Radial Head Fractures: Repair-replace

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Nothing in this presentation is related

Consensus backed up by literature
Radial Head Fracture
Don’t excise
Can never be sure there isn’t an Essex-Lopresti IOM injury
Fix all “fixable fractures”
That means not more than 3 parts and preferably 2 parts
More than that is a radial head prosthesis
For me a monoblock, press fit, straight stem
Not overstuffed
“Clinical outcomes for elbow joint stability, grip strength, pain frequency, and range of extension and supination motions were in favor of ORIF, compared with radial head excision, which is also associated with more complications.”

Open Treatment of Radial Head Fractures
Adams J E \textsuperscript{1,2}, Semsa S \textsuperscript{1}, Steinmann S P \textsuperscript{1,2}

Outcomes following radial head fixation, resection, or arthroplasty for isolated radial head fractures are generally favorable. Loss of motion is particularly problematic in the pronation-supination arc in the setting of plate fixation, and patients are generally counseled that implant removal is often necessary. Loss of motion in the flexion-extension arc, particularly loss of terminal extension, may be noted. Resection of the radial head results in radiographic evidence of degenerative changes along the ulnohumeral joint, but this may be well tolerated as symptoms develop slowly, particularly in older patients. Radial head replacement results in changes in the capitellum over time, but these are usually asymptomatic.

The Best Option in Treatment of Modified Mason Type III Radial Head Fractures: Open Reduction and Internal Fixation Versus Radial Head Excision

“Clinical outcomes for elbow joint stability, grip strength, pain frequency, and range of extension and supination motions were in favor of ORIF, compared with radial head excision, which is also associated with more complications.”

Case: 55 y/o F, Fx Dislocation

[Image of X-ray showing elbow joint]
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 with replacement
Radial Head Algorithm

Get CT scan to help with decision making
Younger patients try to fix the fracture
If not RH prosthesis must be available
Understand and fix the instability pattern associated with injury to LUCL, MCL, coronoid

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

LUCL repair with suture anchor, monoblock press fit RH prosthesis

If Joint is subluxed → Increase flexion

How to Rx this subluxation?
1. Re-operate with MCL repair
2. Re-operate with anterior capsular repair
3. Re-operate with spanning external fixator, static or dynamic
4. Continue splinting and start isometric elbow flexion exercise
23 patients (5 non-op, 18 operative)

- Slight residual subluxation after treatment
- Prescribed active elbow exercises and avoidance of shoulder abduction

Stable elbow in 23/23

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

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
Soler (Stryker) - monoblock, cobalt chrome, cemented fixation
Liverpool (Biomet) - monoblock, angled surface, offset stem
Evolve (Wright) - modular, cobalt chromium
R-Head System (SBI) - cobalt chrome, modular, cutting guide
Katalyst (KMI) - modular, cobalt chrome, telescoping shaft, bi-polar neck design
Evolve (Wright) - modular, cobalt chromium

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
2. Revise prosthesis to cemented stem
3. Remove prosthesis
4. Continue to observe
@ 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
2. ORIF with proximal radial locking plate
3. Primary excision of radial head
4. Continued closed Rx and late excision of RH

ORIF performed
What approaches?
Surgical approach to RH

Kaplan- ECRB- EDC interval

Kocher- Anconues- ECU interval

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- Our Study

HAND 2018

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

Determination of Correct Implant Size in Radial Head Arthroplasty to Avoid Overlengthening

Do not overstuff 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
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

2. Radial head ORIF

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