o F, Fx Dislocation
Options?

1. Closed Reduction
2. ORIF
3. RH Replacement

After closed reduction?

Assess potential for forearm rotation - Then?

1. If forearm can rotate without block - closed Rx in LAS
2. If rotation blocked then ORIF with IM headless screw
3. If rotation blocked then ORIF with prox radius locking plate
4. Do primary radial head excision
Essex – Loprest Injury

- Injury to IOM especially critical central 1/3
- Difficult in the acute setting to insure stability despite careful distal examination of the DRUJ for pain or instability
- MRI may help - doesn’t predict whether after a primary radial head resection if there will be significant proximal radial migration
- This leads to ulno carpal impingement
- Late salvage is difficult and diaphyseal ulna shortening usual RX

Neck broken – Now what?

1. Open reduction with headless bone screws 0%
2. Open reduction with proximal locking T plate 0%
3. Radial Head Replacement 0%
4. Continued closed Rx to malunion and then late excision of RH 0%

My premise is that all radial head fractures may be associated with ligament injury: MCL, IOM

Therefore we must either save the head or replace it

If radial head is displaced
- Fix or replace, don’t excise
If radial head is not displaced
- Aspirate + inject local anesthetic
  → early motion
My plan: LUCL repair with suture anchor, monoblock press fit RH prosthesis

Joint is subluxed → Increase flexion

How to Rx this subluxation?

1. Re-operate with MCL repair 0%
2. Re-operate with anterior capsular repair 0%
3. Re-operate with spanning external fixator, static or dynamic 0%
4. Continue splinting and start isometric elbow flexion exercise 0%

23 patients (5 non-op, 18 operative)
- Slight residual subluxation after treatment
- Prescribed active elbow exercises and avoidance of shoulder abduction

Residual subluxation of the elbow after dislocation or fracture-dislocation: Treatment with active elbow exercises and avoidance of varus stress

Andrew S. Stakeholders, MD

2008:17:276-280
Case: RH replacement and HO complication
71 y/o F fell while roller skating
L elbow fx dislocation, radial head and neck fx, distal radius intra-articular fx

@ 1 year elbow stiffness
ROM
• flexion/extension: 30-95 deg
• supination: 70 deg
• pronation: neutral
Block to flexion due to large anterior HO

1 month s/p release and excision of heterotopic bone
• DASH: 19.0  flexion/extension: 25-125

Post op films
Fix vs Replace - different challenges and complications

PROSTHESIS
- Improper sizing limits motion and accelerates OA
- Loosening
- Instability
- Capitellar wear

ORIF
- Nonunion / malunion
- Synostosis

Both
- Nerve injury
- Stiffness
- Infection
- HO

PEARLS AND PITFALLS: IMPLANT SELECTION
- Monoblock vs bipolar: radial head is elliptical not spherical
- Mobile bearing vs fixed axis
- Press fit stem vs cemented
- Straight vs curved stem
- Motion around head - stem interface or in canal around stem
- Modularity to allow easier insertion

IMPLANT CHOICES...
- Vitallium (Howmedica / Stryker): my custom
- Swanson: silicone elastomer, historical
- Ascension: cobalt chrome, press fit, resection guides
- Solar (Stryker): monoblock, cobalt chrome, cemented fixation
- Liverpool (Biomet): monoblock, angled surface, offset stem
- Evolve (Wright): modular, cobalt chromium
- Head System (SBI): cobalt chrome, modular, cutting guide
- Katalyst (KMI): modular, cobalt chrome, telescoping shaft, bi-polar neck design
- Judet (Tournier): bipolar, cobalt chromium with polyethylene insert, cemented, stem angled 15°
- Align (Skeletal Dynamics): modular
2 year FU: lucency around press fit implant stem
What should you consider?

Options?

1. Revise prosthesis to bigger press fit stem 0%
2. Revise prosthesis to cemented stem 0%
3. Remove prosthesis 0%
4. Continue to observe 0%

@ 7 months
Stable elbow, no pain, exc ROM
@ 2 years

Back to work, 90/90 pronosupination, mild ache
STEM LUCENCY NOT A SIGN OF FAILURE

67 y. F- Fx dislocation- RH and neck Fx

After reduction RH still displaced and block to motion
Options?

1. ORIF with IM headless screws 0%
2. ORIF with proximal radial locking plate 0%
3. Primary excision of radial head 0%
4. Continued closed Rx and late excision of RH 0%

ORIF performed
What approaches?

Surgical approach to RH

- Kaplan-ECRB-EDC interval
- Kocher-Anconues-ECU interval
Surgical approach to RH

Photo of the area visible from the limited Kocher approach with the LUCL intact

Photo of the area of the coronoid visible from the proximally extended Kaplan approach. The tendon origin of the EDC is preserved, while the ECRB is divided and reflected anteriorly.
Comparison of Exposure in the Kaplan versus the Kocher Approach in the Treatment of Radial Head Fractures

Accepted for publication in HAND

Abstract:
• Conclusions: The Kaplan approach affords significantly greater visible surface area of the proximal radius than the Kocher approach.

ORIF through Kocher approach

• Immediate PIN palsy
• No recovery @ 4 months
Now What?

1. Observe for another 2-4 months for nerve recovery
2. Do hardware removal
3. PIN neurolysis/nerve grafting
4. Radial nerve tendon transfers

P.I.N. Palsy post ORIF radial neck

Moral of this story
- See and protect the PIN during this procedure
- Don’t rely on “SAFE” intervals
- Don’t use Homan levering retractors as it will stretch the nerve
Do not overstuffed the joint
After insertion assess ROM and prevent capitellar impingement in flexion

Technical Pearls
Resected radial head is the best template for sizing the implant
Move elbow through ROM after insertion to observe radio-capitellar contact and to scrutinize the height and diameter of the implant
Examine for parallelism of the medial ulnotrochlear joint space via fluoroscopy
Examine DRUJ alignment and ulnar variance
Avoid over-lengthening the radius—excessive capitellar loads can cause early capitellar degeneration
Case: 3.5 years FU, RH loaded – bone remodeling

Video - Stable elbow with power

Case: 30 y/o M slip and fall
Post-reduction

VIDEO

Postop x-rays
9 months Post-op

- Patient ROM 10-130
- Minimal Pain
- Returned to Work as Construction Worker
- elbow STABLE

Key Point

Coronoid Fixation necessary only if elbow unstable
- Check intra-op for valgus and varus instability at 30 degrees flexion

Case: 65 y/o RHD F, Fracture dislocation
Question: lateral column reconstruction?

1 Radial head replacement 0%
2 Radial head ORIF 0%

6 weeks post-op

1 year follow up
Pearls

Kaplan approach preferred over Kocher
  • Better visualization, better access, protect vital structures

Undersize the head when replacing
  • Intraoperative visualization of lateral ulnohumeral joint space

Partial radial head resection / fragment excision not a good option

Fix the head with headless bone screws if less than 3 fragments

Fix the LUCL always, coronoid and MCL, ant capsule when necessary

Elbow must be stable from 30-130 at surgery

Thank You