

Carpal Injuries

**AO Advanced Principles of Fracture Management
Fredericia, 25.-28 April 2022**

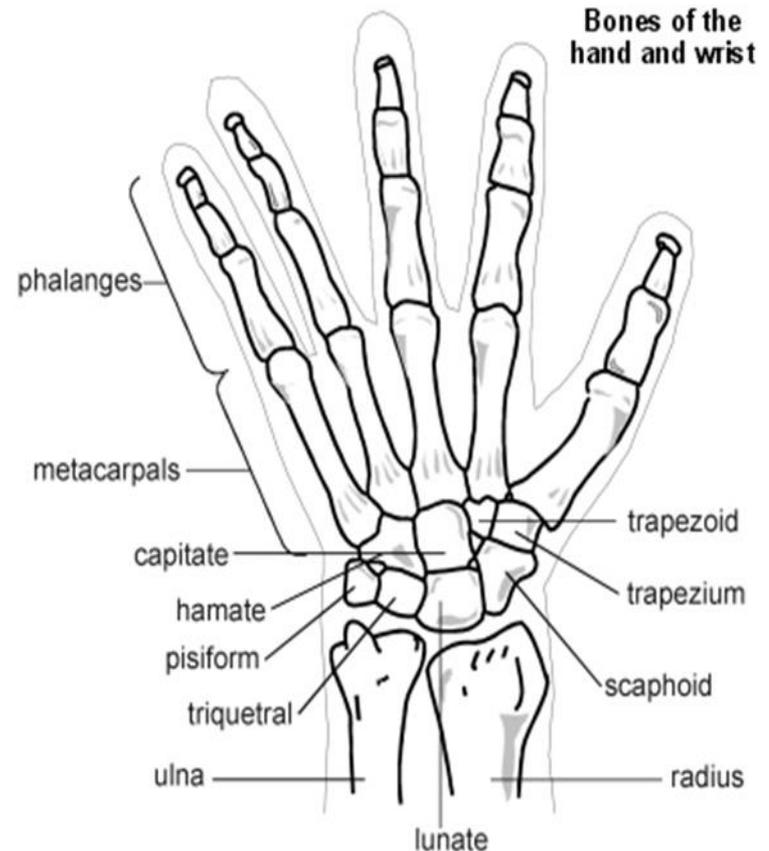
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Rigshospitalet**



AOT Advanced Principles Course

Anatomy

- Bones tightly linked by capsular and interosseus ligaments
- Capsular ligaments originate from distal radius onto the carpus
- Interosseus ligaments traverse the carpal bones
- The Lunate is the key to carpal stability



Epidemiology

- Metacarpal fractures 12 %
- Finger fractures 10 %
- Carpus 3%
 - 70 % Scaphoid
 - 14 % Triquetrum

[J Trauma](#). 2011 Oct 13. **Scaphoid Fracture Epidemiology**.

[Duckworth AD](#)¹, [Jenkins PJ](#), [Aitken SA](#), [Clement ND](#), [Court-Brown CM](#), [McQueen MM](#).

Charles M. Court-Brown *, Ben Caesar Epidemiology of adult fractures: A review. *Injury, Int. J. Care Injured* (2006) 37, 691—697

Mechanism of Injury



Diagnosis - Imaging

- Clinical findings
 - Swelling, tenderness (“Snuff Box”)
- Imaging
 - X-ray with scaphoid view
 - CT
 - MRI

Scaphoid Fractures

“Therapy of this fracture has been characterized by: confusion, impatience, invention, intervention, reaction, re-evaluation and frustration.”

Mazet & Hohl, JBJS, 45A, 1963

X-ray evaluation



CT



MR



- Routine?

