Fractures of the Distal Ulna Associated with Fracture of the Distal Radius

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Fractures of the Distal Ulna

**Anatomy**
- The dorsal and volar radioulnar ligaments (TFCC) originate at the base of the ulnar styloid.
- A displaced fracture of the distal radius is likely to tear the TFCC or fracture the ulna.
Foveal Attachment to Distal Ulna
Physical Examination

- Palpate for tenderness at or near the foveal attachment of the TFCC
- Palpating soft spot bordered by
  - ECU
  - FCU
  - Ulnar Styloid
  - Triquetrum
Physical Examination

- Manipulate DRUJ in a dorsal and volar direction to determine instability or pain (in pronated, supinated and neutral forearm rotation).

- Should also be done after fixation of the distal radius fracture. If asymmetric to opposite side may suggest need for repair of ulna fracture or TFCC tear.
Fractures of the Distal Ulna

- AO Classification—
  Q Modifier for ulna fracture
- Q1. Ulnar styloid base
- Q2. Ulnar neck-simple
- Q3. Ulnar neck-commninated
- Q4. Ulnar head
- Q5. Ulnar head and neck
- Q6. Ulnar diaphysis
Which Injuries Need to be Fixed?

Type 1 - probably stable

Treatment of Type 1 Injuries

- These are by definition stable injuries

- Styloid tip fractures require minimal casting or splinting for comfort

- Short course of immobilization for stable ulnar neck fractures is usually required
Which Injuries Need To Be Fixed?

Type 2 - possibly unstable

Treatment of Type 2 Injuries

- Mild instability and no ulnar fracture indicates a mild to moderate ligament injury which may respond to treatment by:
  - Pinning the ulna to radius and a long arm cast for 4 to 6 weeks
Treatment of Type 2 Injuries

- Gross instability and no fracture indicates a more severe ligament tear which should be treated by:
  - Arthroscopy to evaluate ligaments
    - TFC usually torn from either radial or ulnar attachment
  - Arthroscopic or open repair to capsule, fovea, or radius

Repair of Palmer type IB tear
Treatment of Type 2 Injuries

An unstable distal radioulnar joint associated with a base of ulnar styloid fracture can be fixed in a multitude of ways:

- Suture anchor repair using the suture material in a tension band fashion
- Percutaneous K-wire +/- casting
- Tension band wiring
- Pin Plating
Which Injuries Need To Be Fixed?

Type 3 - probably unstable

Unstable lunate facet fx

Unstable ulnar head and neck fx

Treatment of Type 3 Injuries

- Radius fractures of the dorsal ulnar or volar ulnar facets, can lead to instability as they represent avulsion injuries of the dorsal and volar DRUJ ligaments and disrupt the bony architecture of the sigmoid notch [REF]

- If found to be unstable should anatomically repair the bony architecture.

Treatment of Type 3 Injuries

Markedly comminuted ulnar neck fractures can be repaired although it may be technically challenging. Screw fixation is often not optimal.

We have had some success using locking plates designed for radius or small bone fixation and bending them to fit the ulna for fixation.
Unstable DRUJ Lesions

Associated with:

- Intact ulna and >20° - 30° dorsal tilt or marked radial collapse
- >5-7mm positive ulnar variance
- Interosseous membrane and/or TFCC torn

Patient 1: Sue

Question 1

- 50-year-old woman
- Tripped on the edge of a rug at home

Circle the fracture of the ulna.
Sue

Answer 1

- 50-year-old woman
- Tripped on the edge of a rug at home

Circle the fracture of the ulna.

The circled area is CORRECT.
Based upon the patient’s radius and ulna fractures, how likely is it for her to have DRUJ instability?

a) Very likely
b) Somewhat likely
c) Unlikely
Based upon this patient’s radius and ulna fractures how likely is it for her to have DRUJ instability?

a) Very likely ? No.
b) Somewhat likely ? No.
c) Unlikely ?

CORRECT. The radius fracture is only moderately displaced. The small tip of styloid fracture does not correlate either positively or negatively to DRUJ instability. It is therefore critical to evaluate the DRUJ and compare it to the opposite wrist after reduction and fixation of the radius.
PA radiograph after plate and screw fixation
Patient 2: Tina
Question 1

- A 40-year-old female fractured her wrist while rollerblading
- Radiographs taken immediately after the injury are shown

Circle the ulna fracture.
Tina:
Answer 1

- A 40-year-old female fractured her wrist in a fall while roller skating.
- Radiographs taken immediately after the injury are shown.

