

# MSK Case Conference

August 21, 2015

Anthony Tadros, R3

- 21 year old male presenting with wrist pain.

November 2013



Acute scaphoid  
waist fracture



November 2013



6 weeks later



No significant  
change

December 2013







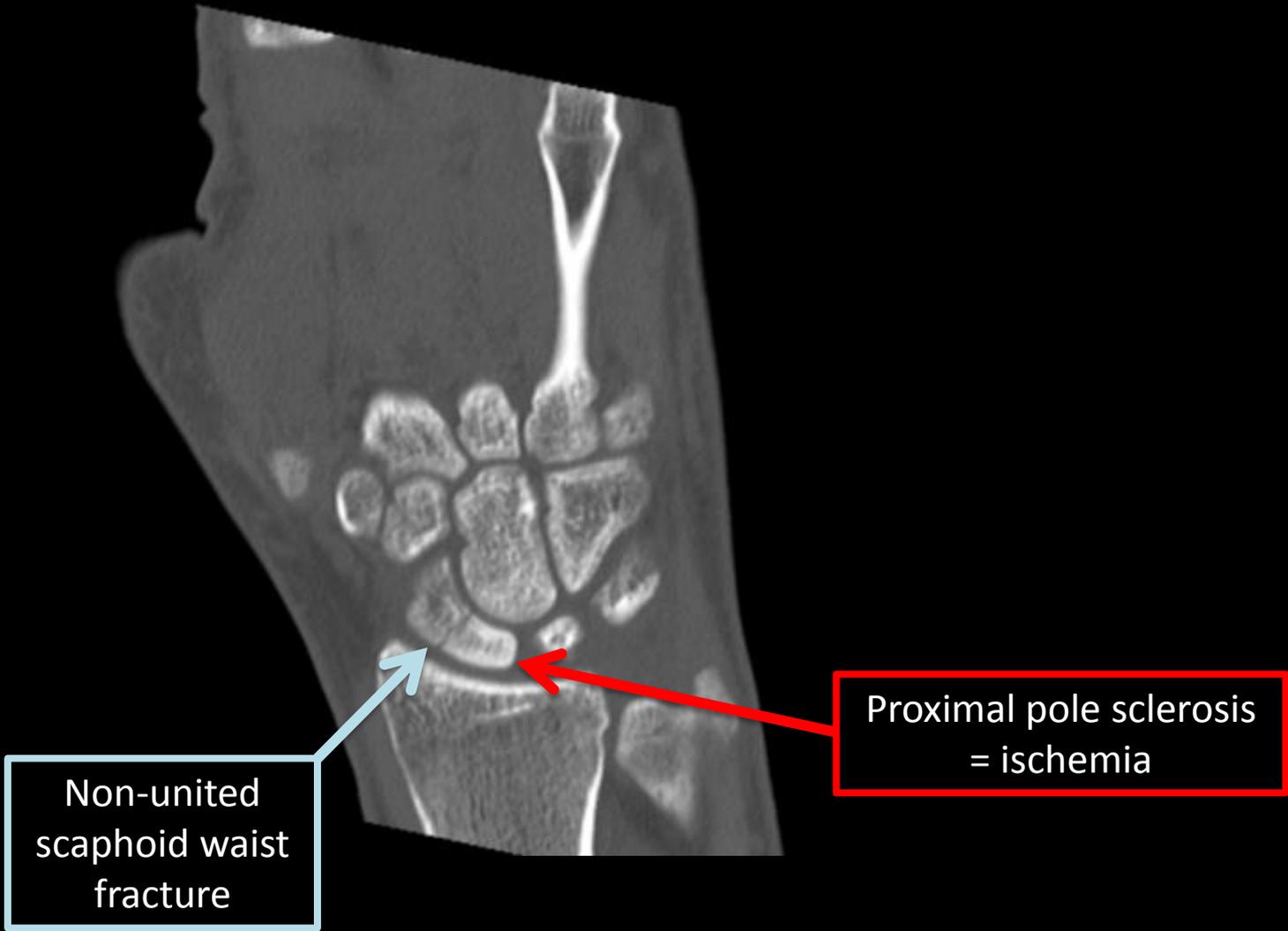












August 2015









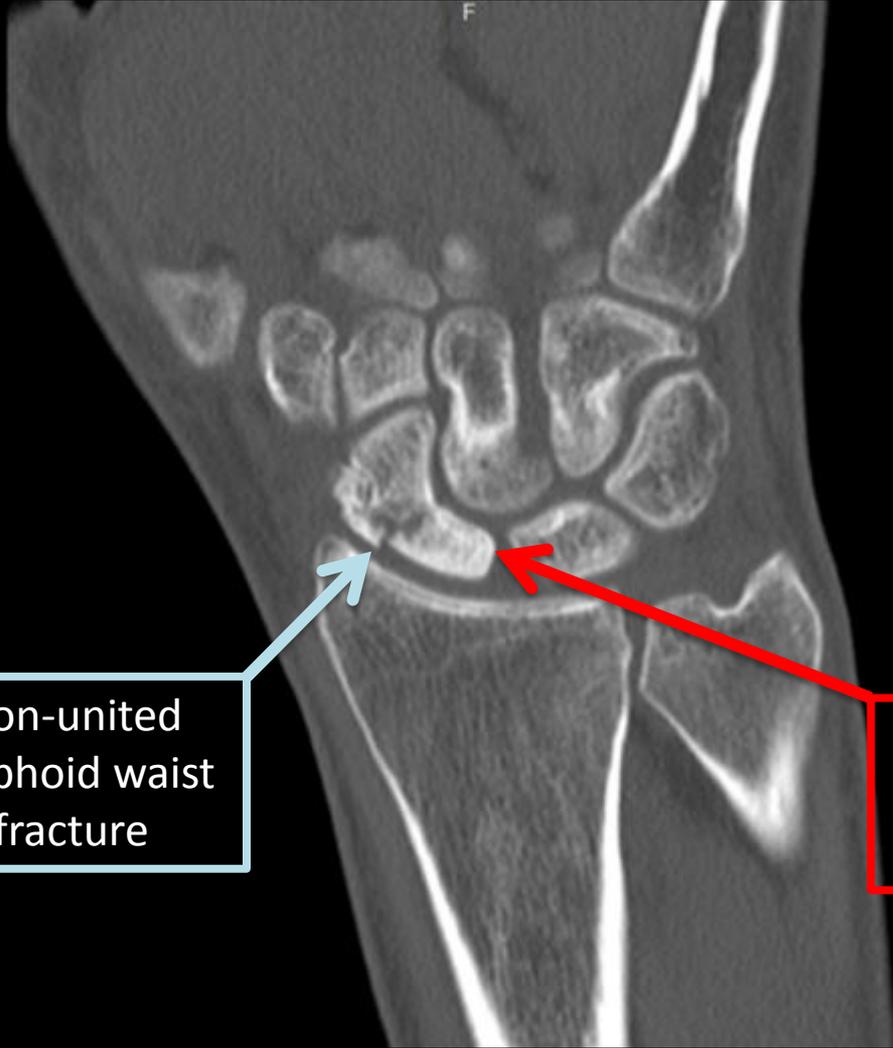












Non-united  
scaphoid waist  
fracture

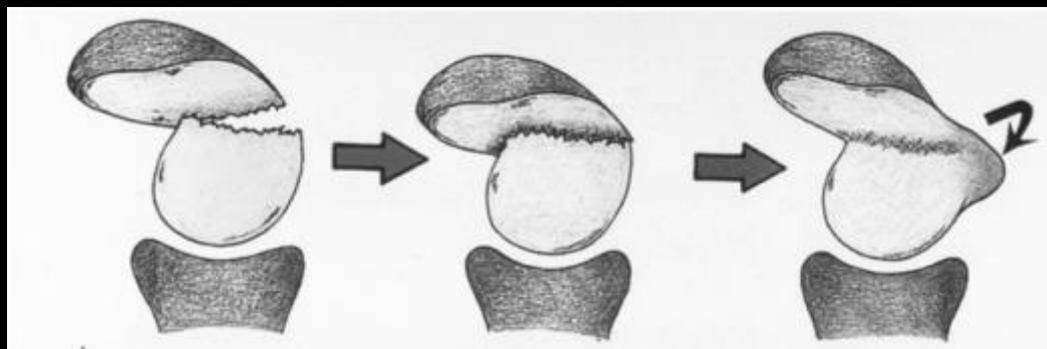
Progressed sclerosis  
and cystic changes  
= ischemia