Br J Radiol. 2012 Aug; 85(1016): 1098–1101.doi: [10.1259/bjr/73145885](https://doi.org/10.1259/bjr/73145885)

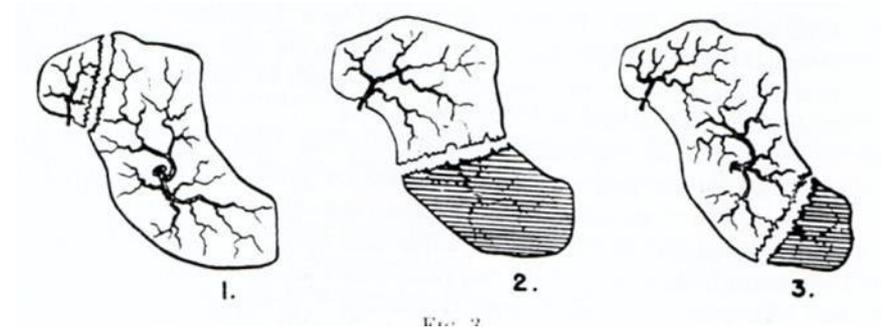
A.D. De Zwart et.al. "MRI as a reference standard for suspected scaphoid fractures"

Fowler C, Sullivan B, Williams LA, McCarthy G, Savage R, Palmer A. A comparison of bone scintigraphy and MRI in the early diagnosis of the occult scaphoid waist fracture. Skeletal Radiol 1998;27:683-687.

Breitenseher MJ, Metz VM, Gilula LA, Gaebler C, Kukla C, Fleischmann D, Imhof H, Trattig S. Radiographically occult scaphoid fractures: value of MR imaging in detection. Radiology 1997;203:245-250.

Scaphoid fracture - location

- Waist: 66-70%
- Distal Pole: 10-12%
- Tuberosity: 17-20%
- Proximal Pole: 5-7%



Management

- Clear injury and positive exam with normal x-rays
 - immobilize for 7-10 days (thumb spica best)
 - Repeat x-rays if patient still symptomatic
- If pain still present but x-ray continues to be normal
 - consider MRI early
 - recast and f/u at 3 weeks
- If acute diagnosis necessary
 - consider MRI or CT early

Non-operative Treatment

- Nondisplaced distal third fracture (6-8 weeks)
- Tuberosity fractures – symptomatic cast 2-4 weeks
- 80-90% of middle third fractures heal (8-12 weeks in a cast)
- Only 60-70% of proximal third fractures heal
 - of those that do, many have deformity
 - 10-12 weeks immobilization

Non-operative Treatment

- Long or short cast?
- Including thumb?

Short cast incl. thumb

Non-operative vs. Operative Treatment

- 25 pts with acute nondisplaced fracture of the scaphoid waist
- Randomized to either:
 - cast immobilization (14)
 - fixation with a percutaneous cannulated screw (11)
- Fracture union
 - screw fixation group 7 weeks
 - cast immobilization group 12 weeks ($p = 0.0003$)
 - Return to work
 - screw fixation 8 weeks
 - cast immobilization 15 weeks ($p = 0.0001$)
- no significant difference in ROM or grip strength at the 2 yr f/u

