

Distal Scaphoid Excision in Treatment of Symptomatic Scaphoid Non-Union: Systematic Review and Meta-Analysis



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Background

- Current treatment options for persistent scaphoid non-union are limited to salvage procedures such as proximal row carpectomy (PRC) or four-corner fusion (4CF).^{1,2}
- These salvage procedures are associated with complications including hardware failure or prominence with soft-tissue irritation, stiffness and worse functional outcomes.³
- Several studies have demonstrated that distal scaphoid excision may provide a simpler alternative with faster recovery.^{4,5}
- Benefits of this procedure as compared to traditional PRC and 4CF may include minimal morbidity, early return to preoperative activity, relief of pain and improved grip strength, functional score, and range of motion.
- Furthermore, distal scaphoid resection preserves the midcarpal joint and thus leaves PRC and 4CF as options for revision if needed.

Objective

- The purpose of this study was to determine the efficacy of distal scaphoid resection as a treatment option for symptomatic scaphoid non-union.

Materials and Methods

- The MEDLINE and PubMed databases were searched for the use of distal scaphoid excision in scaphoid non-unions
- Studies that were included reported on either the function or patient centered outcomes of distal scaphoid excision with greater than 6 months of follow-up.
- A total of 6 studies met all criteria and were included in the analysis.
- Primary functional outcomes reviewed included flexion-extension arc, radial- ulnar deviation and grip strength.
- Patient centered outcomes assessed included DASH, MMWS, and VAS.
- Radiographic findings analyzed included radiolunate angle, carpal height ratio and presence of degenerative joint disease other than styloscaploid.
- Other factors investigated included postoperative relief of pain, duration before return to work, patient reported satisfaction, and complications.

Table 1: Study Demographics

Study demographics	
Number of studies	6
Number of patients	70
Average number of patients per study	11.7
Average age, y	40.8
% Male	90
Duration of nonunion, y	11.2
Length of follow-up, y	6.5

Figure 1: Study Selection Process

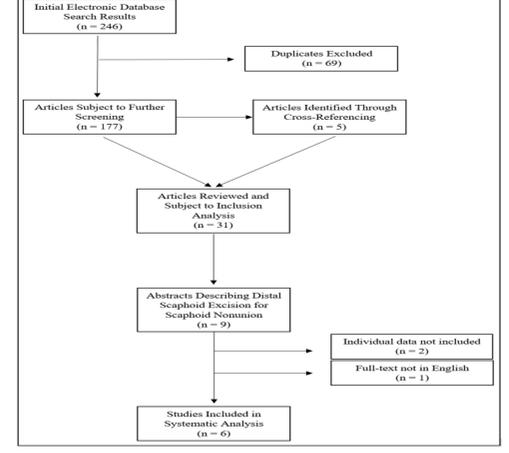


Table 2: Patient Reported Outcomes

	Postoperative	% Improvement	p value
MMWS	89.21 ± 8.04	92.6	<0.0001
DASH	25.33 ± 19.43	137.17	<0.0001
% Return to work	93.33 ± 25.23		<0.0001
Time to return to work (weeks)	6.89 ± 2.85		
VAS	0.708 ± 0.606	84.97	<0.0001
% Complete relief of pain	68.75 ± 46.84		
% Pain with strenuous activity	20.83 ± 41.04		
% Pain at rest	10.42 ± 30.87		
% Satisfaction	87.80 ± 33.13		<0.0001

Note. MMWS = Modified Mayo Wrist Score; DASH = Disabilities of the Arm Shoulder and Hand; VAS = visual analog scale

Results

Included Study Characteristics

Study demographics are included in Table 1. Ninety-six percent of patients included in the study population did not require subsequent salvage procedures within the follow-up periods. Functional and radiographic measures of outcome varied slightly between studies but included range of motion, grip strength and radiolunate angle. Patient derived outcomes included Modified Mayo Wrist Score (MMWS), Disability of the Arm, Shoulder, and Hand (DASH), the Visual Analog Scale (VAS) and return to work.

Functional Outcomes

Individual data from each study analyzed table is displayed in Figure 2. The average percentage improvement from preoperative measurements in flexion extension arc across all six studies was 98.95%. Two studies involving 10 patients assessed radial- ulnar deviation demonstrated an improvement of 37.97% from preoperative measurements. Five studies including 53 patients found a 131.08% improvement in grip strength

Complications

Two patients in the cohort analyzed went on to have further surgical intervention. One study reported that newly developed degenerative arthritis occurred at the proximal scapholunate-capitate articulation in one patient who had a type II lunate. The presence of midcarpal arthritis was noted by some articles investigated but was not indicated to effect long-term outcomes.

Conclusions

While there are a relatively small number of studies investigating distal scaphoid excision, this represents the first cumulative analysis of the available data. Overall, the conclusions drawn by each of the six studies reviewed were similar, and included favorable results and substantial improvement across all functional and patient centered outcomes. Thus, distal scaphoid excision should be considered as a less invasive treatment option that can significantly improve the quality of life of patients with symptomatic scaphoid non-unions.

In conclusion, our meta-analysis, would support the use of distal scaphoid excision, despite its limitations and low case numbers, for SNAC wrists as a simpler and less invasive alternative to other commonly utilized salvage procedures. Furthermore, it provides these benefits while preserving other salvage options of PRC, 4CF and wrist arthrodesis if necessary.

Future Directions

Future studies should look to compare distal scaphoid excision to PRC and 4CF in a randomized control trial. Additionally, future studies should examine the limitations of this procedure with regards to distal scaphoid fragment size.

Figure 2: Functional Outcomes

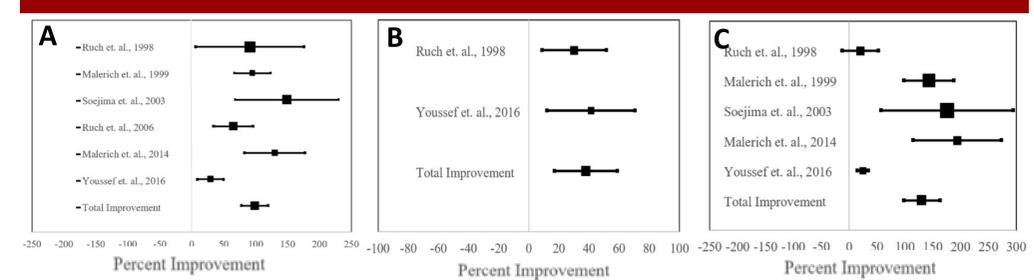


Figure 2: (A) Improvement in Flexion-Extension Arc. (B) Improvement in Radial-Ulnar Deviation. (C) Improvement in Grip Strength. All values are listed as percentage improvement from pre-operative measurements.

References

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