Humpback-like deformity



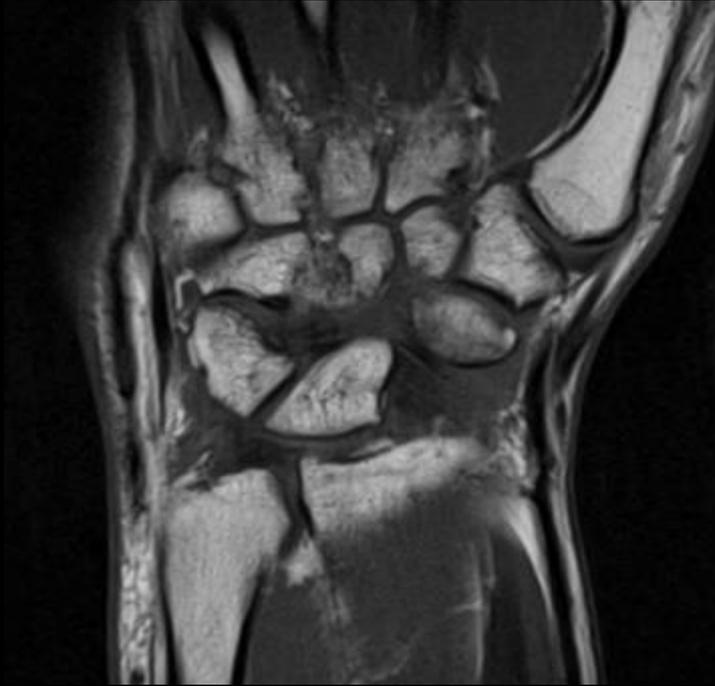
Dorsal intercalated segment instability



Dorsal tilting of the lunate



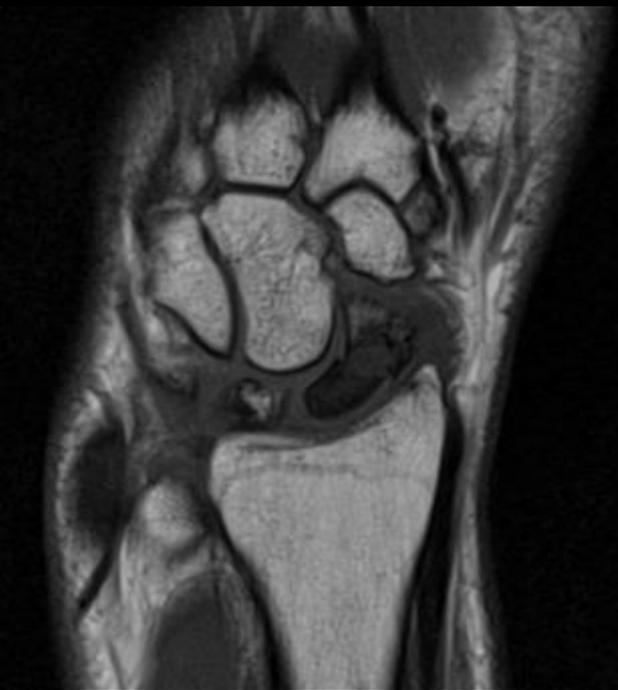
August 2015



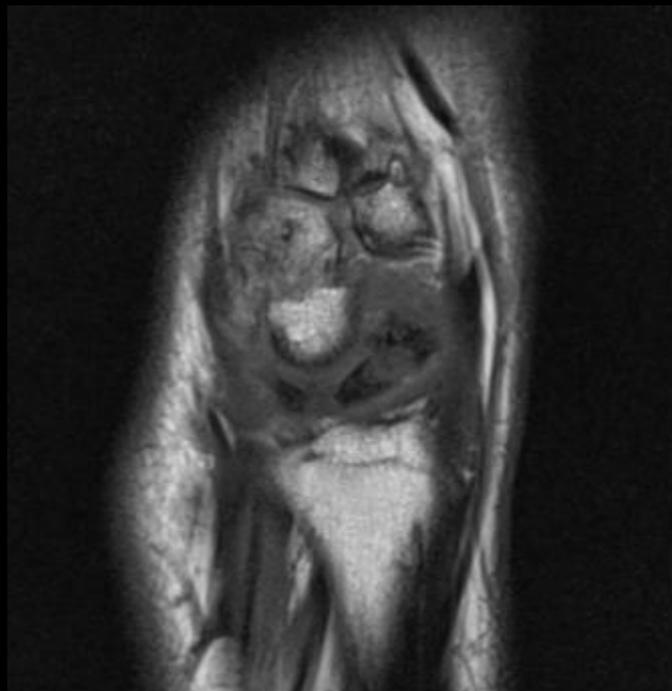






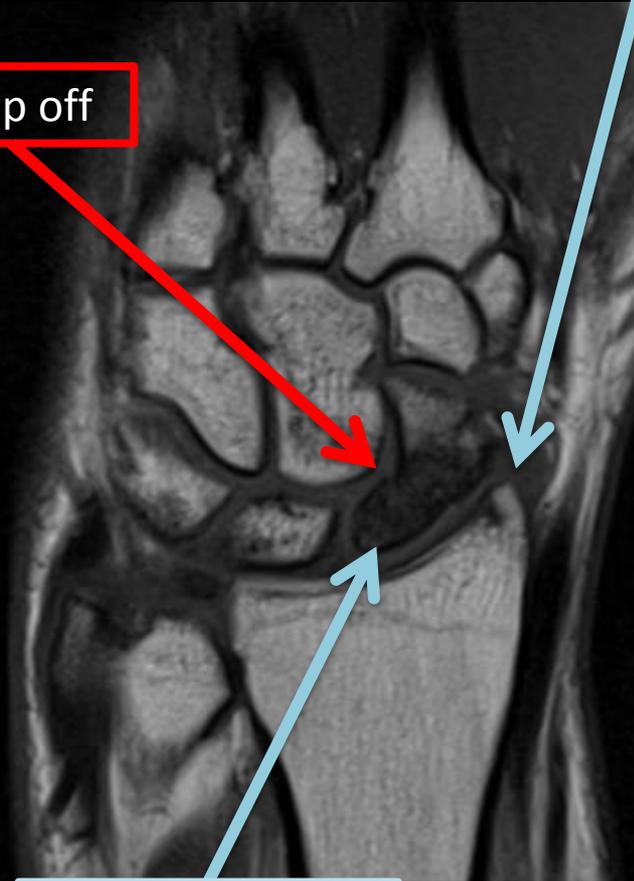




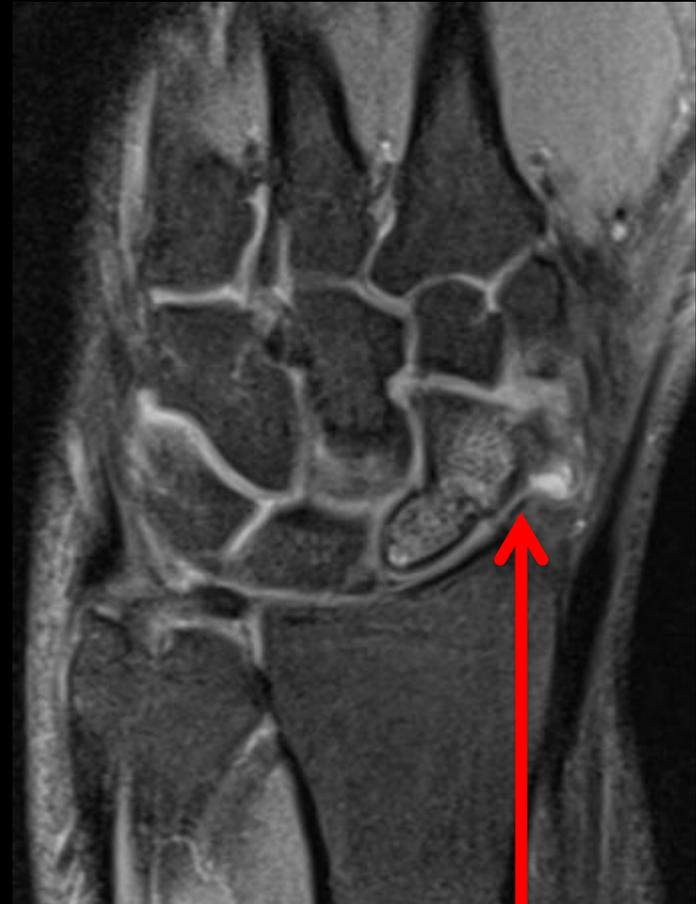


Radial styloid osseous proliferation

