

# Scaphoid Fracture Repair: Role of One Versus Two Screw Fixation in Contributing to Nonunion and Delayed Union

Crystal Y Jing<sup>1</sup>, John Mwangi<sup>2</sup>, Jessica Michelle Welch, Christopher Klifto, Tyler Steven Pidgeon, Warren C Hammert<sup>3</sup>

<sup>1</sup>School of Medicine, Duke University, <sup>2</sup>School of Medicine, <sup>3</sup>Duke University Medical Center

**INTRODUCTION:** Displaced scaphoid fractures warrant surgical fixation to mitigate the risk of nonunion or malunion. Biomechanic and clinical studies have shown better outcomes for patients who received double screw fixation, in terms of wrist range of motion and stability, while still maintaining adequate rates of union. We hypothesize that two screw fixation will result in higher rates of union in shorter time frames.

**METHODS:** This was a retrospective review of patients older than 18 years, who presented with scaphoid fracture and underwent surgical fixation from January 1, 2008, to December 31, 2022. Pre-operative data, including demographics, comorbidities, tobacco use, mechanism of injury, hand dominance and injured wrist, time to surgery, and previous scaphoid surgeries were collected. Operative data, including number of screws and complications, were extracted. Pre-operative and post-operative CT imaging, wrist motion measurements, and patient reported outcomes were collected. Continuous variables were compared between groups via t-test if parametric and Wilcoxon Rank-Sum or Fisher exact tests if non-parametric.

**RESULTS:** There were 34 patients included in this study, with 22 receiving one screw and 12 receiving two screws. Patients between the two groups had similar demographics, with no statistically significant difference in sex, ethnicity, prevalence of medical co-morbidities (diabetes, rheumatoid arthritis, thyroid disease), athlete status, labor job, and insurance status (Table 1). Characteristics of injury, such as presence of displacement, laterality, poly-trauma, chronicity of injury (acute versus subacute), mechanism of injury, and fracture type, were similar between patients who received one screw and two screws. The average time to union in months was similar between the two groups: 3.56 for one screw and 4.02 for two screws ( $p=0.646$ ). The average time to surgery in days was 28.00 for one screw and 86.17 for two screws ( $p=0.0559$ ). The age at treatment, time to union, length of occupational follow-up, and clinical follow-up time were similar between the two groups. Post-operative Patient-Reported Outcome Measures were similar between one screw and two screw patients. Post-operative range of motion scoring was similar between groups.

**DISCUSSION AND CONCLUSION:** In this study, we reject our null hypothesis as two screws were similar to one screw fixation. However, when two screws were used, they were used in a more delayed manner. Rates of healing and outcomes were similar between the two groups.

Demographics of One Screw versus Two Screws				
Variable (reference)	One Screw (N=22)	Two Screw (N=12)	p-value	
Sex (n (%))				
Male	20 (90.9)	11 (92.0)	1	
Female	2 (9.1)	1 (8.0)		
Ethnicity (n (%))				
White	18 (81.8)	8 (66.7)	0.615	
Black	3 (13.6)	4 (33.3)		
Asian	0	0		
Native American or Alaskan	0	0		
Native	0	0		
Native Hawaiian or Pacific Islander	0	0		
Other	1 (4.5)	0	0.724	
Medical Comorbidities (n (%))				
Diabetes	1 (4.5)	0	0.718	
Rheumatoid Arthritis	0	0		
Thyroid Disease	0	0		
Other	9 (40.9)	6 (50.0)		
Smoking Status (n(%))				
Current every day smoker	1 (4.5)	2 (16.7)	0.750	
Current occasional smoker	0 (0)	1 (8.3)		
Former smoker	3 (13.6)	0 (0)		
Never smoker	17 (77.3)	8 (66.7)		
Unknown	1 (4.5)	1 (8.3)	0.711	
Athlete (n (%))	15 (68.2)	7 (58.3)		
Labor Job (n (%))				
Yes	5 (22.7)	1 (8.3)	1	
No	15 (68.2)	10 (83.3)		
NR	2 (9.1)	1 (8.3)		
Workers Compensation				
	0	0	0.602	
Insurance Status (n (%))				
Private	17 (77.3)	10 (83.3)		
Government	1 (4.5)	0		
Veterans Affairs	1 (4.5)	0		
Unknown	3 (13.6)	2 (16.7)		

p-values computed using Fisher Exact Test or Welch Two-Sample T-test  
NR = not reported

p-values computed using Fisher Exact Test or Welch Two-Sample T-test

NR = not reported