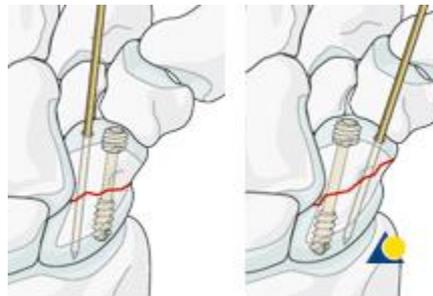
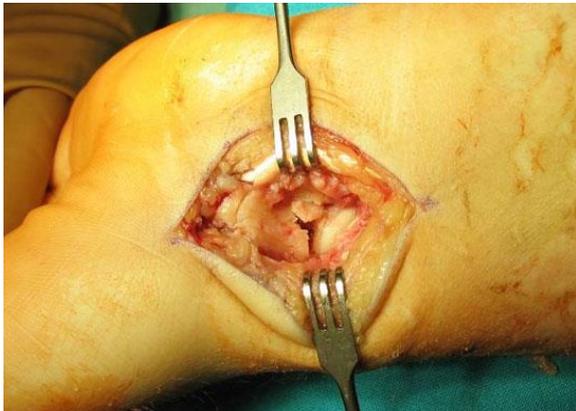
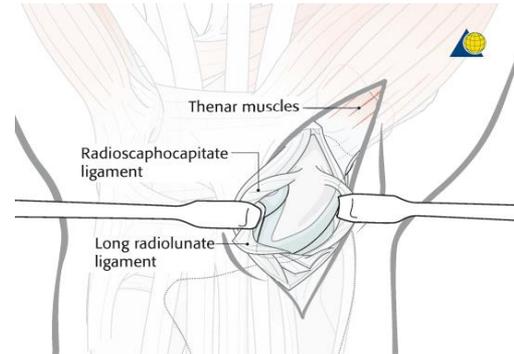
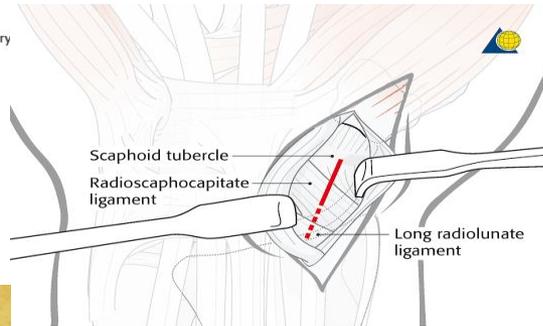
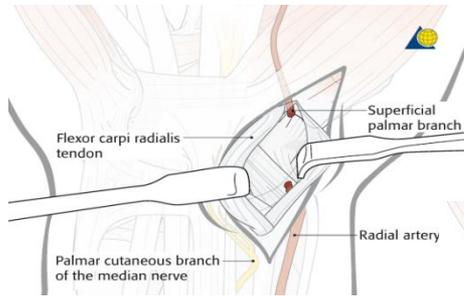
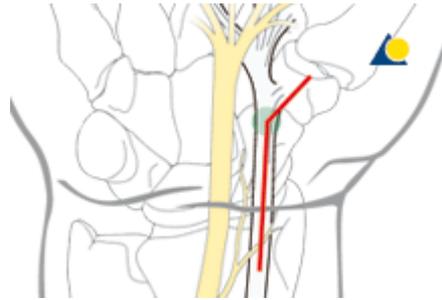
Bond, Shin, et al JBJS 2001

Operative Treatment

- Unstable Scaphoid Fractures
 - Displacement of > 1 mm
 - Radiolunate angle > 15 degrees
 - Scapholunate angle of > 60 degrees
 - “Humpback” deformity
 - intra-scaphoid angle >10 degrees
- Nonunion

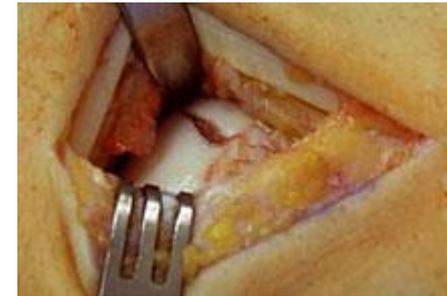
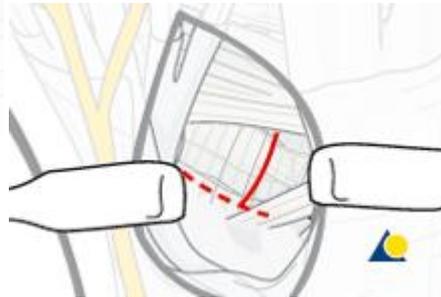
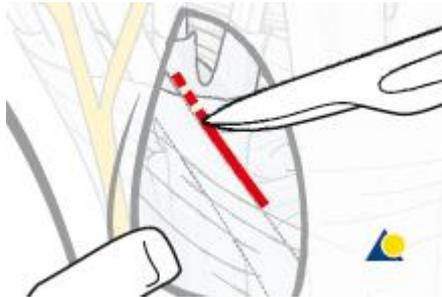
Surgical Technique - ORIF