Cortical step off



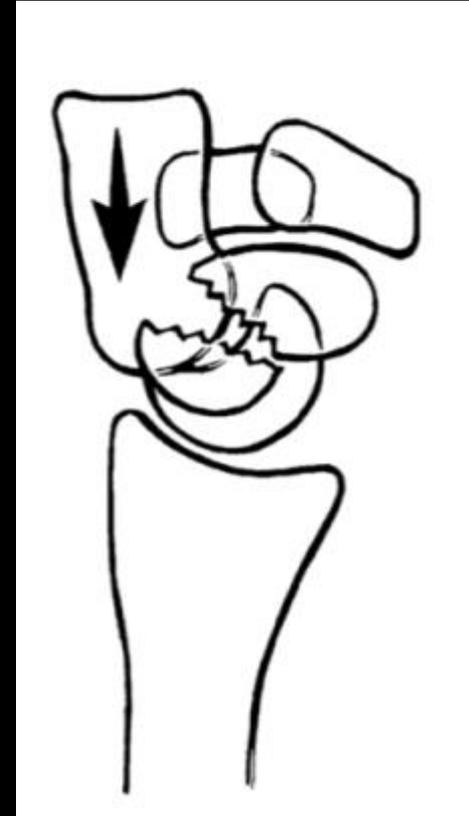
Proximal pole ischemia



Joint space arrowing and cartilage loss between radial styloid and distal pole of scaphoid

# Scaphoid Nonunion Advanced Collapse (SNAC)

- Failed union of scaphoid fracture
- Three stages of progressive arthrosis
- Dorsal intercalated segment instability (DISI) →

