

Distal Scaphoid Resection for Degenerative Arthritis Secondary to Scaphoid Nonunion: A 20-Year Experience

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Purpose To evaluate the long-term results of distal scaphoid excision for degenerative arthritis secondary to scaphoid nonunion and compare them with our original results published in 1999.

Methods Nineteen patients who were treated by distal scaphoid resection arthroplasty from 1987 through 2010 were included. The mean follow-up was 15 years (range, 10–25 y) vs 4 years in the previous study. Clinical evaluation included measurement of the visual analog pain scale, wrist range of motion, and grip strength. Radiographs were taken at follow-up to assess for signs of arthritis and wrist collapse.

Results The outcomes of this procedure include increased grip strength and total arc of motion, a small decrease in revised carpal height ratio, and a small increase in radiolunate angle. Two patients failed distal scaphoid resection arthroplasty necessitating proximal row carpectomy (1) and wrist arthrodesis (1) for recalcitrant pain. More than half of the remaining patients developed midcarpal arthritis on radiographs that was asymptomatic. No patients developed radiolunate arthritis.

Conclusions This study showed that distal scaphoid resection arthroplasty produced favorable, long-term clinical results and did not result in noteworthy wrist collapse. Midcarpal arthritis, which may develop after the procedure, did not cause appreciable deterioration in patient outcomes. This procedure also did not eliminate the option of using additional, more conventional reconstructive procedures if needed. (*J Hand Surg Am.* 2014;39(9):1669–1676. Copyright © 2014 by the American Society for Surgery of the Hand. All rights reserved.)

Type of study/level of evidence Therapeutic IV.

Key words Arthroplasty, degenerative arthritis, scaphoid nonunion, scaphoid resection.

CHRONIC SCAPHOID NONUNION associated with scaphoid nonunion advanced collapse (SNAC) remains a clinical challenge. Patients report progressive activity-related pain with wrist motion and

loss of motion and weakness.^{1–4} Bone grafting of the scaphoid combined with radial styloid excision may be considered for stage I SNAC, but salvage procedures are often indicated for more advanced pathology.⁵

Proximal row carpectomy (PRC), scaphoid excision, and intercarpal 4-bone arthrodesis (4CA), and wrist arthrodesis are 3 well-studied techniques that reliably provide improvements in pain and activity tolerance for patients with SNAC.^{4,6–10} These salvage procedures, however, carry the risk of potential complications such as pin track infection, pseudarthrosis, hardware failure or prominence with soft-tissue irritation, and stiffness associated with prolonged immobilization.^{9,11} Additionally, both PRC and 4CA eliminate

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the midcarpal joint, and revision surgery would require a total wrist arthrodesis or arthroplasty.

Distal scaphoid resection arthroplasty represents a relatively simple procedure for patients with recalcitrant symptoms secondary to chronic scaphoid nonunion and post-traumatic arthritis. Since the first description of this technique, subsequent studies have confirmed its success as a treatment option.^{12–15} However, the durability of the technique has not been established because previous studies have been limited by a relatively short-term follow-up of 5 years or less. The purpose of this study was to evaluate the long-term clinical and radiographic outcomes of distal scaphoid resection arthroplasty over the course of a single surgeon's 25-year experience.

MATERIALS AND METHODS

Institutional review board approval was obtained before we identified 19 consecutive patients treated with distal scaphoid resection by a single surgeon between 1987 and 1996. The average age at the time of surgery was 40 years (age range, 22–60 y). The group comprised 18 men and 1 woman. The dominant wrist was injured in 5 patients. Seven injuries were work-related, and 7 patients were manual laborers. Prior to undergoing distal scaphoid resection 5 patients had a volar approach to a scaphoid waist nonunion with unsuccessful Russe bone grafting, and 2 of these 5 underwent subsequent radial styloidectomy for persistent nonunion and radioscaphoid arthritis producing pain. All preoperative radiographs demonstrated scaphoid nonunion. In the 14 patients who could recall a specific injury, the mean interval from injury to their distal scaphoid pole excision was 13 years (range, 2–32 y).

The indications for distal scaphoid resection were a painful chronic scaphoid waist nonunion with radial styloid-distal scaphoid arthritis with loss of wrist extension and radial deviation (Fig. 1). If the wrist had normal range of motion, an open reduction and internal fixation using distal radius bone graft was performed, and these patients were not included in the study. The loss of wrist motion occurs due to bony overgrowth of the distal pole of the scaphoid (Fig. 2). Seven of the initial cases had midcarpal arthritis, and because 3 of these had progressed radiographically in our 1999 series, we determined that pre-existing midcarpal arthritis should be a contraindication to distal scaphoid resection arthroplasty. Other contraindications included a torn scapholunate ligament and a dorsally subluxated midcarpal joint.

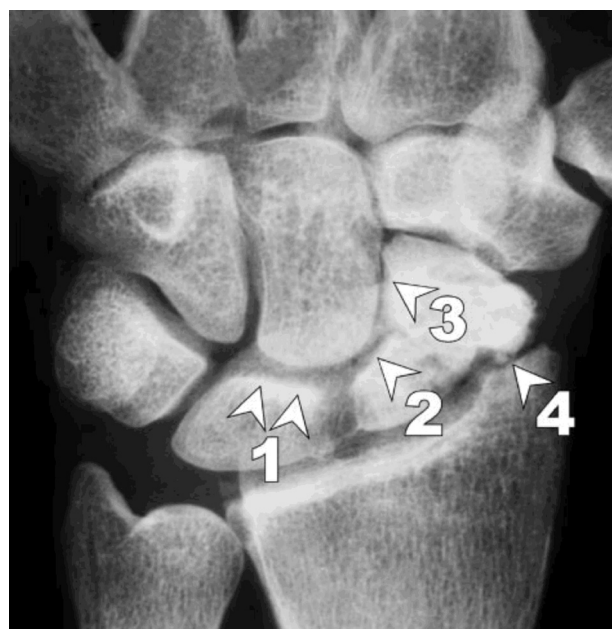


FIGURE 1: Preoperative x-ray illustrating this patient's (#9) scaphoid nonunion. The arrowheads denote the (1) capitulunate, proximal (2) and distal (3) scaphocapitate, and (4) styloscapoid articulations. There is joint space narrowing at the distal scaphocapitate and styloscapoid articulations. The flattening of the radial styloid was secondary to styloscapoid impingement from overgrowth of the distal scaphoid pole, not a styloidectomy. This flattening was a consistent finding.

The chief complaint was typically pain with wrist motion or activities that stressed the wrist, notable wrist stiffness, and an inability to perform activities that required a large range of wrist motion. All patients were unresponsive to nonsurgical treatment and not candidates for bone grafting because of post-traumatic arthritis and major loss of wrist motion.^{2,3}

The scaphoid nonunion was at the waist in all patients except 1 (patient #15) who had a proximal pole fracture. For this patient we divided the scaphoid at its waist to preserve concavity of the scaphoid-capitate joint (Fig. 3). The surgical technique, which has been reported in detail elsewhere¹⁶, was similar for each patient and is reviewed briefly here. A 5-cm dorsal oblique incision was made starting at the Lister tubercle and extending distally over the extensor pollicis longus tendon. The third dorsal compartment was released at the Lister tubercle, and the joint was entered directly beneath the extensor pollicis longus tendon. An elevator was inserted into the scapho-trapeziotrapezoidal articulation to lift the distal fragment in order to incise its soft-tissue attachments. In 1 patient (patient #1, two failed Russe bone grafts), a volar incision was made to release the volar ligamentous attachments that could not be detached through

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