Circle the ulna fracture.
The circled area is CORRECT.
Tina: Fx of the Base of the Ulnar Styloid

Question 2

Fracture of the base of the ulnar styloid

- What is the most likely status of the TFCC?
  a) Completely torn
  b) Partially torn
  c) Intact
What is the most likely status of the TFCC?

a) Completely torn
   Possibly. In multiple studies of radius fractures, greater than 50% of injuries resulted in TFCC disruption. Correlation was closest with shortening and dorsal angulation of the radius.

b) Partially torn
   Most likely. Due to the amount of displacement of the radius, it is very likely that there is some injury to the TFCC injury, which may lead to DRUJ instability.

c) Intact
   Least likely. The presence of an ulnar styloid fracture does not prevent a concomitant injury to the TFCC. The lack of correlation between ulnar styloid fractures and TFCC injuries in radius fractures has been shown in several studies.
Patient 3: Eric

Non-operative Treatment of Ulnar Styloid Base Fracture

PRE-OP...

- 37-year-old male with comminuted intra-articular radius fracture after fall from scaffold
Eric
Non-operative Treatment of Ulnar Styloid Base Fracture

POST...
- No symptoms or signs of DRUJ instability after ORIF distal radius and no treatment of displaced ulnar styloid base fracture required.
Eric: Fracture of the Base of the Ulnar Styloid

Question 1

How common is DRUJ instability after distal radius fracture with a fracture at the base of the ulnar styloid?

- a) Very common. The ulnar styloid fracture should always be repaired.
- b) Somewhat common. The ulnar styloid fracture should be considered for repair in specific circumstances.
Some opinions in these slides are contrary to what much of the literature of the past 15 years states. (The older literature suggests more aggressive treatment of the ulnar styloid fracture.) This may be due to our improved ability to restore radius--and therefore sigmoid notch anatomy--and regain DRUJ stability without the need to address the ulna fracture or related soft tissue injuries.
**Eric: Fracture of the Base of the Ulnar Styloid**

**Answer 1**

How common is DRUJ instability after distal radius fracture with a fracture of the base of the ulnar styloid?

_a) Very common._ The ulnar styloid fracture should always be repaired.

No. When the radius heals in adequate alignment, the DRUJ is usually stable, even if the ulnar styloid base fracture does not have radiographic union.

_b) Somewhat common._ The ulnar styloid fracture should be considered for repair in specific circumstances.

No. With new techniques in management of the distal radius leading to near anatomic restoration of distal radius alignment, DRUJ instability seems to be less common. If there is clinical instability after radius fixation the ulnar styloid base fracture or DRUJ needs to be stabilized.

_c) Uncommon._ The ulnar styloid fracture rarely needs specific treatment. **CORRECT.** The indications for ulnar styloid fixation are incompletely defined. Clinical assessment of DRUJ stability after radius fixation is the best determinant of whether ulnar styloid repair is indicated.
Eric: Fracture of the Base of the Ulnar Styloid

Answer 1

How common is DRUJ instability after distal radius fracture with a fracture of the base of the ulnar styloid?

a) Very common. The ulnar styloid fracture should always be repaired.
   No. When the radius heals in adequate alignment, the DRUJ is usually stable, even if the ulnar styloid base fracture does not have radiographic union.

b) Somewhat common. The ulnar styloid fracture should be considered for repair in specific circumstances.
   No. With new techniques in management of the distal radius leading to near anatomic restoration of distal radius alignment, DRUJ instability seems to be less common. If there is clinical instability after radius fixation the ulnar styloid base fracture or DRUJ needs to be stabilized.

   1. CORRECT. The indications for ulnar styloid fixation are incompletely defined. Clinical assessment of DRUJ stability after radius fixation is the best determinant of whether ulnar styloid repair is indicated.
If the Eric is found to have DRUJ instability after fixing his radius, what are some of the available options for fixing the ulnar styloid fracture? Name at least 2.

- _______________________
- _______________________
- _______________________
- _______________________
- _______________________
If the Eric is found to have DRUJ instability after fixing his radius, what are some of the available options for fixing the ulnar styloid fracture? Name at least 2.

Any 2 of these 4 is CORRECT.