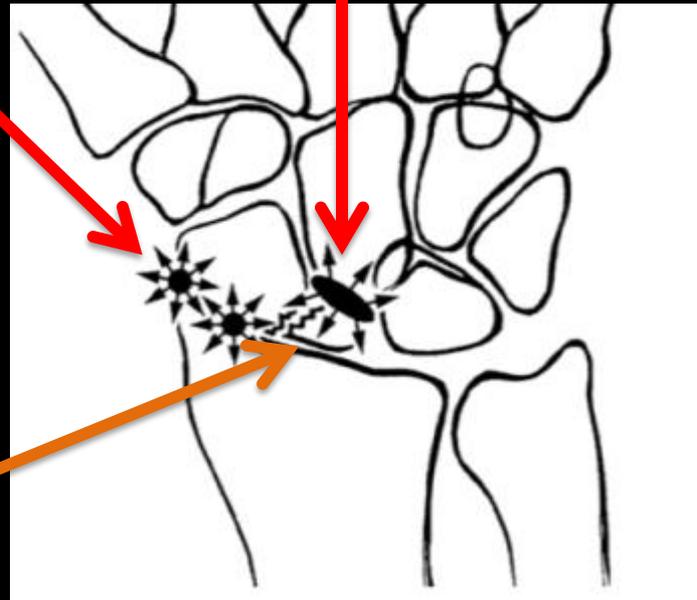


## Stages 3

- Midcarpal joint

## Stages 1 & 2

- Radioscaphoid joint
  - Distal scaphoid



## Spared

- Proximal scaphoid
- Distal radius

# SNAC versus SLAC

## Scaphoid nonunion advanced collapse (SNAC)

- Scaphoid fracture



## • Scapholunate advanced collapse (SLAC)

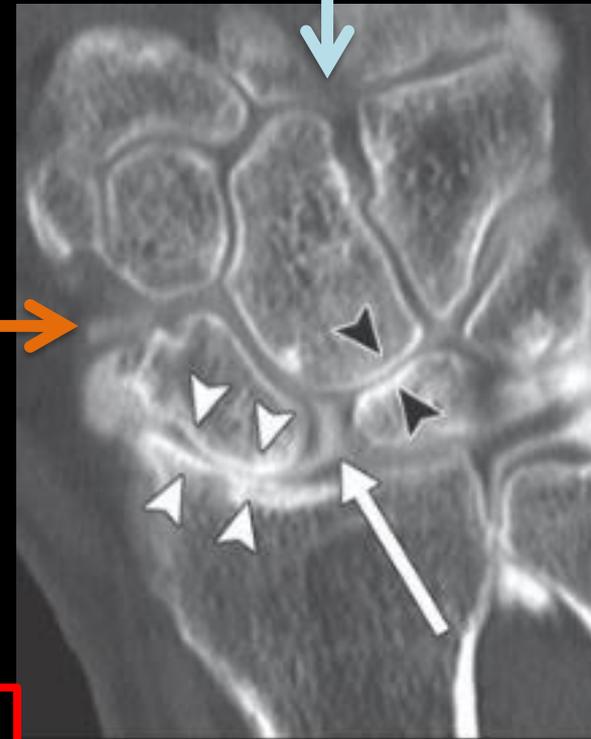
- Scapholunate ligament injury
- CPPD, RA, neuropathic disease, amyloid

