Scaphoid Fractures and Carpal Instability – Radiographic Measures - Moamen Salamah, Ziv Wasbrout, Shai Luria
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Objectives
• Scaphoid fractures with signs of associated carpal instability are considered unstable fractures with elevated risk of nonunion [1]
• Scaphoid fracture displacement - extension and supination of the proximal fragment, no motion of the distal fragment [2], differing from the rotatory instability of the scapholunate ligament (SLIL) injury
• How reliable are the radiographic measures of instability?
• Is wrist position a significant factor in this analysis?

Our hypothesis - there is a correlation between wrist position and the presence of signs of carpal instability.

Methods
Wrist radiographs – PA and lateral, examined
Patients with scaphoid fractures (under 6 weeks), SLIL injuries (no arthritis) and a control group (no pathology).

Measures of carpal instability –
scapholunate (SL), radioscaphoid (RS) and radiolunate (RL) angles on lateral views and cortical ring sign (CRS) on PA views [3].

An association was examined with measures of wrist position –
radiocapitate (RC) and radius-3rd metacarpal (R3M) angles on PA views and radiocapitate (RC) angle on lateral views.

Results
• We examined radiographs of 57 patients with fractures (31 waist fractures, 23 with SLIL injuries (6 static injuries) and 43 with no pathology.
• Measures of wrist instability differed between the three groups (graphs 1, 2). A complete ring sign was associated with a static SLIL injury (p = 0.025).
• SL angle differed between the healthy and the displaced body fracture and static SLIL injury groups (p<0.001).
• RS angle differed between the healthy and SLIL injury groups (p<0.001).
• In the study groups, wrist position was found to be in flexion (lateral view RC angle) and radial deviation (PA view R3M angle) in comparison with the healthy group (p<0.001 and p=0.18, respectively).
• A ring sign could be seen with wrist radial deviation (PA view RC and R3M angles) (p=0.003 and p=0.003, respectively) and wrist flexion (lateral view RC) (p=0.024), regardless study group. A complete CRS was specifically associated with wrist radial deviation (measured with the PA view RC angle) in comparison with absent or incomplete CRS (p=0.004). The RS angle was correlated with the lateral RC and PA R3M angles (R=0.5).

Conclusions
• Cortical ring sign, to differentiate pathology - significant if examining complete and incomplete rings; complete CRS associated with static SLIL injury.
• Wrist pathology - radiographs are taken when wrists are radially deviated and flexed – a position of reduced pain?
• Significant correlation between pathology, wrist position and signs of instability
• When utilizing different measures of carpal instability, the effect of wrist position must be considered.