- Percutaneous pinning
- Suture anchor
- Tension band wire
- Screw or plate and screw
What are the options for fixation of an ulnar styloid base fracture?

- **Percutaneous pinning**
  - Technically simple, but this does not compress the fracture and usually requires immobilization of the wrist and forearm. Likely has the highest nonunion rate of the four techniques.

- **Suture anchor**
  - Can be a useful technique and alternative to tension band wire. 
    *See video, screen 35*

- **Tension band wire**
  - Most widely used technique because it combines the use of small wires and fixation engaging the soft tissues so that it does not rely on bony fixation alone. Hardware frequently needs to be removed.

- **Screw or plate and screw**
  - Screws can be too large for the styloid, but a technique using a pin-plate can be used. *See video, screen 36*
Eric: Fracture of the Base of the Ulnar Styloid
Answer 4, continued

Video: Courtesy of Brian Adams, MD
Eric: Fracture of the Base of the Ulnar Styloid
Answer 4, continued
Eric: Fracture of the Base of the Ulnar Styloid
Answer 4, continued

Tension band fixation
Eric: Fracture of the Base of the Ulnar Styloid
Answer 4, continued

Pre-op: Pin plate fixation
Eric: Fracture of the Base of the Ulnar Styloid
Answer 4, continued

Pin plate fixation
Patient 4: Mary

Ulnar neck fracture

- 70-year-old woman tripped and fell
- Unstable comminuted fractures of the distal radius and potentially stable ulna fracture
Mary: Ulnar Neck Fracture

Question 1

What is your preferred treatment of the ulna fracture?

a) No specific treatment
b) Percutaneous pinning
c) Plate and screw fixation
d) Excision of the distal ulna
What is your preferred treatment of the ulna fracture?

a) No specific treatment
   CORRECT. Provided that the ulna fracture lines up reasonably well and is not unstable, it is likely to heal in good alignment. This is the BEST treatment option in the majority of patients.

b) Percutaneous pinning.
   It may be difficult to reduce the fracture without opening it. Percutaneous pins provide limited fixation and are associated with pin tract problems.

c) Plate and screw fixation
   Possible. This is feasible if fixed-angle implants are used. Standard plates are likely to fail in the osteoporotic metaphyseal bone. Locking plates may be the preferred treatment for the uncommon fracture that remains malaligned or unstable after alignment and fixation of the distal radius. This option also allows for more rapid mobilization.

d) Excision of the distal ulna.
   Possible. Excising the distal ulna avoids ulnar impaction if there is any radial collapse. It can also prevent mechanical impingement in the DRUJ in the extremely comminuted segment. The distal ulna could also be used as bone graft. Resection of the distal ulna is reasonable in a low-demand older patient, but is less optimal in younger, more active patients.
Mary: Ulnar Neck Fracture

Question 2

What should be done for Mary?
Mary: Ulnar Neck Fracture
Answer 2

What should be done for Mary?

- The ulna fracture was stable and well aligned after alignment fixation of the radius.
- It healed with good forearm function.
Mary: Ulnar Neck Fracture
Answer 2, continued
Patient 5: Elsa

A 20-year-old woman was injured in a car crash.
Elsa: Ulnar Neck Fracture

- The ulna fracture remained poorly aligned after ORIF of the distal radius.
- A direct ulnar exposure was made and the ulna was fixed with a locking plate and screws.
Patient 6: Rita
Ulnar Head Fracture

- A 30-year-old woman was injured in a fall.
- The fracture of the distal ulna created separate head fragments.
Rita: Ulnar Head Fracture

- After open reduction and internal fixation
Displaced Ulnar Head Fxs
Involving Sigmoid Notch

Screws need to be subchondral
With Displaced Comminuted Ulnar Head Fxs in the Elderly

May be better to consider a primary Darrach
Irreparable Comminuted Displaced Ulnar Head Fxs in Young Patients

- 1° Arthroplasty
  - Maintain stability and support of ulnar column
  - Avoids problems associated with a Darrach

Summary

- With distal ulna fractures, the surgeon needs to evaluate:
  - DRUJ stability
  - Possible ulnar sided ligament tears
  - Articular congruity
Summary

- How to repair
  - K wires
  - Tension band wire
  - Suture anchors
  - Ulnar pin plate/Wireforms
  - Plates/screws
  - Ulnar head replacement
  - TFC repair
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