## • Abnormal joint kinematics

- Lunate unrestrained by distal scaphoid

## • DISI - Degenerative arthritis

- Radioscaphoid
- Midcarpal



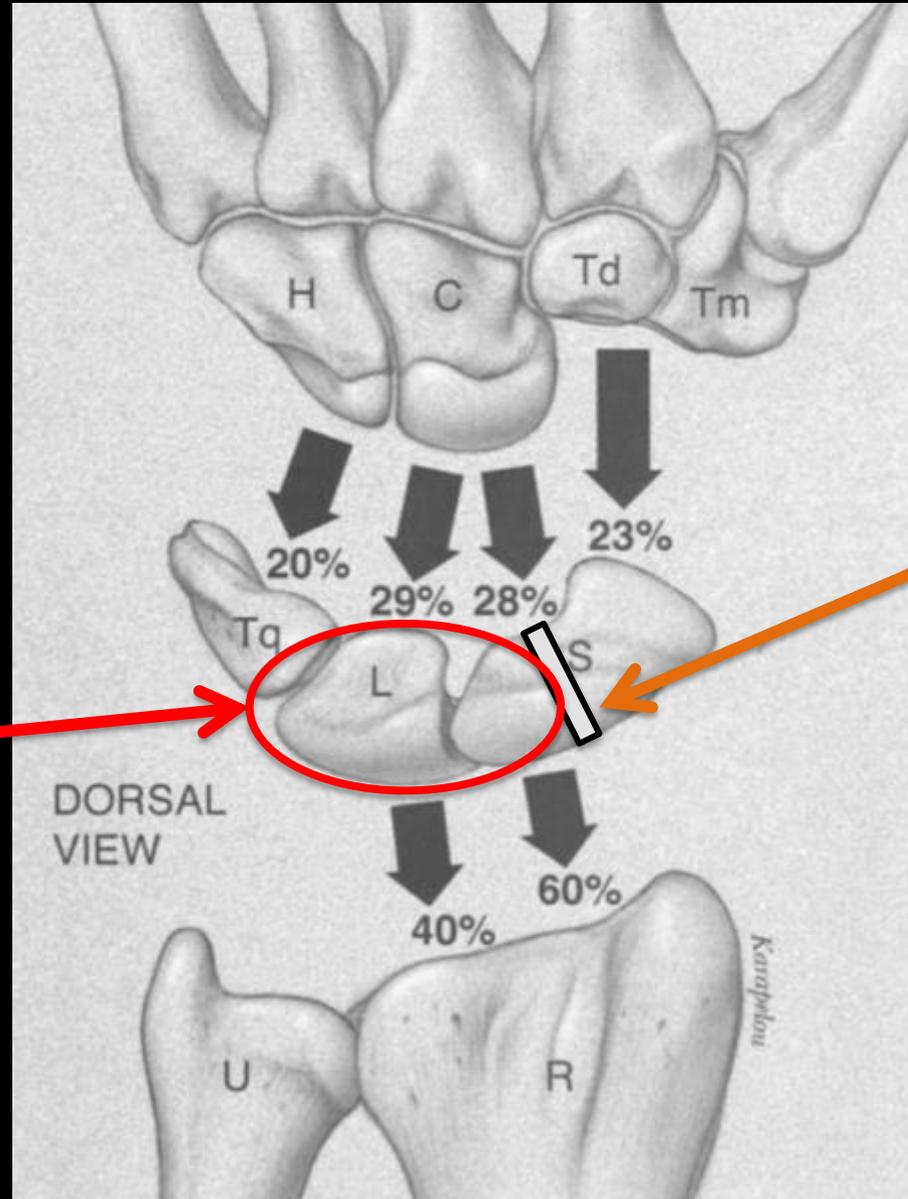
## Only Difference

- Sparing of proximal scaphoid-radius articulation

# SNAC versus SLAC

## Only Difference

- Unloaded proximal scaphoid pole
- Acts as extension of lunate through intact SL ligament



Scaphoid fracture

# SNAC Classification

J Hand Microsurg (January–June 2012) 4(1):12–15  
DOI 10.1007/s12593-012-0062-2

ORIGINAL ARTICLE

## Scaphoid Nonunion Advanced Collapse Classifications: A Reliability Study

Fernando Travaglini Penteadó •  
João Baptista Gomes dos Santos •  
Fábio Augusto Caporrino • Vinícius Ynoe de Moraes •  
João Carlos Belloti • Flávio Faloppa

- Two classifications – widespread use for treating SNAC
  - Watson & Ballet
  - Vender
- Evaluate intra and interobserver agreement between two classifications for SNAC

### Watson & Ballet (1984)

- 1 - Radial styloid – scaphoid
- 2 - Radioscaphoid fossa
- 3 - Midcarpal

### Vender (1987)

- 1 – Radioscaphoid fossa – distal scaphoid
- 2 – Proximal scaphoid fragment – capitate
- 3 – Midcarpal

# SNAC Classifications

- Forty-eight PA wrist XRs
  - Scaphoid nonunion
- Five observers
  - Hand surgeons/residents
  - Ortho surgeons/residents
