

# Comparing Conservative and Surgical Treatment for Acute Non-Displaced Fractures of the Scaphoid Based on Fracture Location: A Systematic Review and Meta-Analysis

Samuel Dale Hawkins<sup>1</sup>, Yazan Esoid Al-Kharabsheh<sup>1</sup>, Jinpu Li, Emily Leary, Julia Vetter Nuelle, Daniel London

<sup>1</sup>Student

**INTRODUCTION:** The scaphoid is the most fractured bone of the wrist. Treatment of these fractures with either conservative or surgical methods involves shared decision making when fractures are non-displaced. Many studies and reviews have investigated differences in outcomes between surgical and conservative treatment. Scaphoid can break in several places; each has a different prognosis. To date, no meta-analysis has reported on differences in outcomes between different fracture locations. We aimed to report the risk of nonunion in minimally displaced scaphoid fractures when divided by both treatment type and fracture location.

**METHODS:** Meta-analyses were considered for the pooled proportion of those with scaphoid fracture nonunions, separately for those treated with either surgical or conservative approaches. To determine the pooled proportion, the variances of the raw proportions from each publication reviewed were stabilized using a Freeman-Tukey-type arcsine square root transformation and the pooled proportions were calculated as the back-transform of the weighted mean of the transformed proportions, using fixed or random effects models as appropriate. Heterogeneity between studies was tested using the Q test and corresponding prediction intervals (PI). Random effects models were chosen if the Q test was significant, otherwise, fixed effects models were applied.

**RESULTS:** We screened 2,033 potential articles and applied exclusion criteria. Final data analysis included 29 studies (9 randomized control trials and 20 retrospective cohort studies). The total proportion of nonunion in surgical patients was 0.02 with a PI 0.00-0.10 (Study heterogeneity 0%) and casting patients was 0.05 with a PI 0.01-0.21 (Study heterogeneity 44%). Proportion of nonunions in the surgical group divided by fracture class were: Proximal (0.11, PI 0.01-0.55), Medial (0.02, PI 0.01-0.55), Distal (0.0, PI 0.0-1.0). Prediction intervals of nonunions in the conservative treatment group were: Proximal (0.10, PI 0.04-0.25), Medial (0.06, PI 0.01-0.26), Distal (0.01, PI 0.0-0.12). Only seven distal fractures were treated surgically with zero of these progressing to nonunion.

**DISCUSSION AND CONCLUSION:** Selection of a treatment plan for scaphoid fracture should be an informed decision. Our data overall indicates that surgical treatment results in less nonunions than conservative treatment. This is especially true when observing medial fractures. Our review of data highlights a distinct lack of literature on scaphoid fractures of the distal pole. Many studies that include distal scaphoid fractures, do not specify the location when complications are listed. Results of this study can be used to inform shared decision making when selecting a treatment for a scaphoid fracture.