Palmar approach



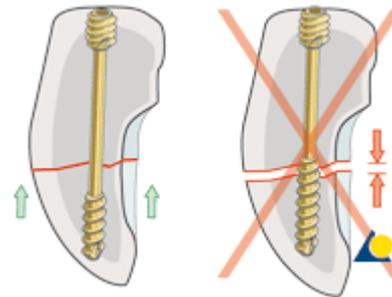
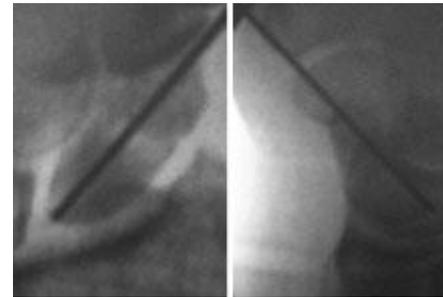
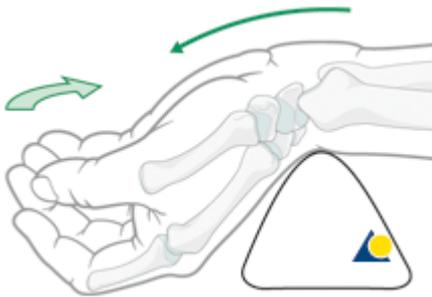
Surgical Technique - ORIF

Dorsal approach



Surgical Technique - Percutaneous

Cannulated screw, palmar approach



Surgical Technique - Percutaneous

Cannulated screw, dorsal approach



Percutaneous Internal Fixation of Scaphoid Fractures via an Arthroscopically Assisted Dorsal Approach

Joseph F. Slade III, MD; Andrew P. Gutow, MD; William B. Geissler, MD

J Bone Joint Surg Am, 2002 Nov; 84 (suppl 2): S21 -S36 . <http://dx.doi.org/>

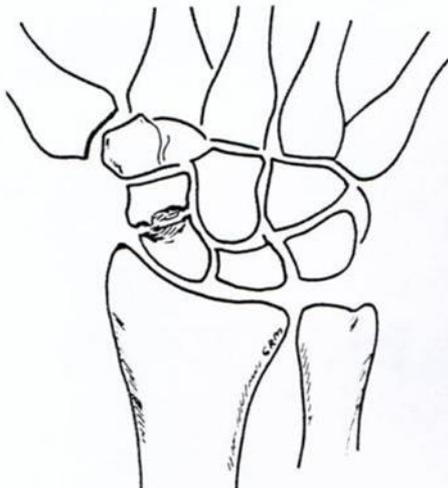
Percutaneous Screw Fixation for Scaphoid Fracture: A Comparison Between the Dorsal and the Volar Approaches

[In-Ho Jeon](#), MD, [Ivan D. Micic](#), MD, [Chang-Wug Oh](#), MD, [Byung-Chul Park](#), MD, [Poong-Taek Kim](#), MD

[The Journal of Hand Surgery Volume 34, Issue 2](#), February 2009, Pages 228–236.e1

Outcome, complications

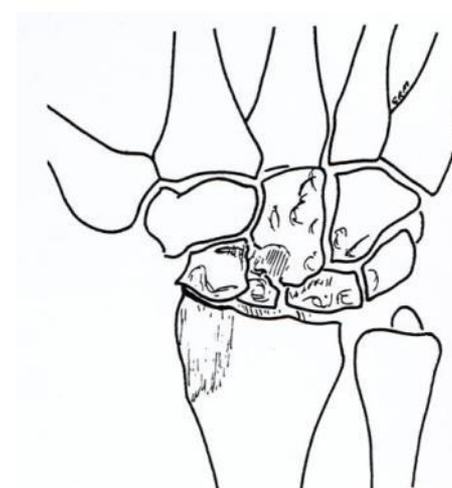
- AVN of proximal pole
- Nonunion
- Malunion
- Arthritis (SNAC) wrist



Type 1 – N/U < 10 y



Type 2 – 15 years



Type 3 – 25 years

Perilunate Injuries

- Often high energy
- Severe ligament injury
- X-ray may be obscure !!!
- Compression of median nerve

Perilunate Dislocation



Treatment

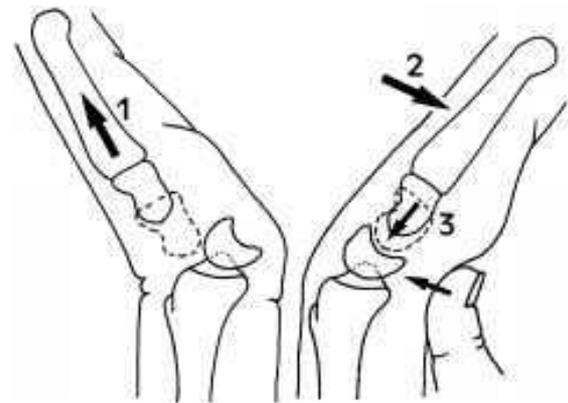
- Closed reduction (GA, PNB)
- Early surgical reconstruction if swelling allows.
- Immediate surgery needed if there are signs of median nerve compromise.
- Delayed reconstruction if early intervention is not necessary