- Unsatisfactory agreement:
- Cohen's Kappa < 0.5

## Conclusions

- Unsatisfactory agreement for both classifications
- No clear correlation between expertise and kappa values

## Treatment relevant

- Isolated radiocarpal
- Radiocarpal and midcarpal

Table 3  
Vender

Fatal Flaw

Kappa correlations for Watson & Ballet and Vender analysis



and Ballet

Vender et al.

T2

T1

T2

0.225

0.093

0.080

0.140

0.220

0.023

0.108

0.192

0.075

0.321

0.418

0.386

0.143

0.498

0.351

0.143

0.373

0.251

-0.039

0.020

0.098

0.405

0.376

0.292

-0.312

0.078

0.131

0.266

0.175

-0.014

M2 = Hand surgeon 2; R2M = a last-year

orthopedic surgeon; R20 = second-year

# SNAC Management

## Different stages and therapeutic options for scaphoid nonunion advanced collapse wrist

Stage	Severity of arthrosis	Therapy
I	Arthrosis between radial styloid and distal fragment of scaphoid	Resection radial styloid and scaphoid reconstruction with bone graft and a screw
II	Arthrosis distal fragment of scaphoid and scaphoid fossa	Four-corner fusion with scaphoid excision  Resection of proximal carpal row Lunocapitate fusion with scaphoid and triquetrum excision
III	Arthrosis midcarpal joint	Four-corner fusion with scaphoid excision Lunocapitate fusion with scaphoid and triquetrum excision



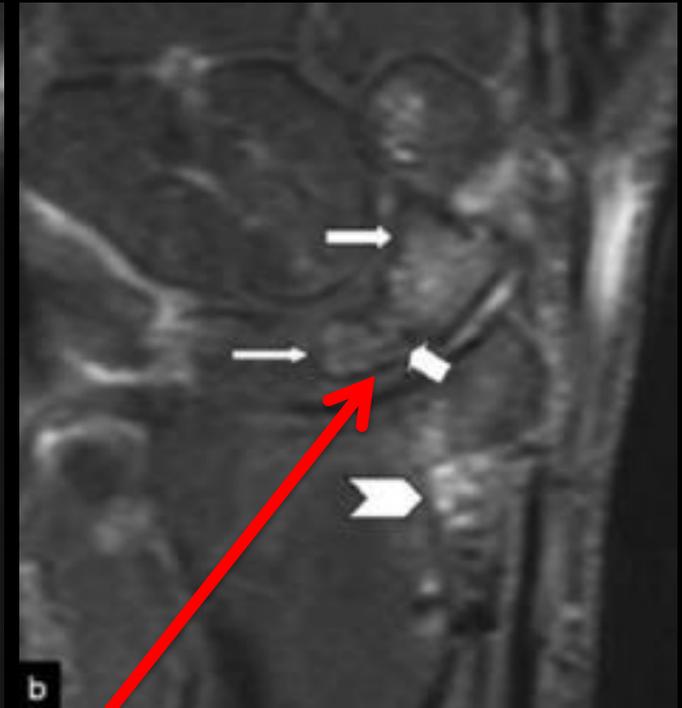
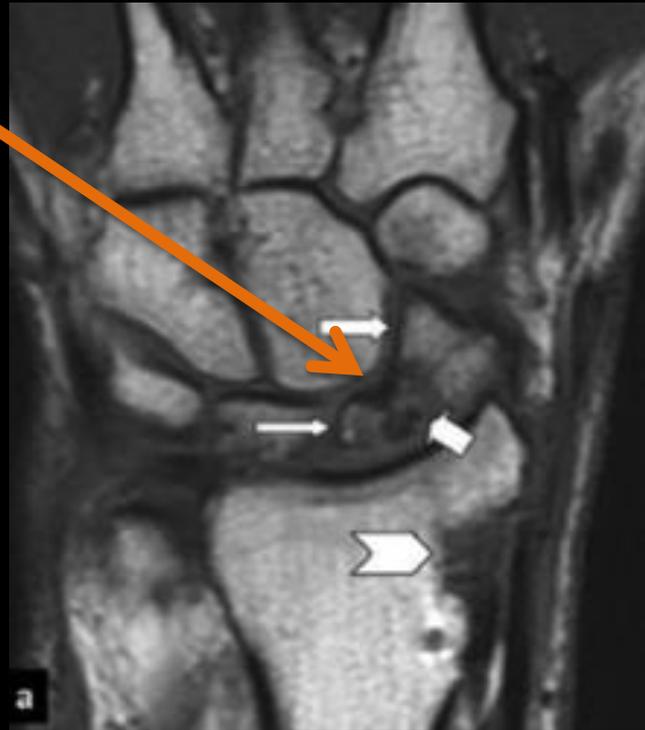
Sauerbier et al. Intercarpal fusion for scaphoid nonunion. *Atlas Hand Clin* 8 (2003) 163–183

I.A. Trail, A.N.M. Fleming (eds.), *Disorders of the Hand: Volume 2: Hand Reconstruction and Nerve Compression*, DOI 10.1007/978-1-4471-6560-6\_6

del Piñal F, Early experience with (dry) arthroscopic 4-corner arthrodesis: from a 4-hour operation to a tourniquet time. *J Hand Surg Am.* 2012;37:2389–2399.

# Scaphoid Nonunion Postoperative MRI

Low signal intensity graft



Diffuse enhancement  
• Normal healing

Normal marrow crossing union sites