Case



Closed Reduction - Technique

- Longitudinal traction for 5 -10 minutes
- For dorsal perilunate injuries: *apply dorsal directed pressure to the lunate volarly while a reduction maneuver is applied to the hand and distal carpal row*
- Palmar flexion then reduces the capitate into the concavity of the lunate.



Definitive Treatment

- Closed reduction and percutaneous pinning?

ORIF with volar and dorsal approaches

Procedure of Choice

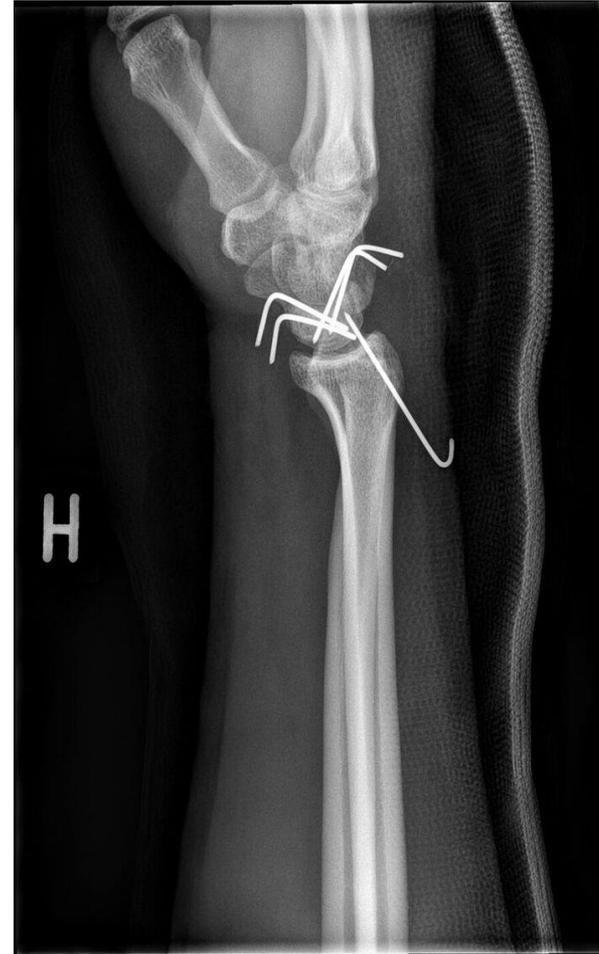
Hand N Y). 2012 Dec; 7(4): 380–387. Published online 2012 Oct 26. doi: [10.1007/s11552-012-9452-y](https://doi.org/10.1007/s11552-012-9452-y)

PMCID: PMC3508016

Treatment of dorsal perilunate dislocations and fracture–dislocations using a standardized protocol

[John T. Capo](#) et al.

Definitive Treatment



Definitive Treatment

- Often other injuries/fractures



Carpo-Metacarpal Injuries



Carpo-Metacarpal Injuries



Carpo-metacarpal Injuries



5. Metacarpal Base Fracture



5. Metacarpal Base Fractures

Unstable

“Reverse Bennett’s fracture”

If treated right they do well

Open/closed reduction, pinning

Management of Intra-Articular Metacarpal Base Fractures of the Second Through Fifth Metacarpals
Brandon D. Bushnell, et al. Journal of Hand Surgery. April 2008. Volume 33, Issue 4, Pages 573–583

5. Metacarpal base fracture



Take Home Messages

- Fractures of the carpus are common
- Fractures of the carpus are often overlooked
- If the clinical signs are more serious than the X-ray can explain – CT, MRI
- If untreated complications WILL occur
- Definitive surgery better left for the handsurgeon
- Treatment is (still) controversial in many ways

Thank You 😊



TAK

